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June 6, 2018

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

Dear Mr. Wruck:

Re: British Columbia Utilities Commission (BCUC or the Commission) Inquiry into the Regulation of Electric Vehicle (EV) Charging Service (the Inquiry) ~ Project No. 1598941

FortisBC Inc. (FBC) Responses to Information Requests (IR) No. 1

In accordance with Commission Order G-67-18 establishing the Regulatory Timetable for the above noted Inquiry, FBC respectfully submits the attached responses to IRs No. 1 on FBC's Written Evidence as follows:

- Responses to BCUC-FBC IR1
- Responses to BCOAPO-FBC IR1
- Responses to BCSEA-FBC IR1
- Responses to CEC-FBC IR1
- Responses to ChargePoint-FBC IR1
- Responses to Flintoff-FBC IR1
- Responses to VEVA-FBC IR1

If further information is required, please contact the undersigned.

Sincerely,

FORTISBC INC.

Original signed:

Diane Roy

Attachments

cc (email only): Registered Parties

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A. BASIS FOR EV CHARGING SERVICE REGULATION EXEMPTION

1.0 Reference: Exhibit C12-2, pp. 5, 15–16; Exhibit C19-2, pp. 7–8, 12

The British Columbia Utilities Commission (BCUC) Retail Markets Downstream of the Utility Meter Guidelines (RMDM), dated April 1997, p. 3

Degree of competition

On page 5 of Exhibit C12-2, FortisBC Inc. (FBC) states: "Based on the current state of the EV market and projections for the near future, FBC believes that investment by both utilities and government is required to encourage growth."

On page 8 of Exhibit C19-2, citing an article from the Center for Strategic and International Studies, British Columbia Ministry of Energy, Mines and Petroleum Resources (MEMPR) states:

> [The article] notes that establishing a profitable business model for EV charging infrastructure is challenging because of high upfront investment costs, low and uncertain near-term demand, and competition from home charging. The article notes that some see utilities "as the way to overcome all three of these challenges: utilities can address uncertainty by being told by regulators to install infrastructure (and at a pace directed by the regulator), can address the financing challenges by seeking ratebasing for the infrastructure, and can deploy in the immediate term if directed to do so by public utility commissions. In short, the market challenges faced by third-party EV charging vendors evaporate when the utility is the one doing the installing." Disadvantages of public utility involvement include the potential risk to ratepayers and the potential for stifled competition.

On page 7 of Exhibit C19-2, MEMPR states: "For Level 3 charging stations, there are barriers to entry, which suggests that utilities have an opportunity to play an important role in developing this market."

Further, on page 12, MEMPR states that it "supports a role for public utilities in "kick-starting" the market for EV charging services. A role for public utilities would not preclude other entities from also investing in EV charging services."

In the BCUC's Retail Markets Downstream of the Utility Meter Guidelines, dated April 1997 (RMDM Guidelines)[1], on page 3, it states:

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[1] http://www.bcuc.com/Documents/Guidelines/RMDMGuidelns.pdf

> In general, the total range of goods and services potentially provided by energy utilities can be categorized as belonging to one of three areas… These areas are: goods and services which still clearly are defined as core monopoly products (e.g., wires and pipes), competitive products which could best be produced by a variety of players operating within a competitive market (e.g., appliance sales), and debatable/transitional products, i.e., those which are associated with the monopoly core and which may or may not be considered true monopoly activities depending on one's assessment at any given time (e.g., billing/meter information). For example, **these products might be provided by the utility as they emerge, later be produced by a mix of utility and unregulated providers as the market grows and eventually be provided solely by the competitive market when the market is mature (e.g., natural gas vehicle conversions).** Core monopoly products result primarily from economies of scale or scope and are expected to decrease as a result of advances in technology reducing these economies, competitors' demands for access to the market for these products, customers' demands for more choice and the success of deregulation elsewhere. *[Emphasis added]*

1.1 Does FBC have a position on the extent to which utilities should be encouraged to take a lead on installing EV infrastructure (Level 2 and direct current fast charging [DCFC]) as a means of scaling up significant expansion of public EV charging infrastructure in BC? Please explain whether FBC considers that public utility involvement in BC could stifle competition in the EV charging marketplace.

Response:

FBC believes that public utilities have an important role to play in establishing adequate and reliable EV Charging infrastructure in BC, particularly as the adoption of electric vehicles is accelerating. In this context, utilities should be encouraged to take a lead role in deployment of infrastructure to facilitate electrification of the transportation sector. A successful transition to the adoption of electric vehicles will support important public policy objectives, such as the reduction of GHG emissions in the transportation sector and deployment of clean fuels through electrification. As such, FBC believes public utilities should be both permitted and encouraged to own and operate EV charging infrastructure.

In the course of the Inquiry the Commission has heard about numerous competing considerations affecting public charging infrastructure. These include issues in the following areas:

- public charging stations not being convenient or available;
- public charging stations being out of service, in some cases for protracted periods of time;

- stations in certain corridors being backed up, with several vehicles waiting to charge, leading to long wait times; and
- incompatibility between charging station infrastructure and a particular vehicle's charging system (among other technical issues).

These are all issues that utility involvement in charging station deployment could help to mitigate. The preamble to the question identifies several unique elements to the EV Charging marketplace, including the expectation that much EV charging will continue to be done in non-public settings such as at home or the workplace, and that the technology in electric vehicles (e.g. battery capacity and charging capabilities) and in the vehicle charging equipment, is changing rapidly. FBC believes that these issues should not be ignored in the discussions pertaining to the competitive nature of the EV charging marketplace. EV charging service is not a single uniform product, nor are the customers uniform in their needs for service. EV charging service has various combinations and permutations based on the following parameters – (1) public vs non-public, (2) service provider – home owner or business (under an existing utility account), municipality, public utility, other government and non-government organizations, (3) type of charging service - Levels 1, 2 and 3 (AC and DC) – and expected future higher level charging technologies, (4) equipment / network services provider, and (5) vehicle specifications and charging capabilities. As suggested above, EV adoption and EV charging service are also caught up in numerous public policy initiatives (from several levels of government), typically aimed at combatting climate change, reducing greenhouse gas emissions or promoting renewable energy technologies.

FBC believes that public utility involvement in EV Charging in BC will not stifle competition, particularly with Commission oversight of utilities. Please also refer to the response to BCUC-FBC IR 1.1.2 for further discussion in this regard.

1.1.1 In light of the RMDM Guidelines, does FBC have a position on whether utility involvement in the EV charging service market should change as the market matures?

Response:

FBC considers that it may be appropriate to change the nature of utility involvement as the market matures. However, the particular qualities of what might constitute a mature market and how long it will take to reach that state are difficult to predict at this point.

Utilities will, at a minimum, be participating in the provision of electricity service to EV charging facilities, including providing the electrical energy and capacity, the interconnection equipment and any system upgrades that may be necessary to service the EV charging station, as well as billing and customer service functions regardless of station ownership. If the utility's involvement in the actual vehicle charging activity was to be reduced over time, the utility would continue to have a significant interest in the ongoing provision of reliable electricity service to third party-owned EV charging stations.

1.1.1.1 If so, please explain and provide any key indicators that FBC considers would demonstrate market maturity. For example, should this be the number of EVs fleet in BC, number of EV charging stations/ports per EV, distance measured between public EV charging stations, or some other measures?

Response:

FBC believes that indicators of market maturity will have to be developed as the market unfolds and becomes competitive. One indicator for a mature and competitive marketplace is when third-party owners/providers of EV charging services enter and remain in the marketplace. This in turn will depend on three main factors:

1. Cost: This includes financing and operating costs of stations including the electricity;
2. Demand: Utilization of the public charging stations; and
3. Price: The amount customers are willing to pay.

In today's context of growing EV adoption and an emerging EV charging service market, there are financial barriers to entities entering the market due to demand being low and therefore the profitability of charging infrastructure is challenged, although the current subsidies and incentives from governments and other agencies are helping to fill the gap. FBC believes that in this market (the development of which is serving important public policy objectives), where there are many variables that are still unknown, the focus should be to promote the development of the EV charging market by keeping prices reasonable and ensuring that, in areas under the purview of the Commission, there are no significant barriers to owning and operating EVs. FBC suggests that the BCUC consider a review in 5-10 years to identify whether the EV charging market has matured and can be considered competitive, at which time the Commission could re-evaluate the regulation of EV charging station services.

FBC believes the main concern of the Inquiry pertains to public EV charging facilities, in contrast to EV charging that is done at home or another location (such as the workplace) that is not publicly available. Compiling information on how EV adoption is progressing in BC regarding the growth in the numbers and types of stations, as well as their geographic distribution, along the lines of the measures suggested in the question, would be useful in the review process.

1.1.2 Is FBC aware of any jurisdiction where the unregulated providers and/or private third-party investors are leading the EV charging market? Please discuss the stage of growth of the EV market in such jurisdiction, the policy environment, and the regulatory environment.

Response:

FBC is aware of some unregulated and/or private third-party investors who have undertaken significant initiatives to help facilitate the deployment of EV charging stations in North America. These investors include a mix of car manufacturers like Tesla and other private entities like FLO or AddEnergie, General Electric, ChargePoint, eCAMION, who are leading the EV charging market. However, the level of investments by these private entities is different for different levels of charging stations i.e. Level 1, Level 2 and DCFCs. The funding for some of these projects in Canada is provided by Natural Resources Canada through the Energy innovation Programs and by participating municipalities and electric utilities. FBC believes that in an emerging EV market, both public utilities and non-regulated entities need to participate and that any concerns can be mitigated through appropriate oversight by the Commission, such as through the establishment of guiding principles that would allow utilities to support the development of EV markets in BC.

Concerning the policy and regulatory environment, FBC researched a few other jurisdictions in North America other than BC, like California and Oregon. In its research, FBC found that the EV market in these jurisdictions is underpinned by a supportive policy environment, wherein the state government has adopted policies to support the use of clean and renewable energy sources and to reduce the greenhouse gas emissions. The EV market in these jurisdictions is at a different stage of growth, California being the leader in terms of developing the market and at the most advanced stage in terms of setting the framework for the regulatory environment.

As discussed in response to Question 3 in FBC's Evidence, the CPUC initially expressed concern (in 2010-2011) with regard to utility ownership of EV charging infrastructure and utilities

providing EV charging services. However, in its December 2014 decision (D.14-12-079)[2], the CPUC overturned the broad prohibition against utility EV infrastructure ownership.

Similarly, in Oregon the Utilities Commission authorized[3] Portland General Electric Company (PGE) to undertake three pilot programs designed to accelerate transportation electrification.

1.1.3 In FBC's view, under what market conditions would private third-party investment be more appropriate than public utility investments in the EV charging service market?

Response:

FBC believes that the private third-party investment in EV charging stations will become more appropriate than public utility investments when the market for EV charging service becomes mature and competitive. The willingness of non-regulated parties to invest in particular types of EV charging stations will provide a signal that a particular sector is becoming more competitive. As discussed in response to Question 1 of FBC's Evidence (Exhibit C12-2, pages 11 to 13), the emerging EV market is currently not competitive and requires involvement by governments, utilities, businesses, municipalities and other third party entities to increase the adoption of EVs and to grow the necessary infrastructure (i.e. EV charging stations) in the province. Given the important policy objectives to be achieved by increasing EV adoption, FBC believes that government incentives, and involvement by government, utilities, and other entities are important to further develop this emerging market until it becomes more mature and competitive.

1.2 Does FBC consider that the commencement, continuation, or proliferation of regulated utilities like FBC or the British Columbia Hydro and Power Authority (BC Hydro) in the EV charging service to be a barrier for other third-party service providers to enter this market? Please explain why or why not.

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[2] Page 7 of CPUC Decision D.14-12-079 issued on December 22, 2014. Follow the link: http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M143/K682/143682372.PDF

[3] Public Utility Commission of Oregon approval Decision 18-054. Follow the link: http://apps.puc.state.or.us/orders/2018ords/18-054.pdf

Response:

No, FBC does not believe participation by regulated utilities in the provision of EV charging service will be a barrier for third party service providers to enter this market.

As discussed in FBC's Evidence (Exhibit C 12-2) and response to BCUC-FBC IR 1.1.3, the current EV charging marketplace is emerging, complex and multi-faceted and cannot be considered a competitive marketplace. At this time, FBC believes that the main barrier to third-party entry and subsequent participation in the EV charging market is profitability, which in turn depends on substantial EV adoption and higher utilization rates of charging stations. FBC believes that without substantial EV adoption, it is unlikely third parties will enter the marketplace. A competitive market requires lots of buyers and many participants. Charging stations owned and operated by utilities will help to increase the demand from EV drivers, and will accelerate EV adoption and as a result foster third-party provider participation as EV adoption grows.

1.2.1 What are the incentives for other third-party service providers to enter this market if it is/will be dominated by regulated utilities with a large customer base to spread its costs over.

Response:

FBC will install EV stations only where there is a clear need, either because a charging station is required to extend the charging network, or where there are insufficient stations to meet the demand.

Please refer to the response to BCUC-FBC IR 1.1.1 which notes that the emerging EV market is not mature and competitive at this time. FBC believes that until such time, utilities have a critical role to play in supporting the growth of the EV market by facilitating the deployment of EV Charging Infrastructure to meet BC's climate action goals in reducing GHG emissions. In an emerging EV market, there is room for both public utilities and non-regulated entities to participate and that any concerns can be mitigated through appropriate oversight by the Commission. As discussed in the response to BCUC-FBC IR 1.1.1, FBC suggests the Commission consider a review in a period of 5-10 years to re-evaluate regulation and profitability of third party service providers.

1.3 Please discuss whether the RMDM Guidelines which govern activities of regulated utilities wishing to enter into a market that is after the customer's meter would apply in the case of EV charging service. Why or why not?

Response:

FBC believes, for the following reasons that the RMDM guidelines do not apply at this time to EV charging service.

- The UCA definition of a public utility clearly includes EV charging service as public utility activity;
- The markets for EV charging service are not currently competitive; and
- EV charging service can be provided by a utility in a manner that is not downstream of any customer meter.

Each of these issues support that public utilities' involvement in EV charging service is appropriate and that the RMDM guidelines do not currently apply to this service when provided by utilities.

The question preamble makes note of the fact that core monopoly products result primarily from economies of scale or scope. EV charging service offered by a utility can be characterized as either an economy of scale or an economy of scope. The fact that EV charging service is a somewhat different offering than other electric utility service makes it an economy of scope and the fact the EV charging has the potential to create more electricity sales and make more efficient use of the grid makes EV charging an economy of scale. These considerations provide further support for public utilities providing EV charging service as a product or service offering and imposing constraints on the service, such as those from the RMDM guidelines would not be appropriate.

If circumstances change in the future and an adequately competitive market is found to exist for various aspects of EV charging service, FBC believes it would be appropriate to revisit the applicability of the RMDM Guidelines to public utility participation in EV charging at that time. For further discussion on the current lack of a competitive marketplace for public EV charging service please refer to the responses to BCUC-FBC IRs 1.1.1.1 and 1.1.3.

1.4 In a competitive market, there are low barriers to enter and exit. Please discuss the potential issues, if any, should EV charging service providers freely exit the market at any time.

Response:

Consistent with FBC's view that there is not a competitive market with respect to EV charging service in BC, the Company does not believe that the barriers are low for entry to and exit from the EV charging service market, particularly in regard to DCFC service. The primary reasons are that it will take some time to recover the costs associated with providing the service and usage rates are currently unknown. EV Charging service providers may also be under contractual obligations that place constraints on their freedom to exit contracts at any time. Potential issues, should EV charging service providers seek to exit the market could range from customer inconvenience to inadequate charging infrastructure to support demand in a particular area.

Due to the relatively high barriers to entering and exiting the DCFC charging market, charging stations with lower use may not be built or could be abandoned, even if they are serving an important role in a highway charging grid. Utility participation would ensure a stable charging network in this circumstance.

1.5 Please discuss FBC's view on the degree of captivity of customers in multi-dwelling residences and on rural highways.

Response:

For many customers in multi-dwelling residences, access to a parking location with electrical charging capability is limited. Over time, access within multi-dwelling residences may improve with the implementation of municipal bylaws mandating a number of electrical charging parking stalls to be included within the new building development. Some municipalities such as the City of Vancouver[4], Port Coquitlam, City of Richmond and the District of Squamish[5] have already passed bylaws mandating a percentage of EV-ready parking stalls in multi-unit residential buildings.

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[4] https://pluginbc.ca/city-vancouver-goes-100-ev-new-builds/

[5] https://pluginbc.ca/port-coquitlam-passes-ev-charging-bylaw/

Based on a review of the charging locations available,[6] the facilities available along several rural highway corridors are quite limited.

FBC does not believe the issue of customer captivity is central in these situations – instead it is one of practicality associated with EV ownership. Until station availability on rural highways and/or multi-dwelling residential locations improve, the lack of readily available EV charging capability will be a factor that limits EV adoption in these situations. Individuals in these circumstances may find owning an EV to be impractical.

On page 16 of Exhibit C12-2, FBC states:

> FBC believes that in an emerging EV market, there is room for both public utilities and non regulated entities to participate and that any concerns can be mitigated through appropriate oversight by the Commission, such as through the establishment of guiding principles that would allow utilities to support the development of EV markets in BC.

1.6 Please outline what FBCs considers to be "guiding principles" and what that might look like.

Response:

The Commission has numerous guidelines documents, such as the CPCN Guidelines, Resource Planning Guidelines and Thermal Energy Systems Regulatory Framework Guidelines, to name a few. The Commission could establish a set of guidelines to be applicable to EV charging service in BC that would guide participation by various parties in this market. As an example, the guidelines could set out that certain types of EV charging service would be exempt from active Commission oversight (unless complaints are received). Other areas that EV charging guidelines might address are compatibility requirements, third-party safety standards and Measurement Canada requirements.

[6] https://pluginbc.ca/charging-stations/finding-stations/

On pages 15-16 of Exhibit C12-2, FBC states:

> Initially, the CPUC [California Public Utilities Commission] expressed strong concerns with regard to utility ownership of EV charging infrastructure and providing EV charging services, and imposed strict limits on such activities. However, in a 2014 decision (D.14-12-079), the CPUC overturned its earlier prohibition against utility EV infrastructure ownership. The CPUC cited the following as reasons for overturning the broad prohibition on utility ownership of EV infrastructure:
>
> …the utilities have a crucial role in the electrification of transportation as the infrastructure support and fuel supplier in their service territories.
>
> …certain market segments are harder for third parties to penetrate and the utilities may be better positioned to develop those market segments or support third party providers to do so.
>
> …even limited utility involvement to accelerate the PEV infrastructure market can improve the business case for third parties.

Footnote 25 on page 15 of Exhibit C12-2 identifies the initial CPUC decision (2011 Decision).[7]

1.7 Is FBC aware of any study or article that outlines what the state of the California EV charging market was before CPUC's 2011 Decision, after CPUC's 2011 Decision, and now after CPUC's 2014 Decision? If yes, please provide as a submission in this proceeding and discuss.

Response:

FBC is unaware of any article or study that outlines the state of EV charging market in California before CPUC's 2011 Decision, after CPUC's 2011 Decision and after CPUC's 2014 Decision.

FBC in its research found that in August 2009, the CPUC opened the Alternative-fueled vehicle Rulemaking (R.) 09-08-009 to ensure that California's investor-owned electric utilities are prepared for the projected statewide market growth of light-duty passenger plug-in hybrid electric vehicles and battery electric vehicles to support California's greenhouse gas emissions reduction goals and to support the Governor's Executive Order B-16-2012, which set a target of 1.5 million zero-emission vehicles (ZEVs) on California roads by 2025.[8]

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[7] CPUC Decision 11-07-029, pp. 49-50. http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/139969.PDF

[8] In R.09-08-009, the Commission took steps to develop charging infrastructure. In Decision (D.) 11-07-

As mentioned in response to Question 3 in FBC's Evidence (Exhibit C12-2), the CPUC in its Phase II of the Rulemaking Decision (Decision 11-07-029) expressed strong concerns with regard to utility ownership of EV charging infrastructure and providing EV charging services, and imposed strict limits on such activities[9]. However, in its December 2014 decision (D.14-12-079)[10], the CPUC overturned the broad prohibition against utility EV infrastructure ownership.

As noted in response to Question 7 in FBC's Evidence, the CPUC issued a series of decisions after 2014 that authorized three large investor owned utilities (SDG&E, PG&E and SCE) to own the EV charging infrastructure and recover costs from utility ratepayers, net of any revenues generated from such activities, on a pilot program basis.

029, the Commission established the requirements for the large electric utilities to develop rules to incorporate customer owned submeters into the utilities billing and metering systems. Submetering is viewed as an important step in facilitating PEV charger installations at multi-unit dwellings. After two workshops and two extensions, the Commission in D.13-11-002 adopted a pilot for the large electric utilities to develop submetering pilot programs.

[9] CPUC Decision 11-07-029, p. 49-50 http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/139969.PDF

[10] Page 7 of CPUC Decision D.14-12-079 issued on December 22, 2014. Follow the link: http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M143/K682/143682372.PDF

2.0 Reference: Exhibit C1-2, pp. 8, 12

Evolution of the EV market and regulation

On page 8 of Exhibit C1-2, BC Hydro states: "Currently in B.C. there are a limited number of DCFC stations, and outside of urban areas in particular there is not a fully competitive environment; that is, one in which charging stations can compete and fully differentiate by price, location and other attributes."

On page 12 of Exhibit C1-2, BC Hydro states: "BC Hydro supports reasonable level of regulation that enables market growth and cost recovery, at least until some future period when the market may have advanced and the Commission warrants that the regulation of EV services should be revisited."

2.1 If the EV charging service were to be regulated in the short term, and as degree of competitiveness in the EV market evolves, please discuss FBC's view on what would be specific market triggers for the BCUC to re-evaluate regulation?

Response:

FBC suggests that the Commission consider a review of customer use and availability of charging infrastructure after a period of time. There are many aspects of EV adoption and EV charging service markets that are evolving and the Commission's determinations in this Inquiry (as well as any legislative changes that may occur) will affect how the EV charging market unfolds. Time is needed to assess how EV charging service markets are developing.

As discussed in the response to BCUC-FBC IR 1.1.1.1, after a 5 to 10 year period, demand for EV charging service may have increased to levels that could support full recovery of costs and charging infrastructure may have become more readily available throughout the province.

3.0 Reference: Exhibit C19-2, pp. 7, 10

Other jurisdictions

On page 7 of Exhibit C19-2, MEMPR states: "Similar to the current regulatory scheme in BC, some other US States require EV charging service providers to become public utilities, subject to all other aspects of energy regulation, including pricing."

In response to the BCUC's question 3 on "Should the Commission regulate the services provided by EV charging stations? What are benefits and detriments to such regulation? ", MEMPR states on page 10 of Exhibit C19-2, "The experience from other jurisdictions shows that a variety of regulatory models for EV charging services are feasible, ranging from full regulation as public utilities to no public utility commission oversight."

3.1 Has FBC reviewed other jurisdictions to explore the different regulatory environments in EV charging service? If yes:

Response:

Yes, FBC has reviewed jurisdictions other than BC to explore different regulatory environments in the EV charging service. These jurisdictions include California and Oregon, which are both leading jurisdictions for EV adoption in the U.S. Please also refer to the response to BCUC-FBC IR 1.1.2.

3.1.1 Please list the jurisdictions and discuss any key differences between the jurisdictions cited with the BC market or regulatory environment that FBC is aware of, which may affect comparability.

Response:

Please refer to the response to BCUC-FBC IR 1.1.2.

3.1.2 Does FBC have a view on whether any of the regulatory models in other jurisdictions as reviewed by FBC are preferred or unsuitable for BC? Please discuss.

Response:

As discussed in the response to BCUC-FBC IR 1.1.2, FBC researched two jurisdictions (California and Oregon) other than BC. The details of their regulatory models for EV charging service are specific to the regulatory context and history in each of those jurisdictions and therefore the degree of relevance for BC is more at the level of general principles.

The situation in California (discussed below) where the CPUC reversed an earlier decision to expressly allow utility investment in EV charging stations and infrastructure in order to accelerate the advancement of state policy objectives is a point of particular importance to consider, since BC's own stringent GHG emission reduction targets require strong action. Having said that, FBC has not undertaken an in-depth review or evaluation of various models in a large number of other jurisdictions that would inform a view regarding specific models.

As noted in response to Question 3 of the evidence filed by FBC (Exhibit C12-2), in California the government has been taking an active role in developing EV market for the last 10 years. The previous attempts to allow the market to develop competitively have not succeeded. Whether EV charging station services should be provided by regulated utilities was considered in California by the CPUC. Initially, CPUC expressed strong concerns with regard to utility ownership of EV charging stations. However, the CPUC overturned its prohibition and in its recent decisions has directed California's electric utilities to include EV charging infrastructure in their rate base and allowed recovery from all ratepayers of any revenue shortfalls from these activities. Recently, the Public Utility Commission of Oregon approved the Portland General Electric Company (PGE) application to undertake three pilot programs in support of accelerating transportation electrification. PGE's program will expand its electric avenue project by owning six EV charging stations with each containing up to four DCFCs. In addition, the program includes electric bus charging stations, education, and outreach.[11]

Similar to these jurisdictions, FBC believes that a public utility has a critical role to play in supporting the growth of the EV market by facilitating the deployment of EV Charging Infrastructure to meet BC's climate action goals in reducing GHG emissions. The primary focus at this time should be to help facilitate the expansion of this emerging market to support the use of clean and renewable energy sources to make contributions to the achievement of BC's Climate action goals.

[11] Public Utility Commission OF Oregon approval Decision 18-054 http://apps.puc.state.or.us/orders/2018ords/18-054.pdf

4.0 Reference: Exhibit C12-2, p. 22

Exhibit C6-2, p. 5

The BCUC's Thermal Energy System Guidelines (TES Guidelines), p. 7

Class of cases exemption

On page 22 of Exhibit C12-2, FBC states: "Another item that may assist in the effective and efficient review of the Inquiry is to consider amendments to the UCA or an exemption from parts of the UCA that would encourage non-utility companies to participate in and encourage the development of the EV market."

4.1 Please confirm that the above statement refers to the definition of public utility in the UCA. Otherwise, please identify other proposed amendments to the UCA.

Response:

Confirmed. The amendments contemplated in the preamble quote refer to the public utility definition in the UCA.

On page 5 of Exhibit C6-2, BC Sustainable Energy Association and Sierra Club BC (BCSEA) states:

> 7. The Commission should consider, either within this Inquiry or in a follow-on proceeding, exercising its authority under section 88(3) of the UCA to exempt from some or all of the provisions of the Act certain classes of entities providing EV charging services (to be defined) that but for the exemption would be "public utilities" and regulated under the Act. (For clarity, this includes entities providing EV charging services that may not currently meet the definition of "public utility" but that likely would do so if they started to receive compensation for their EV charging services.) An exemption under s. 88(3) requires the advance approval of the Minister responsible for BC Hydro, i.e., the Minister of Energy, Mines and Petroleum Resources.

On May 19, 2016 by Order G-71-16, the BCUC granted Bakerview EcoDairy an exemption from Part 3 of the UCA, except sections 25, 38, 42, 43, 44 and 49.[12]

4.2 In FBC's view, if the BCUC were to recommend a class of cases exemption to government in relation to EV charging service, what factors should be considered in developing the classes? Further, what sections of the UCA, in FBC's view, should EV charging service be exempt from?

Response:

In addition to the concerns that gave rise to the exemption exceptions in the Bakerview EcoDairy case (i.e., sections 25, 38, 42, 43, 44 and 49), FBC believes that physical factors pertaining to the charging station, such as station type (Level 1, 2, 3 or combination), cost and size (number of charging posts), location (e.g. municipal land, private land (such as at a business or shopping centre), MURB, urban vs rural, proximity to other public EV charging) would be worthwhile considering in the development of an exemption. Consideration should also be given to limiting the exemption to parties that are not otherwise a public utility – this concept is already in the UCA definition of public utility with respect to CNG and LNG stations which are regulated if a public utility owns and operates them but not regulated if owned and operated by a party not otherwise a public utility.

In establishing a class exemption, FBC believes the Commission should give close attention to the residual oversight of exempt entities required based on the exemption exceptions. As one possible example, since there may be a large number of exempt entities providing EV charging service, the Commission may wish to keep ongoing reporting requirements under section 49 to a minimum to keep the regulatory oversight process manageable.

4.3 Does FBC have a view on what the classes could be (e.g. based on different levels of EV charging equipment, charging station geographic locations, type of dwelling, owner/operator structure, some combination of the above, or others)? If yes, please describe.

Response:

FBC agrees generally with the preamble quote from BCSEA that an important distinction for constructing an exemption framework is whether the entity providing the EV charging service is otherwise a public utility or not. However, as discussed in the response to BCUC-FBC IR 1.4.2,

[12] http://www.bcuc.com/Documents/Proceedings/2016/DOC_46352_05-19-2016_Bakerview-Exemption-Approved_G-71-16.pdf

consideration should be given to other physical factors or ownership arrangements before a blanket exemption is granted to all parties that are not already public utilities. The Commission may wish to retain a greater regulatory role of certain subsectors of the EV charging space, such as, for example (hypothetically), DCFC charging service not in large urban centres.

On page 7 of the BCUC's Thermal Energy System Guidelines (TES Guidelines), it states:

> Strata Corporation TES[13]: A TES owned or operated by a Strata Corporation, or the Strata Corporation's lessee, trustee, receiver or liquidator, that supplies the Strata Corporation's owners, is exempt from Part 3 of the UCA other than sections 42, 43 and 44.

4.4 In FBC's view, should an exemption similar to the Strata Corporation exemption in the TES Guidelines be considered for Strata Corporations if EV charging service were to be regulated by the BCUC? Please discuss.

Response:

Yes. It makes sense to provide a similar exemption for strata corporations regarding EV charging service as has been granted for thermal energy systems.

In the absence of an exemption, strata corporations with EV charging in their complex and not wanting to become public utilities, would be obliged to collect the incremental costs of providing EV charging service through strata fees, meaning other property owners in the strata complex would be covering costs for the subset of owners that drive EVs. An exemption would enable the strata corporation to pass on some or all of the incremental costs of EV charging to the users.

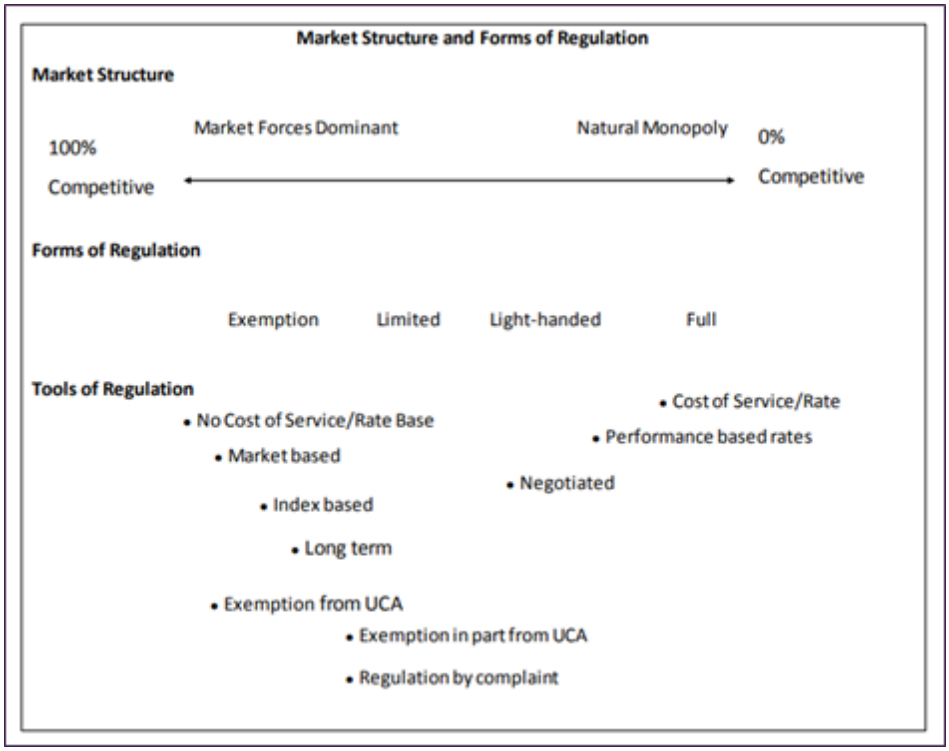
[13] As defined by the *Strata Property Act* [SBC 1998].

5.0 Reference: The BCUC Inquiry into FortisBC Energy Inc.'s Offering of Products and Services in Alternative Energy Solutions (AES) and Other New Initiatives proceeding, Order G-231-13A with reasons for decision, pp. 23–24

Proposed regulatory framework and guide for thermal energy service utilities

On pages 23 and 24 of the in the Reasons for Decision attached to Order G-231-13A, the BCUC states:

> The [AES] Inquiry found that the form of regulation should be determined by the market structure. The Panel agrees with this assessment. The figure below illustrates the Panel's view of the relationship between market structure and the various tools of regulation.



The Panel in Order G-231-13A also agreed with the basic regulatory concepts outlined in the AES Inquiry Report whereby regulation should be the option of last resort and competition should always be preferred over regulation.

5.1 Please discuss whether the BCUC in this EV Inquiry should consider the relationship between market structure and forms of regulation, as shown above in the diagram. If not, why not?

Response:

The diagram provides a useful summary of a market structure continuum, as well as the forms of regulation and regulatory tools that may be a suitable for the Commission to employ in particular market contexts.

With respect to EV charging service, FBC believes the market is nascent and evolving, and it may never be the case that EV charging service will fit neatly into one spot on the continuum or that only a single form of regulation will be necessary. New charging technologies may continue to emerge that require utility investment.

5.2 Suppose the BCUC uses the above diagram as a guide to determine the appropriate form of regulation. Given the market structure noted in FBC's submission, what would be the corresponding form of regulation and tool of regulation? If any different, please explain in terms of the FBC's view of the current market structure and the expected market structure in the next 3-5 years.

Response:

As stated elsewhere and in the response to BCUC-FBC IR 1.5.1, FBC believes that the market for EV charging service is nascent and evolving, and cannot be considered a competitive market. Therefore regulation of some degree remains appropriate; however, the main distinctions that should be considered in assessing the form of regulation are the type of charging station and whether the station owner is a public utility or not.

FBC believes that stations that are providing Level 2 or Level 1 service and that are owned by parties not otherwise public utilities should either be provided some form of exemption from relevant sections of the UCA, or alternatively be subject to a very light-handed form of regulation, such as complaints-based regulation.

FBC does not expect to own public Level 1 charging but Utility-owned Level 2 stations could be regulated on an aggregate basis. The rate-setting process, reporting requirements on issues such as station costs, revenues and usage could be dealt with in an aggregated fashion, with any Utility-owned Level 2 charger rates set on a postage stamp basis.

For Level 3 DCFC and any future higher capacity EV charging stations, FBC believes that more regulatory oversight is appropriate, with differences however between utility-owned stations, and those owned by non-regulated parties. For utility-owned stations, FBC expects to apply for postage stamp rates for all stations of in the same category (for example, Level 3 DCFC). FBC

believes a streamlined approach for rate setting is appropriate where, once a charging service rate is approved for a particular segment of its EV charging stations, and as long as the aggregate projected revenues and costs from all stations in the category do not result in a revenue deficiency over a pre-determined amount or time period, no further review or rate approval is required.

For non-regulated parties providing DCFC service, FBC suggests that the Commission does not need to set rates for EV stations in this category – the station owners should have discretion to determine their own pricing. This would require an exemption of some sort to be developed for non-regulated DCFC stations.

The foregoing recommendations are based on the current UCA definition of a public utility and would need to be reconsidered if the government chose to make relevant amendments to the UCA.

6.0 Reference: Exhibit C1-2, p. 11; Exhibit C26-2, p. 1; Exhibit C1-2, p. 11

Regulator's responsibility

On page 11 of Exhibit C1-2, BC Hydro states "…public utilities are well-positioned to meet the expectations of the regulator in relation to service quality and the reliability of EV charging services."

On page 1 of Exhibit C26-2, Electrical Contractors Association of British Columbia (ECABC) states:

> …ECABC wants to reinforce the importance of requiring the installation and maintenance of EV charging stations is done exclusively by appropriately trained and qualified journeyman electricians. This ensures the safety and reliability of all EV charging stations.

6.1 In FBC's view, what are the indicators for "service quality" of an EV charging station?

Response:

Indicators of service quality for an EV charging station include:

- Highway signage directing drivers to the EV charger;
- Convenient parking configuration for accessing EV charging stations (e.g. pull-through parking);
- Maintenance of the EV charging parking stall (for example, snow clearing, garbage removal);
- Display of contact information for customers with questions or who are experiencing difficulties using the EV charging station;
- Visible station signage and parking stall painting/stenciling as well as lighting of the parking stall and associated equipment;
- Enforcement of EV-only parking rules for EV charging parking stalls;
- Easy use of the EV charging station, including whether network membership is required in order to transact for EV charging services, or whether a point-of-sale system equipped with a credit card/debit card reader is locally available at the station;
- Proximity of EV charging stations to local attractions and amenities;
- Both CHAdeMO and Combined Charging System connectors available on DC chargers;

- Availability of multiple charging ports to allow several vehicles to charge simultaneously where required and economic;
- Co-location of a Level 2 charging stations at DC fast charger sites;
- Networkability of EV charging station to provide remote visibility of station status (e.g. online, alarm status, etc…); and
- Information on the location and availability status of the EV charging station on network vendor websites (e.g. ChargePoint, Flo, GreenLots) and/or network vendor agnostic websites (e.g. plugshare.com, chargehub.com).

6.2 In FBC's view, what are the indicators for "reliability" of an EV charging station?

Response:

Indicators for the reliability of an EV charging station include:

- The reliability of the utility electrical supply (SAIDI and SAIFI) to the EV charging station;
- The annual up-time of the EV charging station;
- The ability to operate the emergency stop on an EV charging station and subsequently restore station service without requiring physical access to disconnects or switches either internal or upstream of the station (restoration should be possible through customer reset of the EV charging station emergency stop button);
- A comprehensive operating and maintenance plan for the EV charging station, including periodic station inspections and annual maintenance as required, and a well-defined support path for responding to issues with the charging station (e.g. service level agreements with local qualified personnel for responding to emergencies);
- A mechanism for ensuring station compatibility with new electric vehicles, including a defined process for periodically updating the EV charging station software as required;
- The ability for the EV charging station to continue to provide EV charging services if the station loses network connectivity or if remote station management system is offline; and
- The ability for the EV charging station to operate across a wide range of ambient temperatures (e.g. -30 Celsius to +40 Celsius).

6.3 In FBC's view, what are the indicators for "safety" of an EV charging station?

Response:

Indicators for the safety of an EV charging station include:

- Certification of the charging equipment by the appropriate standards body (e.g. Underwriters Laboratories, Canadian Standards Association);
- Appropriate enclosure ratings for the station and associated equipment for outdoor installation and operation in a variety of climatic conditions;
- The use of protective electrical devices with the EV charging station (e.g. fuses, breakers, etc…) to address potential electrical issues (e.g. overvoltage events, current surges, grounding issues, etc…);
- Permitting for EV charging station site (e.g. electrical installation permit);
- A comprehensive operating and maintenance plan for the EV charging station, including periodic station inspections and annual maintenance as required;
- The availability of an emergency stop button to discontinue a charging session in the event of an emergency with the station and/or vehicle;
- Use of a cable management system to reduce trip hazards from the charger cord; and
- Use of bollards and/or curb stops to prevent contact between vehicles and the EV charging station equipment.

6.4 If EV charging service is regulated, please discuss what would be the BCUC's role as a regulator in relation to (i) service quality, (ii) reliability, and (iii) safety?

Response:

Where it has been determined that EV charging service is regulated, the BCUC's role should be similar to the regulation of electric utilities, which includes ensuring adequate, safe, efficient, just

and reasonable service (as set out in the UCA section 38). The extent of regulation of these matters can vary depending on the circumstances of the service.

FBC is committed to service quality, reliability and safety, because it makes good business sense and will support the development of electric vehicle growth and infrastructure to meet customer needs both now and into the future. It is as important for third party EV service operators to adhere to similar standards to protect the public interest.

Section 38 of the *Utilities Commission Act* (UCA) states:

> A public utility must
>
> (a) provide, and
>
> (b) maintain its property and equipment in a condition to enable it to provide,
>
> a service to the public that the commission considers is in all respects adequate, safe, efficient, just and reasonable.

6.5 If EV charging service is regulated, in FBC's view, does an obligation to provide a service exist? If yes:

Response:

In FBC's view, if EV charging service is regulated by the Commission, then there is an obligation on an electric utility to provide an EV charging service as stated in Section 39 of the UCA. This obligation would apply once the EV charging infrastructure is built and is in-service for public use. The obligation to serve is part of the regulatory compact, such that an entity with this obligation must also be provided with a reasonable opportunity to recover costs and earn a fair return on investment.

Section 38 of the UCA would impose a requirement on a public utility to maintain its property and equipment appropriately and provide service to the public that is adequate, safe, efficient, just and reasonable.

The duty to serve would not, however, automatically compel a public utility to construct new charging stations. As the Commission has held in the past with respect to new facilities in its decision regarding BC Hydro's application for a certificate of public convenience and necessity for the Dawson Creek/Chetwynd Area Transmission Project, "the Commission Panel wishes to

emphasize that the absolute obligation to serve is always in context: the service must meet the appropriate electrical standards; options must be weighed diligently; and the service must be adequate, safe, efficient, fair and reasonable. (*UCA*, Section 28)."

6.5.1 What are the EV charging station's owner and/or operator's obligations to provide service?

Response:

Under the UCA, a person who owns or operates equipment or facilities for the delivery or provision of electricity would generally be a public utility and subject to the obligation to serve as described in the response to BCUC-FBC IR 1.6.5.

6.5.2 Does the physical configuration of the adaptor, to ensure any type of EV can charge at the station, fall under an obligation to provide service? Please discuss.

Response:

The obligation to provide service from an existing facility is subject to a test of reasonableness, such that the size of the investment required to serve a customer will be part of the assessment. Although the physical configuration of the adaptor may fall under an obligation to provide service, it should be noted that obsolescence may render some adaptors/connectors uneconomic to continue to support, similar to certain non-standard secondary voltages that are no longer available to customers. Further, certain charging connectors such as the Tesla Supercharger connector are proprietary, and can only be deployed, owned, and operated by Tesla.

Current best practices for the deployment of DCFC stations include the ability to support the two non-proprietary DC Fast Charging connection protocols currently in use in North America (Combined Charging System and CHAdeMO). Although one of these protocols may become obsolete at some point in the future, it is likely that adaptors will become available for older vehicles to continue to use the dominant DC fast charging protocol, lessening the need for continued support by the station owner/operator of a defunct charging standard.

6.6 What are FBC comments on the BCUC's jurisdictional in the regulation of safety and service? Could the BCUC regulate EV charging on the basis of safety and service yet refrain from regulating rates? Please discuss the pros and cons and market impact to stakeholders if such a model were to be recommended.

Response:

Based on Section 38 of the UCA, FBC believes it is within the Commission's mandate to regulate safety and services in a transparent and consistent way

If safety and service are regulated, as a utility FBC believes it would be appropriate to regulate rates too since the two have a symbiotic relationship. It is noted that in a purely competitive market like gasoline, service and rates are not regulated, however the supply and demand for gasoline operates in a mature marketplace. With regard to safety of EV charging and gasoline station equipment, both are required to meet Canadian Standards Association (CSA) and UL Canada standards before being approved for use.

The table below provides some pros and cons of the model posed in the question.

Table 1: Pros and Cons of Regulating Safety and Service, and Not Rates

Component	Pros	Cons
Regulation		
Safety	Increased protection of public interest and Commission oversight	Increased cost of regulation compliance
	Transparency and escalation path for public concerns	
Service	Increased protection of public interest and Commission oversight	Increased cost of regulation compliance
	Transparency and escalation path for public concerns	
No Regulation		
Rates	Increased opportunity to let competitive market evolve	Increased risk the EV market may not evolve fast enough without utility involvement and mechanism for cost recovery
	Consumers could benefit from lower rates	Consumers could be subject to higher rates or highly variable rates depending on the station
	EV Service providers can adapt service and bundling to meet market demand	

6.7 Sponsored by BC Hydro, the Canadian EV Infrastructure Deployment Guidelines 2013[14] discusses safety protocols in EV infrastructure. Please discuss FBC's involvement and requirements in terms of safety as it relates to installation, operations, and maintenance of EV supply equipment.

Response:

FBC's involvement and requirements in terms of safety for the installation, operations, and maintenance of EV supply equipment include ensuring the supply equipment is certified by the appropriate standard body (e.g. Underwriters Laboratories, Canadian Standards Association), the equipment is rated for use in the installed location (e.g. indoor, outdoor), and consideration for protective measure to reduce the potential for vandalism or damage by vehicles. Please also refer to the response to BCUC-FBC IR 1.6.3 for additional safety related indicators considered by FBC when deploying EV supply equipment.

[14] https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/power-smart/guides-tips/canadian-ev-infrastructure-deployment-guidelines-2013.pdf

7.0 Reference: Exhibit C12-2, pp. 15, 20, Exhibit C35-2, pp. 4, 9–10, Potential cross-subsidization

On pages 15 and 20 of Exhibit C12-2, FBC states:

> Deployment of EV infrastructure should be considered as a whole in BC and not as individual locations. The BCUC can enable the mass deployment of public infrastructure in the public interest and which may balance the obligation to serve all customers in all locations (profitable and unprofitable) with the right to serve all locations; this is advantageous for network infrastructure that relies on having a large and diverse geography, irrespective of the costs of individual locations.
>
> Depending on how demand materializes over the coming years, there is the potential for some cross-subsidization from other rate classes to support this new service. This needs to be balanced against the need to develop the EV market, to support government policy, and the potential for net benefits to be provided to other rate classes.
>
> FBC believes that the potential for significant cross-subsidization from other ratepayers is small.

7.1 What are the assumptions underlying the statement above in that the "potential for significant cross-subsidization from other ratepayers is small." Would the level of potential cross subsidization depend on the rate of EV uptake in the province, technological changes in EV batteries and charging infrastructure, any grants or subsidies from third parties, other variables? Please discuss.

Response:

FBC's statement about cross-subsidization as mentioned in the preamble was based on FBC's cost of service assumptions and analysis as explained in sections 3.2 and section 3.4 of FBC's Application for Approval of Rate Design and Rates for EV DCFC service (the FBC EV Application), provided in Exhibit C12-2, Appendix 3.

Based on those assumptions and depending on how demand materializes over the next few years, Figure 3-1 on page 22 of the Application shows the under and over recovery of cost of service in each year using the proposed rate. As shown in Table 3-3, it is expected that all of FBC's other electric customers will experience a very small rate impact from the EV charging stations. Also, it should be noted that the benefit of revenues from the sale of low carbon fuel credits is not considered in these rate impacts so there is the potential for smaller shortfalls in the early years and greater surpluses in the later years.

FBC believes that BC's EV market is emerging and is in a state of flux. The primary focus at this time should be to help facilitate the expansion of this emerging market to support BC's climate action goals. FBC agrees that the level of cross-subsidization would depend on EV uptake in the province, technological advances, grants and subsidies from third parties and other variables. The issues pertaining to rate design and cross-subsidization should be revisited after 5-10 years when some of these variables become clearer than what exist today.

7.2 What does FBC view as the key indicators of when cross subsidization becomes "unduly" discriminatory?

Response:

As described in the response to BCUC-FBC IR 1.7.1, FBC does not expect significant rate impacts to other customers as a result of EV charging stations. Further, as described in FBC's evidence it is possible that as demand grows for FBC's charging service, the service may even generate a net benefit to general ratepayers over time.

The assessment of whether cross-subsidization is "unduly" discriminatory is necessarily contextual, and can't be determined in the abstract. The issue of cross-subsidization should be revisited after a 5-10 years when rate impacts of EV charging stations (positive or negative) become clearer. Until such time, it is difficult to predict, measure or verify with accuracy any level of cross-subsidization and to judge whether any cross-subsidization is "unduly" discriminatory. FBC believes that the primary focus with respect to EV charging service at this time should be to facilitate EV market growth to meet the provincial government's climate action objectives.

On page 4 of Exhibit C35-2, Victoria Electric Vehicle Association (EVA) states: "EVs contribute to gross BC Hydro revenues and do not currently present a cross-subsidization issue," and on pages 9 and 10, it submits two principals based on:

> That the original purpose of public utilities was to make energy (electricity and natural gas) available to all the citizens of a province or state recognizing that it was in the general public interest for urban area

> ratepayers to financially support the higher costs of providing the utility to rural areas .
>
> There is a lower risk of cross subsidization as each EV contributes additional hydro revenues with no immediate additional grid costs. Each block of 10,000 EVs entering service adds as much as $ 2.3 million per year to gross BC Hydro revenues with minimal cost impacts on the existing electricity grid infrastructure.

As per footnote 12 in Exhibit C35-2, the estimated additional revenue is based on 10,000 EVs @ 13,000 km (Stats Canada 2009) @ 160 Wh/km= 2,080 kWh / year @ 0.11.kWh = $ 2.3 m per year.

In a report authored Georgetown Climate Center and by M.J. Bradley & Associates, titled "Utility Investment in the Electric Vehicle Charging Grid: Key Regulatory Considerations" dated November 2017[15] (GCC-MJBA Report), on page 16, it states:

> … a utility can play a critical role in jumpstarting the electric vehicle market; however, such proactive investment necessitates a tolerance for risk in accepting some number of unprofitable or underutilized projects.

7.3 Please provide FBC's view on the first principal that the Victoria EVA submitted.

Response:

FBC acknowledges the first principle stated by the Victoria EV Club has some merit and analogies exist with respect to electrification of the transportation sector, particularly with its strong alignment with government policy and legislative objectives of reducing GHG emissions.

7.3.1 In light of the GCC-MJBA Report, please provide FBC's view on that public utility plays "a critical role in jumpstarting the electric vehicle market" but needs to accept some "unprofitable or underutilized projects."

Response:

FBC believes that utilities can and should play an important role in jumpstarting the electric vehicle market in BC. Given government policy targets and expected growth in customer

[15] http://www.georgetownclimate.org/files/report/GCC-MJBA_Utility-Investment-in-EV-Charging-Infrastructure.pdf

demand, the Company believes that it is important to serve electric vehicle customers and their vehicle charging needs within its service territory. If electric vehicle charging rates are the same across the service territory, it is likely that there will be some variability in station profitability, with the less profitable stations being supported by the more profitable ones. Ultimately all ratepayers will benefit from higher utilization of the existing system in the form of lower rates, as incremental revenues from EV charging service are expected over time to exceed the incremental costs.

7.3.2 Is it plausible that the EV charging market will result in public utilities taking on unprofitable or underutilized projects while site host / third-party investors will pick only high return projects?

Response:

FBC believes that there is an opportunity for public utilities to take on projects that broadly serve the public interest in the form of prescribed undertakings and that some of these projects may be more profitable than others.

FBC is unable to comment on if third-party investors will pick only high return projects. Although FBC may build charging stations in low use areas in order to provide EV customers with a complete charging network, FBC does not intend to adopt a policy to take on only uneconomic or underutilized electric vehicle charging station projects absent Commission or government guidance in this regard.

7.4 With respect to the second principal, please comment on Victoria EVA's estimate of $2.3 million per year based on 10,000 EVs at 13,000km.

Response:

FBC notes that VEVA's estimate of $2.3 million appears to be based upon BC Hydro's residential rates. Although it is reasonable that BEVs may be predominantly charged at a location served by the utility at the tariffed residential rate, there is also potential that community or workplace charging stations may be used which are likely to be served by the utility at a tariffed commercial service rate which is typically less than the equivalent residential rate.

As well, a cursory review of the efficiency of BEVs indicates that VEVA's assumption of 160 Wh/km may be conservative, and potentially understating the potential utility revenue from a BEV with use of 13,000 km per year.

7.5 In FBC's view, is cross-subsidization measurable or verifiable? If so, how? At what point is this cross-subsidization "unduly preferential or discriminatory" or "unfair"?

Response:

Cross subsidization, in the economic sense, is generally ascertained through a cost of service study. The assessment of whether cross-subsidization identified through a cost of service study becomes "unduly preferential or discriminatory" or "unfair" is necessarily contextual. Non-cost factors can go into that consideration. Please refer to the response to BCUC-FBC IR 1.7.2.

B. INVESTMENT DECISION

8.0 Reference: Exhibit C12-2, pp. 5, 11, 12; Exhibit C20-2, pp. 3–4; Exhibit C34-2, pp. 5, 9

DCFC – business model and economics

On page 12 of Exhibit C12-2, FBC states "the current number of EV owners (buyers) and estimated demand for EV Level 3 charging service does not support recovery of the infrastructure and service costs, particularly in the earlier years."

8.1 What is FBC's estimate of the level of EV penetration required for FBC-owned DCFC stations to break-even for FBC? Provide all the assumptions including the different types of costs and revenue. Please express in terms of charges per day (or hour), if possible.

Response:

For FBC's owned DCFC stations, the break-even average is approximately 3 charges per day, per station over the 10 year period, resulting in 7,342 charges per station after present value discounting. The cumulative average of 3 charges per day starts with 1 charge per day, per station in year 1 and is escalated yearly by a compound annual growth rate of 22.8%. In calculating the break even point, it is important to note the cost of service included third party subsidies in the amount of $332 thousand, and there was no charge for the land on which the stations were sited, and without these savings, the payback period would be longer. Please also refer to the responses to CEC IR 1.5.3 and CEC IR 1.7.3 for other ways that break even can be viewed.

For FBC's DCFC stations the total variable cost component for all five stations consists of only power purchases and is approximately $61 thousand out of a total cost of service of $382 thousand over 10 years, or 16 percent of the cost of service. The remainder, being approximately 84 percent, are fixed costs.

Please refer to the FBC EV Application, Section 3.2 and Appendix C thereof (Exhibit C12-2, Appendix 3) for detailed assumptions of different costs and number of charges per day.

On page 5 of Exhibit C12-2, FBC indicates that there are 42 DCFC stations and 43 DCFC ports in BC excluding Tesla Superchargers.

8.2 Please comment on the benefits and costs of having multiple ports per station as compared to a single port per station?

Response:

FBC notes that standalone DC fast charging stations providing DC rectification within the station are typically only equipped with a single port. However, a power distribution system may be used where DC rectification is performed centrally with power distributed to multiple ports at the charging site for use by multiple vehicles simultaneously (e.g. Tesla supercharger sites). The benefits of having multiple ports per charging site include redundancy if there are failures with the connectors, as well as the ability to avoid potential charging station congestion with drivers having to queue for use of the station.

Based on the costs incurred for FBC's five DCFC charging sites, approximately half of the approximate $100 thousand capital cost per station is related to the charging station itself (with internal DC rectification). As such, the incremental cost for additional DCFC stations (to provide additional ports) is approximately $50 thousand per port/station. FBC has not developed estimated costs for a system where DC rectification is performed centrally with power distributed to multiple vehicle charging ports.

8.2.1 Please explain if there are any economies of scale by adding multiple ports per station. What is the incremental cost for additional charging ports?

Response:

Please refer to the response to BCUC-FBC IR 1.8.2 which identifies some economies of scale associated with installing additional stations at a charging site. It is likely that these economies of scale are improved for DC fast charging sites where DC rectification is performed centrally with power distributed to multiple ports.

8.2.2 Please elaborate on the technical limitations or right of way concerns of having multiple ports at stations.

Response:

The primary technical limitations associated with multiple ports at stations relate to the available utility capacity required to serve the charging facilities. Although there are power management systems that can throttle charging speeds depending on the number of connected ports and customer demand, there is a need to ensure that a minimum level of charging demand can be supported in order to meet customer expectations around the ability to receive a charge at a rate appropriate for the station type (i.e. Level 2 or Level 3). For example, splitting a 50 kW supply for a fast charging site across 8 simultaneously charging vehicles results in a charging rate approximately equivalent to a Level 2 charger, or 6.25 kW, which would not be considered "fast charging". As such, there is a minimum amount of utility electrical capacity for a charging site that needs to be considered depending on the number of ports being supported, as well as the type of charging facilities in use (i.e., Level 2 or Level 3).

FBC does not have any concerns with respect to obtaining or administering rights-of-way for providing service to EV charging stations, including stations with multiple ports.

On page 11 of Exhibit C12-2, FBC states:

> There are financial barriers to entities entering the market due to demand being low and therefore infrastructure is not cost effective, even when considering subsidies and incentives from government and other agencies.

On pages 3 to 4 of Exhibit C20-2, AddÉnergie Technologies Inc. (AddÉnergie) states:

> AddÉnergie has provided a Generic DCFC Financial Model (the Generic Model, attached as Appendix A) based on BC Hydro's and FortisBC's respective commercial rates to illustrate how a standard DCFC is likely to perform under different charging scenarios. There are relatively limited scenarios in which a station is likely to recover costs within a decade under the current BC Hydro general service business rate or Fortis BC commercial rates even assuming a $20/hour cost of charging, which is double the rate used in Québec's Electric Circuit, Canada's most advanced EV charging network, and assuming no cost of capital (i.e., that projects are financed at 0% interest).

The Generic Model contains a number of charging station operation assumptions and charging station usage assumptions.

8.3 Please comment on the assumptions of AddÉnergie's model and if the model is a reasonable depiction of DCFC station ownership and operation.

Response:

AddÉnergie's model and assumptions appear appropriate. FBC believes that the model is a reasonable depiction of the current economics of DCFC station ownership and operational costs.

8.4 In FBC's view, please discuss which component of AddÉnergie's model will be sensitive to material changes in the next five years given the developments in the EV market. Please explain.

Response:

In FBC's view, it is likely that as charging networks become more robust with additional stations and ports continually deployed, there may be a decrease in the assumed length of charge events as noted in AddEnergie's model. Although this will likely not affect the overall energy requirements of an EV, it may distort the business case for individual stations. FBC also notes that there is potential for improvement in the overall efficiency of EVs from AddEnergie's assumed 0.2 kWh per km as efficiency is a key focus of EV manufacturers as a means of maximizing the use of available battery capacity.

On page 5 of Exhibit C34-2, Community Energy Association (CEA) provides an illustrative example of a Level 3 Charging Station Business Model. Further, CEA submits that the model is known to be incomplete regarding differences in utility versus non-utility ownership and operation.

On page 9 of Exhibit C34-2, CEA submits that "Non-utility DCFC owner/operators currently have high demand charges for DCFC equipment (typically 50kWh systems) that utilities do not appear to account for in their internal costs for DCFC."

8.5 Please comment on the assumptions of CEA's model and if the model is a reasonable depiction of DCFC station ownership and operation.

Response:

FBC believes some components of the model are a reasonable depiction, such as the network monitoring fees, maintenance, energy charge, basic charge, and demand charge.

Other items are arguably different than FBC would expect, such as the capital renewal, consumption of 6 kWh per charge session, and various calculations and methodologies included in the model.

8.6 In FBC's view, please discuss which component of CEA's model will be sensitive to material changes in the next five years given the developments in the EV market. Please explain.

Response:

FBC believes assumptions regarding growth in demand for EV charging and assumptions regarding battery capacity and size, could materially impact CEA's financial model. Due to declining battery supply costs, manufacturers are able to provide larger battery capacity and increase the range a vehicle will travel. Although larger battery capacities alone will not change the total demand for electrical energy, it will increase the demand for faster charging speeds. Larger battery size will result in increased vehicle range which in turn is likely to increase demand for EVs.

8.7 Please comment on CEA's assertion that public utilities do not appear to account for demand charges in internal cost estimates. Please clarify where FBC would account for the cost of peak demand on grid infrastructure.

Response:

FBC confirms that it did not include Demand Charges in the Cost of Service model for the five DCFC stations operated by FBC. Data on consumption patterns such as peak use and total consumption are required to calculate the appropriate demand charge for a class of customers. Since FBC does not yet have the data to perform a cost allocation study for a new EV charging service customer class, FBC used the Tranche 1 energy rates from FBC's wholesale power purchase agreement with BC Hydro (Rate Schedule 3808) as a starting point and as representative of the incremental costs that FBC would incur for electricity supply. When FBC's

GS21 Large Commercial Rate (demand applicable) is instead used, the revised cost of service results in a rate of $10.39 per half-hour charge session as compared to the current interim approved rate of $9.00 per half-hour. FBC intends to develop and use the appropriate tariff rate in its financial models going forward.

Once sufficient data has been collected regarding service to DCFC charging stations, it is expected that the cost of peak demand on grid infrastructure would be appropriately modeled through a cost allocation study and reflected in a new rate specific to utility supply to DCFC stations owners/operators.

9.0 Reference: Exhibit C20-2, p. 6; Exhibit C15-2, p. 2

DCFC - third-party investment

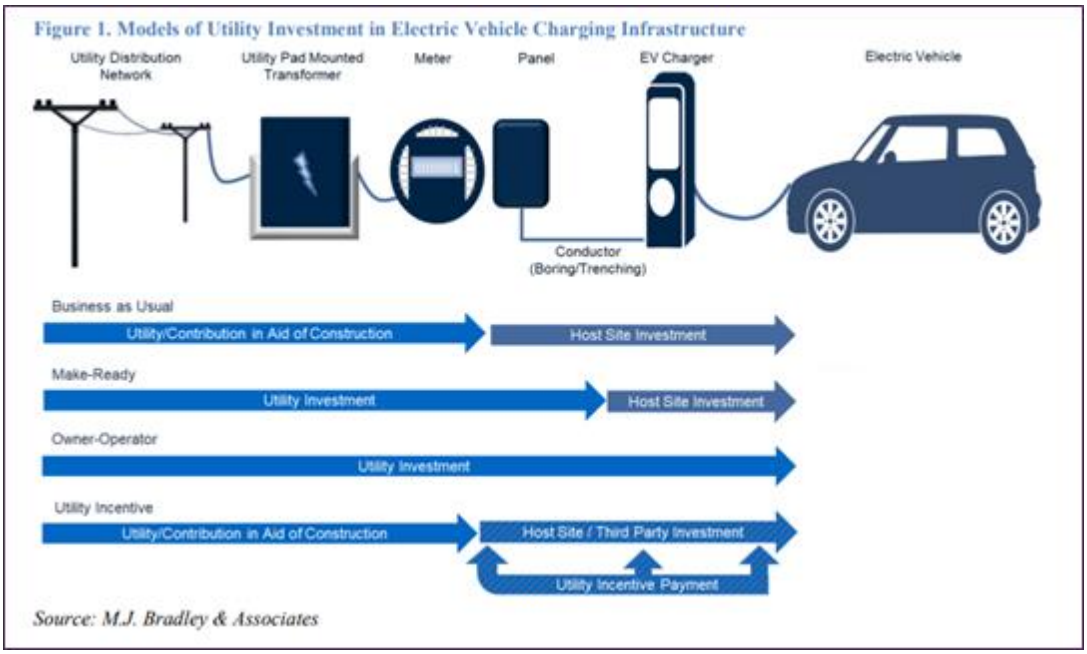
On page 6 of Exhibit C20-2, AddÉnergie submits:

> That the major barrier to EV charging station competitiveness is that British Columbia lacks a comprehensive network of charging stations and that one is unlikely to be developed by [third-party] investment alone.

On page 2 of Exhibit C15-2, Greenlots submits:

> [Unfortunately] a sustainable, competitive market is aspirational, and is unlikely to arise prior to the adoption of a critical mass of electric vehicles. This is primarily on account of a lack of a business model for the ownership and operation of public charging stations based on sustainable revenues from charging activities, and this has thus far resulted in a fundamentally inadequate amount of [third-party] investment in such charging infrastructure.

In a report authored Georgetown Climate Center and by M.J. Bradley & Associates, titled "Utility Investment in the Electric Vehicle Charging Grid: Key Regulatory Considerations" dated November 2017[16] (GCC-MJBA Report), on page 9, Figure 1 provides the models of utility investment in EV charging infrastructure: (i) business as usual, (ii) make-ready, (iii) owner-operator, and (iv) utility incentive:



[16] http://www.georgetownclimate.org/files/report/GCC-MJBA_Utility-Investment-in-EV-Charging-Infrastructure.pdf

9.1 Please discuss the pros and cons of the four business models that are noted in the GCC-MJBA Report. Include considerations such as market growth, business sustainability, customer impacts, public interest, competition, and level of regulation.

Response:

In FBC's view the assessment of pros and cons for the four business models must take into account the specific context and assumptions in a given situation. For example, if two parties had opposing views on whether increasing EV adoption was a good thing, then one party would assess a business model that promoted EV adoption negatively, while the other would assess that business model positively. Below FBC provides its assessment of the current context in BC in which the pros and cons of the four business models are assessed:

- The policy and legislative context in BC is strongly in favour of GHG emission reductions.
- The transportation sector is the largest contributor to provincial GHG emissions.
- There is strong growth in the numbers of plug-in electric vehicles available and in the models offered for sale by manufacturers.
- Electric vehicle adoption in BC has been growing year over year and is expected to continue increasing (likely significantly) in the coming years.
- There is a high level of public interest in BC in promoting the adoption of EVs to achieve public policy objectives, such as GHG emission reductions, and for other personal interest reasons.
- The nature of EV charging service is affected by several variables – public vs. private charging facilities, home charging, Levels 1, 2 and 3 charging service (and future developments), various ownership arrangements for charging facilities (individuals, municipalities, public utilities, private enterprise).
- Public EV charging infrastructure in BC is inadequate to support the expected significant growth in EV adoption.
- The current regulatory framework governing EV charging service in BC is a mixed bag, in which reselling of electricity for compensation is considered public utility activity and subject to regulation, but with exemptions from regulation for certain parties such as municipalities.
- The Commission's goal (in FBC's estimation) is to develop a regulatory framework that supports the development of EV charging service to help achieve provincial policy

objectives, while not unduly impacting other utility ratepayers or hindering the development of competitive markets with respect to EV charging service.

With this contextual framework in mind FBC provides its assessments of the pros and cons of the four business models based on the various items identified in the question.

Comparison of Utility Business Models re: EV Charging Infrastructure				
Consideration	**Business as Usual**	**Make-Ready**	**Owner-Operator**	**Utility Incentive**
Market growth	**Pro** - Utilities and third party operators are familiar with existing practice and can make decisions based on traditional roles.	Pro - Increases growth of EV infrastructure deployment and supports EV adoption - range anxiety less of a deterrent when refueling is available	Pro - Increases growth of EV infrastructure deployment and supports EV adoption - range anxiety less of a deterrent when refueling is available***)***	Pro - Utility involvement can support and enable EV service provider participation by offering rebates for EV charging investment
	Con – Normal costs of connection (CIAC) for service activation pre: EV charger is expensive and is detrimental to EV charging service economics for 3rd parties	Con - Accelerated growth potentially more challenging for utilities to manage grid implications	Cons - Ratepayers exposed to small risks in early years prior to mass market adoption of EVs	Con - Accelerated growth potentially more challenging for utilities to manage grid implications
Ranking	**4**	**3**	**1**	**2**
Business Sustainability	Pros – The status quo, continuation of traditional business – limited sustainability in the context of a growing market	Pro –Provides sustainability and responsiveness to government policy, evolving new market demand and disruptive technology ***)***	Pro – Provides sustainability and responsiveness to government policy, evolving new market demand and disruptive technology	Pro – Provides sustainability and responsiveness to government policy, evolving new market demand and disruptive technology
	Con – Less responsive to government policy, expected market demand, and disruptive technology	Con - Will require coordination of site locations between utilities and EV service providers	-	Con - Will require coordination of site locations between utilities and EV service providers
Ranking	**4**	**3**	**1**	**2**

Comparison of Utility Business Models re: EV Charging Infrastructure				
Consideration	**Business as Usual**	**Make-Ready**	**Owner-Operator**	**Utility Incentive**
Customer Impact	Pro – Allows for modest load growth from EV charging with corresponding modest benefits to all customers - least risk of loss	Pro – allows for greater load growth and benefits to all customers - increased margins and carbon credits	Pro – Enables fastest route to incremental load growth & benefits to all customers from increased margins and carbon credits	Pro – allows for greater load growth and benefits to all customers - increased margins and carbon credits
	Con – Slower EV roll-out is expected and if customers are EV drivers, less non-residential refueling options will be available	Con - MURB's may require specific considerations to ensure uptake of EV infrastructure occurs. (a make-ready program was not enough in California)	Con - MURB's may require specific considerations to ensure uptake of EV infrastructure occurs. (make-ready program was not enough in California)	Con - MURB's may require specific considerations to ensure uptake of EV infrastructure occurs. (make-ready program was not enough in California)
Ranking	**4**	**3**	**1**	**2**
Public Interest	Pro - General ratepayer interest is afforded greater protection in terms of less risk is attributed to EV infrastructure investments	Pro - General ratepayer interest is reasonably protected in terms of less risk attributable to EV charging equipment investments	Pro - EV drivers more likely to have a network of EV infrastructure to meet their refueling needs when away from home. Public interest is protected and served.	Pro - General ratepayer interest is reasonably protected in terms of less risk attributable to Infrastructure since incentives limited to the EV charging equipment
	Con - Government policy GHG targets will unlikely be achieved and therefore not serve the public interest	Con – Some diminishment of public financial interest, because some ratepayers will be impacted albeit offset by GHG benefits, and lower costs	Con – In early years some ratepayers will be impacted albeit offset by GHG benefits, and lower costs due to increased contribution to margin	Con - Public interest may not be served if third party participants are not willing to enter the market until mass adoption
Ranking	**4**	**3**	**1**	**2**
Competition	Pro - competitive market left to develop as it sees fit with no incremental utility support and involvement.	Pro- competitive market left to develop as it sees fit with some incremental utility support and involvement	Pro- With utilities jumpstarting the market, it increases the market size and possibility for more EV service providers, and further competition in the EV marketplace	Pro -Increases possibility for more EV service providers, and jumpstarting EV marketplace

Comparison of Utility Business Models re: EV Charging Infrastructure				
Consideration	**Business as Usual**	**Make-Ready**	**Owner-Operator**	**Utility Incentive**
	Con – Market will be slow to develop, since– economics precludes in near to mid-term. A high station usage rate is required to recover costs and entice market entrants	Con - Economics in the early stage suggest EV charging service providers will not enter the market until mass adoption occurs	-	Con - Economics in the early stage suggest EV service providers will not enter the market until mass adoption exists
Ranking	**4**	**3**	**1**	**2**
Level of Regulation	Pro - The role of utility and Commission would continue as usual	Pro - Increases opportunity for Commission to support provincial policy mandates	Pro – Increases opportunity for Commission to support provincial policy mandates	Pro -Increased opportunity for Commission to support provincial policy mandates
	Con - Less opportunity for Commission to support Provincial Government policy mandate	Con – roles of utility and Commission similar to BAU but slightly higher risk – tariff changes needed for a different connection policy for EV charging than for other business.	Con – roles of utility and Commission similar to BAU but slightly higher risk – tariff changes to add EV Charging Service rate schedule(s)	Con – roles of utility and Commission similar to BAU but slightly higher risk – new program approval for EV charging incentives (similar to a DSM program)
Ranking	**4**	**3**	**1**	**2**

Notes:

1. Other factors have been assessed based on judgement as to the relative ranking of where the identified criteria would fall in fulfilling the context identified above. A ranking of one indicates the highest likelihood of fulfilling the above context, whereas a ranking of four is the least likely.

FBC's response is based on the key principle that while the EV charging market is developing and requires utility participation, utilities should be key participants in the planning of EV charging facilities, including, among other things, their size and location. Once EV charging using a particular technology becomes profitable, third-parties will enter the market without requiring funding from utilities.

Therefore, FBC favours the "Owner-Operator" model, which will see utilities build stations using the same electric service cost inputs as third-parties, but taking more risk by assuming long payback periods. For dedicated EV charging stations owned by third parties the default model would be business-as-usual, but FBC is willing to explore the Make-Ready model in order to support EV adoption and EV charging market growth. For public EV charging facilities behind a utility meter where there is other electrical demand, FBC would employ the business-as-usual

model, but where policy or technical goals can be achieved, would be interested in exploring incentive programs, to support the development of adequate EV charging availability in those areas.

10.0 Reference: Exhibit C12-2, pp. 4-5, Appendix 4, p. 1; Exhibit C28-2, p. 1; Transcript, Volume 7,p. 338

EV range and number of public EV charging stations

On page 4 of Exhibit C12-2, FBC states: "A report by Mogile Technologies Inc. (the Mogile Report) documenting the number and range of rates for Level 2 and DCFC stations across Canada… identifies a number of Level 2 and Level 3 DCFC charging locations in BC and across Canada." FBC provided it's summarized version of the Mogile Report as Table 2-2 on page 5 of Exhibit C12-2, specifically indicating in footnote 10 that the table "Excludes Tesla Chargers":

Table 2-2: EV Charging Station Types in BC[10]

Type of Charging	# of Locations	# of Ports
Level 2	532	940
Level 3	42	43
Total	574	983

On page 1 of Exhibit C28-2, Tesla Motors Canada ULC (Tesla) states:

> Tesla develops Supercharger stations which contain multiple DC-fast chargers capable of delivering approximately 270 km of driving range in 30 minutes. As of February, 28 2018, Tesla operates 78 Supercharger connectors at 10 sites in the province. In addition, Tesla has partnered in the installation of 190 public "Destination Chargers" (Level-2) at over 100 sites in British Columbia.

At the Nanaimo Community Input Session, Ms. Turner suggested:

> … The research that I've done so far has indicated that the battery capacity for a full EV used to be 250 kilometres. It's now up to 383 in the particular vehicle that I was looking at.
>
> In two or three years perhaps that capacity will have increased, and therefore the need for charging stations will be reduced, just by virtue of not being concerned.[17]

10.1 Please comment on Ms. Turner's submission that when vehicle capacity increase, the distance range available will also increase. Thus, the need for charging stations will be reduced.

[17] Transcript, Volume 7, p. 338.

Response:

Ms. Turner's submission pre-supposes that installed EV battery capacity will continue to increase without appropriately considering the potential increase in the costs of the vehicle itself. Although it is possible that improvements in battery capacity may reduce the need for certain stations where adequate density of charging facilities already exists, this is clearly not the case today in BC where a number of DC fast charging stations are already experiencing congestion despite vehicles like the Chevrolet Bolt with its estimated range of approximately 380 km. It is likely that EV manufacturers will settle on battery capacities that provide sufficient range (i.e. 300 – 500 km per charge) while still ensuring the cost of the EV is not disproportionately inflated by the cost of the battery capacity. Despite this, there is also still a need for charging stations in suitable locations to support the range of current EVs (i.e. less than 200 kms). Older EVs with limited range are likely to remain on the road for some time, particularly when the reduced maintenance and increased reliability of EVs relative to conventional internal combustion vehicles is considered.

It should also be noted that despite the potential for increased battery capacities and improved vehicle range, the total amount of energy required per kilometer driven is unlikely to change materially. Although newer EVs may have to charge less often, the amount of energy required during a charging session will increase, resulting in longer charging times.

Regardless of the battery size of new vehicles, EV adoption is expected to follow a relatively steep growth curve, and there will undoubtedly be a need for more charging stations to support the increase in EVs in the province as adoption accelerates. Increased battery range is also likely to broaden the appeal of EVs in general and contribute positively to the expected growth curve.

Another effect not considered in Ms. Turner's submission is that increasing battery capacity and driving range for EVs will likely lead to EV drivers becoming more comfortable with taking their EVs on longer road trips with more driving done away from home, thereby increasing the need for a province-wide network of charging stations.

10.1.1 Please discuss how FBC's EV charging station investment decision considers the possible inverse relationship between technological growth in EV distance range and charging stations.

Response:

FBC has only deployed a single DCFC charging point at each of the five charging stations currently operated by FBC. FBC has deliberately taken a conservative approach to deploying

DCFC equipment, and has not unnecessarily installed additional charging stations where there is likely to be limited demand in the near-term. As well, FBC will continue to revisit gap analyses for identifying prospective locations for future EV charging station installations that appropriately consider the improvements in EV range.

Although FBC believes this approach is appropriate, it should be noted that a risk of “congestion anxiety” exists as a consequence of only having one fast charging port per site, which may adversely impact consumer demand for BEVs until such time as additional charging facilities are deployed.

FBC believes the total number of public charging stations required is relatively insensitive to installed battery capacity. As such, FBC does not believe an inverse relationship currently exists between increases in EV battery capacity and the number of charging stations required to adequately meet customer demand (please also refer to the response to BCUC-FBC 1.10.1). Rather, it is likely that there is a direct relationship between the number of EVs on the road and the number of public charging facilities, and in particular DCFC stations, required, based on the reasons detailed in the response to BCUC-FBC IR 1.10.1.

11.0 Reference: Exhibit C20-2, p. 2

Multi-unit residential buildings & curbside parking

On page 2 of Exhibit C20-2, AddÉnergie states:

> Direct current fast charger (DCFC) and multi-unit residential building (MURB) home charging are unlikely to be widely and comprehensively deployed in British Columbia without public utility involvement because of the current economic barriers facing charging providers and still-emerging demand for EV charging in many parts of the province. Curbside public charging faces similar cost and also regulatory challenges that are likely to inhibit its widespread deployment.

11.1 What difficulties have FBC observed regarding the installation and operation of charging infrastructure in Multi-unit residential buildings (MURBs) and curbside charging?

Response:

Although FBC has limited experience with MURB and curbside charging infrastructure installations, FBC is attempting to better understand the various potential barriers that may affect the installation of EV charging infrastructure in MURBs as discussed in the response to BCSEA-FBC IR 1.6.1. Examples of some of these barriers include difficulties in ensuring sufficient electrical capacity to provide dedicated circuits for Level 2 chargers for each individual parking stall, as well as the need to ensure that some mechanism (i.e. sub-metering) is provided to allow MURBs to properly allocate charging costs for common property stalls as well as for exclusive stalls.

For curbside installations, given that these installations are typically retrofitted to an existing curbside parking stall, difficulties can include the costs to provide electric service to the curbside station, as well as ensuring that the charging station is positioned in a manner that allows the charging cable to easily reach a vehicle's charging port. An additional consideration for curbside installations is protection from contact with vehicles or sidewalk maintenance equipment (e.g. snow clearing equipment), as well as ensuring that the overall width of the sidewalk is not compromised by the addition of a charging station.

11.2 Please discuss which EV charging business model that is most suitable for MURBs (e.g. a public utility or third-party site host owned or operated).

Response:

Utilities should build and own public DCFC chargers (and future new technologies that require support while developing). MURB charging is distinguished by not being publicly available, so a different model may be required. FBC notes that at this time, MURBs would not generally require expensive DCFC charging since EV owners would be tolerant of longer charging times while parked at their residence. MURBs may be better served by more economic Level 2 charging that does not require funding support from utilities.

Various ownership models may work for MURBs, depending on the charging service owner being enabled to receive compensation for providing the service. For stratas, the strata corporation could be the EV charging service provider, as could a third-party service provider.

11.3 Please discuss which EV charging business model that is most suitable for curbside public charging (e.g. a public utility or third-party site host owned or operated).

Response:

Please refer to the response to BCUC-FBC IR 1.11.2. It should be noted also that curbside EV charging service may in many instances be under the auspices of the local municipality and therefore exempt from Commission oversight.

On page 2 of Exhibit C9-2, the Urban Development Institute (UDI) states “Currently, BC Hydro is not allowed to provide metering to each of the stalls in parking garages in residential buildings.”

11.4 Please comment on UDI’s statement. Please discuss whether FBC is able to provide metering to each stall in parking garages in residential buildings.

Response:

FBC is able to provide individual metering to each stall in parking garages in residential buildings (similar to the individual metering already provided for RV stalls in RV parks in FBC’s

service territory); however, it would be necessary to ensure that the electricity being supplied to the parking stall is only for the intended use (e.g., EV charging).

C. TECHNOLOGY

12.0 Reference: Exhibit C1-2, Appendix A, p. 4

Future technologies

On page 4 of Appendix A in BC Hydro's Exhibit C1-2, BC Hydro discusses a new technology, AC Level 3, which is still in development.

12.1 Please discuss the considerations the BCUC should make in this Inquiry about AC Level 3 and/or other future technologies.

Response:

Although FBC believes that the BCUC should not be overly prescriptive in its considerations for future technologies, including AC Level 3, FBC does believe that it is necessary to include consideration of the importance of ensuring an adequate level of utility electrical capacity at individual charging sites such that future improvements to EV charging technologies can be readily accommodated with minimal incremental cost to customers. Additional considerations may include monitoring or addressing power quality impacts on utilities (e.g. power factor, harmonics, etc.) resulting from future EV charging technologies.

It is possible that current DCFC charging stations may become economic and competitive while newer charging technologies (such as AC Level 3) may remain uneconomic and require ongoing utility involvement.

13.0 Reference: Exhibit C12-2, Appendix 1, p. iv, p. 55

Energy Sale to the Grid

On FBC's website on the Net metering program,[18] FBC provides information regarding its Net Metering Program, including the Guidelines for Operating, Metering, and Protective Relaying for Net Metered Systems up to 50kW and below 750 volts (Net Metering Interconnection Guidelines):[19]

> These guidelines state the minimum requirements for safe and effective parallel operation of the FortisBC system with customer owned generation. Both customers and FortisBC personnel should be guided by this document when planning installations of other than FortisBC owned generation.

In Appendix 1 of Exhibit C12-2, FBC has included Background Report EV Technology and Market Overview from PowerTech dated October 19, 2016.

On page iv of Appendix 1 in FBC's Exhibit C12-2, FBC states: "Vehicle-to-Grid (V2G) is a concept that involves EVs acting as a source of energy, potentially to provide backup power or to support grid operations."

On page 55 of Appendix 1 in FBC's Exhibit C12-2, FBC states:

> …V2G has thus far largely remained the subject of small trials and pilot demonstrations. These demonstrations generally require the support of the automaker, as accessing the battery onboard a vehicle for V2G purposes either requires an inverter that is built into the vehicle, or at least vehicle software that permits reverse power flow while connected to a DC station.

13.1 Please discuss the benefits and drawbacks of EV's providing electric power to the grid. Include any current economic and technical challenges to implement V2G systems.

Response:

The extent to which the concept of V2G may become viable is the subject of some debate. Advocates of this potential use of EVs contend that utilities can enable peak load leveling (either

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[18] FBC Net metering program, https://www.fortisbc.com/Electricity/CustomerService/NetMeteringProgram/Pages/default.aspx

[19] FortisBC Inc., Guidelines for Operating, Metering, and Protective Relaying for Net Metered Systems up to 50kW and below 750 volts, p. 1. https://www.fortisbc.com/Electricity/CustomerService/NetMeteringProgram/Documents/Net%20Metering%20Interconnection%20Guidelines%20final.pdf

through a reduction in the load of utility-controlled charging stations, or the actual drawing of stored power into the grid.) Another touted benefit is the voltage and frequency regulation offered by the presence of the batteries on the system. However, it has also been noted that this type of battery cycling will likely reduce the life of battery systems that were not designed for such a use. Another complicating factor is the hesitancy of customers that may expect a fully charged vehicle to be ready when needed only to find out that the battery has been depleted for grid support. The potential benefits to the grid are reduced if participation is voluntary on a short-term basis.

With regard to FBC's current context, benefits may be more limited than in other utilities, and similar to those that can be realized through customer participation in a time-of use (TOU) rate structure. That is, the ability to defer infrastructure investment is not a near-term reality, since the system is robust and must be able to carry the full load in the absence of the connected EV load, and may require additional system investment associated with being able to absorb the power flowing back into the utility system. Benefits associated with the avoidance of power purchase costs during traditional times of peak power prices may materialize over the long term after experience has demonstrated that it is a resource that can factor in planning, however due to the long-term supply agreements enjoyed by FBC that do not vary much with the time that power is taken, these benefits are not large. For example, in the process associated with its 2017 Cost of Service and Rate Design Application (the FBC 2017 RDA), FBC noted that with a $10 per MWh spread between peak and off-peak hours, an additional 1 MW of reduced sales to customers during peak hours every day between November 1 and March 31 would result in increased revenue (through power sales of freed-up contractual power) of approximately $10 thousand.[20]

13.2 In FBC's view, should EV owners have the option to sell power to the FBC grid from stored energy in the EV's battery? Please discuss.

Response:

Please refer to the discussion of the potential value of energy stored in EV batteries contained in the response to BCUC-FBC IR 1.13.1. To the extent that the energy stored in EV batteries may have value to FBC in limited circumstances, in order to realize that value, control of the timing and amount of V2G energy, or the "option", must rest with FBC and not individual customers. In order to not have negative impacts on other customers, any unscheduled deliveries of energy to the grid would have to occur with compensation at an avoided cost rate.

[20] 2017 COSA and RDA Process, Exhibit B-16, IR 3.10

This may be less than the retail rate at which the customer acquired the energy, making such a transaction less likely to occur.

13.3 Please discuss if EV owners could currently transfer power to the FBC grid from stored energy in their EV's battery, and if so, whether EV owners receive compensation for the energy transferred to FBC. Alternatively please discuss any existing challenges that hinder an EV owner from selling energy to the FBC grid.

Response:

Please refer to the response to BCUC-FBC IR 1.13.2.

13.4 If EV owners are allowed to transfer energy from stored energy in their EV's battery to the FBC grid for compensation, does FBC anticipate it would be under the Net metering program or under a different mechanism? Please discuss.

Response:

The Net Metering program is restricted to customers with small scale clean and renewable generation intended to offset only a portion or all of the consumption at the associated premise. Unused net excess generation is only purchased on an annual basis. Both the approved eligibility requirements and the mechanics of the program make it unsuitable for the purchase by the utility of V2G energy.

In order to have value for FBC, and not shift costs to other customers, the purchase of V2G energy would need to be on an as-required basis at a compensation rate that would need to be determined as reflective of the avoided costs of alternate resources. If V2G energy was taken when required by FBC rather than on an unscheduled basis as with Net Metering, it may attract a higher value. However, FBC has not determined what this rate would be at this time.

13.4.1 If FBC considers the Net metering program to be the appropriate means to allow EV owners to sell power from EV battery storage to the FBC

grid, please discuss the necessary amendments to the Net metering program to allow for this.

Response:

FBC does not believe that the Net Metering program is appropriate for V2G applications. Please refer to the response to BCUC-FBC IR 1.13.4.

13.5 Please discuss what interconnection requirements would be placed on EV owners who would want to sell power to the FBC grid and how these requirements may differ from the ones in FBC's Net Metering Interconnection Guidelines.

Response:

It is likely that the interconnection requirements that would be placed on EV owners would be similar to those already applicable for FBC Net Metering customers. However, as described in the response to BCUC-FBC IR 1.13.2, in order for FBC to realize the value of energy stored in EV batteries, control of the timing and amount of V2G energy must rest with FBC. This requirement would likely necessitate some modifications to the existing interconnection requirements as outlined in FBC's Net Metering Interconnection Guidelines as these abilities are currently not in place (aside for the protective requirements) for controlling the timing and amount of net generation received from a net metering customer.

14.0 Reference: Exhibit C12-2, Appendix 3, p. 1; Exhibit C3-2, p. 2

Open Charge Point Protocol

On page 1 in Appendix 3 of FBC's Exhibit C12-2, FBC states:

> FBC is constructing five EV DCFC stations in five communities along the Highway 3 corridor in the West Kootenay area in BC... FBC also anticipates the development of other stations over the coming years to which the DCFC Service tariff and rates will apply.

On pages 2 of Exhibit C3-2, Drive Energy states:

> …the EVSE owner, who are also clients of vendors, are captive of a monopoly/oligopoly structure in which they are tied to the provider of the hardware (charging station) that they have purchased. As mentioned above, until the smart EVSEs operate on Open Charge Point Protocol [OCPP] like ABB, Easton or Tritium DCFCs, all level 2 hardware is tied to the same company to provide payment processing & service and are very vulnerable to uncompetitive monthly fees and payment processing fee hikes.

14.1 Do FBC's EV charging stations currently use ChargePoint, AddÉnergie, or OCPP? Further, will FBC's next generation EV charging stations use the same software? Please discuss.

Response:

FBC's DCFC EV charging stations currently use AddÉnergie's FLO network management protocol, while the network for FBC's Level 2 stations (GE Watt Stations) has been acquired by ChargePoint as GE is no longer manufacturing or supporting the Watt station.

FBC is currently preparing a request for proposals for selecting DCFC stations for future deployments, and will include selection criteria for vendors either using OCPP or identifying a pathway to ensuring compatibility between their existing network management protocol and OCPP. Although it is unknown at this time whether FBC's next generation of EV charging stations will use the same software as existing stations, FBC believes it is important to ensure vendors have either identified a pathway towards OCPP compliance, or have provided a means for FBC to take over network management should the vendor cease operation. Please also refer to the response to BCUC-FBC IR 1.15.1.

14.2 In FBC's view, please discuss the degree of captivity in the North American EV charging station market on a (i) manufacturer level and (ii) payment processing and service level.

Response:

There are currently several OCPP-compliant (e.g. ABB, EFACEC) as well as non-OCPP compliant charging stations commercially available (AddÉnergie, ChargePoint), however the composition of publicly available charging stations may differ significantly depending on jurisdiction. For example, the majority of DCFCs in B.C. are OCPP-compliant and are operating on the Greenlots network. This can be contrasted with a jurisdiction such as Québec where the majority of stations are using a proprietary network management protocol operating on either the Electric Circuit or the FLO network. As such, broadly speaking, there is a moderate degree of captivity that exists in the North American EV charging station market.

With respect to the payment processing and service level, there are a number of different options available to customers, reducing captivity. OCPP-compliant network management services such as Greenlots are able to provide payment processing and servicing for customers using a variety of different OCPP-compliant stations. Despite this, FBC notes that vendors who are using non-OCPP stations and proprietary network management protocols seem to have an enhanced focus on ensuring optimum service levels and minimizing any possible station downtime. It is assumed that this enhanced focus is intended to ensure an optimal customer experience for drivers using these stations/networks, and to maintain a positive impression of both the station and network management brand, such as in the case of FLO or ChargePoint. For station operators using OCPP-compliant equipment, this focus must generally reside with the station operator and not necessarily the station and/or network vendor.

14.2.1 What role would the BCUC play, if anything, in terms of captivity of a monopoly/oligopoly at the manufacturer level or payment processing and service level? Please discuss in light of the BCUC's jurisdiction as a public utility regulator. Are there other entities that would be more appropriate for such oversight?

Response:

FBC believes that the role of the BCUC should be primarily to issue guidelines related to safety, compatibility and Measurement Canada requirements. For instance, FBC believes the BCUC could require all utilities deploying DCFCs to ensure that proprietary station communication and network management protocols are either held in escrow should the vendor cease operation, or that the protocols are published under Creative Commons license as is the case for the protocol

currently used by FLO. Additional considerations for the BCUC may include ensuring customers are able to transact for charging services without necessarily becoming a member of a particular charging network. As well, the BCUC could consider requiring utilities to only use vendors that provide interoperability or roaming between networks, further reducing potential barriers or challenges to EV drivers (i.e. having to manage multiple accounts across multiple networks). FBC is unaware of other entities at this time that may be more appropriate for providing such oversight for publicly regulated EV charging services.

14.3 Please discuss FBC's view on the benefits and drawbacks of using OCPP. Would there be additional costs association with OCPP?

Response:

Benefits of using OCPP include, in theory, a vendor agnostic approach to network and station management that reduces the risk associated with comparable proprietary protocols should the vendor cease operation or the customer become dissatisfied with the service being provided. Additional benefits stemming from the flexibility provided by OCPP potentially include incentive for both equipment and network vendors to compete more aggressively on price and service offerings associated with their product. There is also potential for minimizing overall software development costs as OCPP would more readily permit interoperability amongst a variety of different station vendors as compared to each vendor having proprietary software with its own unique requirements for interoperability development and testing.

FBC has not undertaken an analysis to quantify what, if any, additional costs could potentially be associated with OCPP as compared to proprietary network management protocols. Despite this, it is likely that the costs associated with OCPP would, at a minimum, be comparable to existing proprietary network management protocols, if not less given the potential larger customer base that could result should the adoption of OCPP become wide-spread.

15.0 Reference: Exhibit C4-2-1, pp. 3–8; Exhibit C12-2, pp. 44–46

Upgrades in technology

FBC's Appendix 1 to Exhibit C12-2 (pages 44-46), and Donald Flintoff's (Flintoff) Exhibit C4-2-1 (pages 3-8) discuss the rapidly changing and upcoming technology in the EV charging market, for example wireless charging.

15.1 Please discuss in detail the risk of stranded assets, and FBC's plan to address the risk, if FBC's EV Charging Stations become obsolete.

Response:

Despite the use of a proprietary network management protocol for its existing DCFC stations, FBC believes that the risk of stranded assets is low. Additionally, the network vendor has published their network management protocol under Creative Commons – Attribution-No derivatives 4.0 International Public License[21] which is consistent with the publication of other network management protocols such as OCPP by the Open Charge Alliance. As a result, FBC (or other third parties) could take over network management and control of the associated station hardware in the future should the current vendor cease operations or should FBC become unsatisfied with the level of service being provided.

FBC also expects that emerging new charging technologies will take time to occupy a significant market share and that the demand for the existing EV charging stations will continue for some time beyond the point of introduction of new charging technologies. New charging technologies are likely to be introduced first in larger urban centres or the busier highway corridors. Also, the charging systems on the existing stock of EVs may not be able to accommodate the new charging system technologies. When considering the risk, it is important to note what stage of development the market is in. For example, if in an expanding market, the risk is believed to be less of a factor as opposed to when the market has reached maturity or is shrinking. The EV market is in its infancy stage. All of these factors suggest that the older charging stations will still be needed and support FBC's claim that stranded asset risk for EV charging stations is low.

15.2 Please discuss the benefits and drawbacks to FBC and other participants in the EV charging market of rapidly changing technology. In particular, what can be done to keep up while minimizing the drawbacks?

Response:

The benefits of rapidly changing EV charging technology and network management primarily include improved service to EV drivers, and a potential improved ability for utilities to rely on BEVs for grid support using either V1G and/or V2G technologies.

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[21] https://creativecommons.org/licenses/by-nd/4.0/legalcode

FBC feels that the risks or drawbacks related to evolving charging technology are low assuming that charging connectors and associated protocols are unlikely to be changed, or at least that backwards compatibility will be provided (e.g., adaptors) should a particular charging connector and protocol (e.g., CHAdeMO) be discontinued by those manufacturers currently using it. With respect to potential increases in station charging capacity, FBC has pursued a relatively conservative approach to the deployment of EV charging infrastructure which is reflected in FBC's focus on ensuring sites are "future-proofed" by ensuring additional conduit and/or space for future expansion or upgrades to existing equipment is considered at the time of initial construction of the charging site.

15.2.1 If EV charging service is regulated, please discuss what would be the BCUC's role as a regulator in relation to rapidly changing technology.

Response:

In addition to the items discussed in the response to BCUC-FBC IR 1.14.2.1, regulatory approaches may include allowing higher depreciation rates for assets with shorter useful lives and accepting more innovative forms of rate design including a levelized approach.

Please refer to the response to BCUC-FBC IR 1.6.4 for additional information.

16.0 Reference: Exhibit C4-2-1, pp. 3–6

Future technology

On pages 3-6 of Exhibit C4-2-1, Flintoff summarizes several prospective future technologies that may displace current technologies.

16.1 Please explain FBC's considerations for changes to battery technology, such as solid-state batteries, when the utility invests (owns or operates) in DCFC stations.

Response:

Although changes and improvements in battery technology as well as EV charger technology will almost certainly occur as EV adoption continues to grow, it is difficult to predict at this time when these changes would become commercially feasible. FBC is limited in its ability to address these potential changes when building a new charging site. However, when investing in charging stations, FBC would consider ensuring sufficient utility electrical capacity is available to accommodate upgrades or replacements of EV stations to charge newer battery technologies, or to power higher capacity chargers (e.g., 350 – 450 kW), when such technologies become commercially viable. Additional FBC considerations beyond those related to battery and charger technology include ensuring adequate space and rights-of-way at a charging site to accommodate changes in charging technology and potential growth in the number of stations and/or charging ports provided at a particular charging site.

FBC notes that due to the relatively short useful life of charging stations (FBC has assumed 10 year depreciation for its DCFC stations), the likelihood of unrecovered capital costs still remaining at the time when newer technologies become commercially feasible is low.

16.2 Please explain FBC's considerations for changes to high-capacity charging technology, such as 350-450kW charging rates, when the utility invests (owns or operates) in DCFC stations.

Response:

Please refer to the response to BCUC-FBC IR 1.16.1.

16.3 Please explain FBC's considerations for other changes to technology in the EV market when the utility invests (owns or operates) In DCFC stations.

Response:

Please refer to the response to BCUC-FBC IR 1.16.1.

D. RATES

17.0 Reference: Exhibit C12-2, p. 17

Rate design – utility ownership

On page17 of Exhibit C12-2, FBC states that rate design in the case of utility ownership needs to consider:

- a reasonable recovery of the cost of service itself;
- the willingness of customers to pay the rate; and
- an efficient use of the charging station.

17.1 Please discuss FBC's definition of reasonable recovery of the cost of service.

Response:

FBC's use of the phrase "reasonable recovery of the cost of service" is linked to the Electrification section of the Greenhouse Gas Reduction (Clean Energy) Regulation (i.e. section 4 (4)) which says, in part, that an electrification initiative qualifies as a prescribed undertaking "only if, at the time the public utility decides to carry out the undertaking, the public utility reasonably expects the undertaking to be cost-effective". "Cost-effective" for GGRR electrification initiatives "means that the present value of the benefits of all of the public utility's undertakings … exceeds the present value of the costs of all of those undertakings when both are calculated using a discount rate equal to the public utility's weighted average cost of capital".

FBC believes it is appropriate to apply the foregoing principles to the cost of service of EV charging stations.

18.0 Reference: Exhibit C5-2, p. 12

Rate design – public utility to home EV charging

On page 12 of Exhibit C5-2, the City of Vancouver states:

> The convenience of home charging is important enough to the viability of mass EV adoption that the City believes any regulation of the EV charging service should ensure that rates for electricity supply for home charging are reasonable and support EV adoption.

18.1 Does FBC believe that its current default residential rate structure supports / hinders EV adoption? Please discuss.

Response:

Since FBC's current default residential rate, the Residential Conservation Rate (RCR), is an inclining block rate, it would hinder EV adoption relative to other rate structures such as a flat rate or time-of-use rate. Under the current inclining block structure, the EV charging load would be incremental to other household usage and would likely be billed predominantly at the Tier 2 rate. FBC's residential rate proposals in its current FBC 2017 RDA proceeding, which are to phase out the RCR to a flat rate structure over five years and to re-establish an optional residential time of use rate, would be more favourable to the promotion of EV adoption than the current RCR. The proposed flat rate structure would accommodate all the energy use for home EV charging at the same energy rate as other household use, and not the higher second block rate. The optional time-of-use rate would allow an EV owner to charge the vehicle in off peak hours and be billed at the lower off-peak rate, thereby reducing the electricity costs for EV charging.

18.2 Does FBC believe that its proposed residential flat rate structure supports / hinders EV adoption? Please discuss.

Response:

Please refer to the response to BCUC-FBC IR 1.18.1.

19.0 Reference: Exhibit C12-2, pp. 18–19; Exhibit C1-2, p. 13

Rate design – charging station to EV customer

On page 18 of Exhibit C12-2, FBC states:

> To address the possible negative consequences of very high initial rates, the Commission has accepted approaches like adopting levelized rates in the context of new utilities or new services with growing load over a long term. FBC believes that rate-setting approaches such as these should be adopted in the context of EV charging service. A levelized approach was utilized by FBC in its FBC EV Application (Appendix 3) and resulted in a rate that falls reasonably in the range of other Level 3 charging stations in the marketplace, and also making it competitive with the cost of gasoline.

19.1 The proposed levelized rate setting mechanism is normally a product of a cost of service mechanism. Please discuss FBC's views on implementing this kind of rate setting mechanism for all site hosts/owners of EV charging stations?

Response:

The levelized rate setting mechanism proposed by FBC is appropriate because FBC is a utility that is regulated by the Commission, and it has been accepted in the past as a viable option in developing a new rate. This approach is also believed to be appropriate because the utility will be there to the end of the levelization period. The levelized approach was used to develop a rate that would be competitive with what was being charged in the marketplace for a premium DCFC service. As in the case of different prices for different grades of gasoline, DCFC service is analogous to premium gas.

In the case of site hosts and owners of EV charging stations operating in an emerging market, there will likely be different business models, cost structures, strategies, operating practices, and varying expectations of returns on investment. Generally, their interests may be more narrowly focused on geographic regions where the population is larger. Accordingly, FBC does not believe it is appropriate to impose a utility rate setting mechanism on third party operators.

19.2 If the BCUC were to regulate EV charging rates, should it be postage stamp across the province? Should there be a distinction between charging levels or location of chargers (urban/rural/curbside/MURB)?

Response:

Rates for utility electric service to EV charging stations should be set on a postage stamp basis by each utility. Rates for use of the charging stations (i.e., rates charged to EV drivers) should be approved by the BCUC where the service is regulated.

For regulated utilities, FBC believes it is appropriate to set utility specific pooled rates for EV service on a capital program basis for a period of time (for example, five years). At the end of this period, the utility would re-apply for a new pooled rate in conjunction with an overall review of the evolution of the EV charging station market. This will contribute to making the EV program dynamic and responsive to changes in the marketplace. Please also refer to the response to BCUC-FBC IR 1.5.2 for a discussion of how the rates within the time period that the pooled rate is in effect would be evaluated.

In terms of the level of charging, Level 2 charging service is very different than a DCFC service. DCFC service is a value added premium service compared to Level 2 charging. Moreover, the cost to provide DCFC is significantly higher due its performance capabilities so the EV rate should be commensurate with the service being provided. Therefore, rates may differ by charging level.

Curbside rates should adhere to the general principles discussed above within the respective urban or rural EV rates.

FBC does not see a distinction between the treatment of rates for MURBs and that pertaining to other private residential applications. Energy flowing to charging facilities located behind a customer meter should continue to attract the rates applicable to the premise at which they are attached.

19.2.1 What if the site host/owners operate under a different business model? For example, some businesses do not want to charge for service as a form of attracting customers, should regulation enforce a rate for EV charging service?

Response:

For those stations that are owned by entities that are not otherwise public utilities, charging station user rates should be determined by the owner. Electricity service to the station itself will be at a regulated COS based rate, and the ability to offer the charging service as a marketing or convenience offering should not be hindered by further regulation.

On page 18, with respect to EV customer pricing options, FBC states:

> The possible rate structures for EV charging could include time-based, energy-based, demand based or customer-based components.

19.3 Please discuss the pros and cons and impact on cost behaviour for each: time-based, energy-based, demand based, or customer-based.

Response:

FBC assumes that "cost behaviour" in the question was intended to be "customer behaviour". As further detailed below, the various end-user rate options (as opposed to station electricity supply rate options) that may be used for EV charging services each have their own particular advantages and disadvantages. FBC believes it likely that customers will be most equitably served by a combination of these rate options (e.g. energy-based with a time component for charge sessions over a certain duration) that result in accurate pricing signals reflective of costs incurred as a result of the timing and rate of EV charging required. However, the Company believes that in the case of non-utility owned charging stations, the station owner should have discretion in setting pricing.

With respect to time-based rate structures (i.e., $X per hour), advantages and impacts to customer-behavior include:

- Incent efficient use of the charging infrastructure;
- Is practical for DCFCs given the absence of Measurement Canada accredited DC metering; and
- Simple to administer.

Disadvantages and impacts to customer-behavior from time-based rate structures include:

- Does not reflect the variety of conditions affecting the rate at which a battery charges and as a result may not be equitable for all customers;
- Does not provide accurate price signals relative to the actual supply costs incurred; and
- May not incent conservation.

With respect to energy-based rate structures (i.e., $X per kWh), advantages and impacts to customer-behavior include:

- Simple for customers to understand; and
- Is more equitable for customers given the variety of conditions affecting the rate at which a battery charges.

Disadvantages and impacts to customer-behavior from energy-based rate structures include:

- Not practical for DCFCs given the lack of Measurement Canada accredited DC metering;
- Does not necessarily promote conservation or efficient use of charging infrastructure;
- May not be equitable for all customers.

With respect to demand-based rate structures (i.e., $X per kW), advantages and impacts to customer-behavior include:

- Sends the appropriate price signal related to system capacity costs; and
- May encourage off-peak charging.

Disadvantages and impacts to cost-behavior from demand-based rate structures include:

- May be confusing for customers to understand;
- May not promote conservation or efficient use of charging infrastructure; and
- May not be equitable for all customers.

With respect to customer-based rate structures (i.e., $X per charging session), advantages and impacts to customer-behavior include:

- Relatively simple to administer; and
- May incent increased EV adoption.

Disadvantages and impacts to customer-behavior from customer-based rate structures include:

- May not be equitable for all customers; and

- Does not provide accurate price signals relative to the actual supply costs incurred.

19.4 Has FBC considered Time of Use (TOU) or dynamic rate designs for use between EV charging stations and their customers? Please submit any analysis or report completed.

Response:

In the current FBC 2017 RDA (Proceeding No. 1598939) before the Commission, FBC has proposed to update its existing Time of Use (TOU) offer by updating the time periods and pricing. At this time, FBC has not invested significant resources in evaluating a TOU offering for EV DCFC service since the market is in the early stages of development. In the longer term, FBC does envision TOU as being a potential option, in conjunction with any approved Measurement Canada meters.

With regard to dynamic rate designs, the California experience is instructive. Dynamic rates are complicated and do not offer predictability for EV Drivers, therefore FBC is not persuaded that dynamic rates are the best option at this time. This sentiment is also a similar view of the CPUC, as noted in the proposed CPUC Decision to San Diego Gas and Electric's Application 17-01-20, filed January 20, 2017. Below is an excerpt of the proposed Decision.

Administrative Law Judges Sasha Goldberg and Michelle Cooke Agenda ID #16148 issued November 22, 2017, page 35; *…. we believe, at least in the near term, this type of public charging site requires more pricing predictability for potential EV charging customers.*"

On page 19 of Exhibit C12-2, FBC states "time-based rates may result in more costly charging on an energy consumed-basis for vehicles with a lower charging capacity."

On page 13 of Exhibit C1-2, BC Hydro states: "It may be possible to differentiate time-based charges to vary based on vehicle capacity to address such fairness issues."

19.5 What considerations have been made for a time-based model that is based on vehicle capacity?

Response:

As DCFC stations already identify a charging vehicle's battery capacity, it is conceivable that a rate could be developed that takes into account a number of factors including the total battery capacity of a charging EV. FBC is unaware of any examples of such a rate being implemented by station operators, nor is the Company aware of a station vendor currently supporting such a rate option.

19.6 How would FBC differentiate EV charging based on vehicle capacity? Are there any examples from other jurisdictions?

Response:

Please refer to the response to BCUC-FBC IR 1.19.5.

20.0 Reference: Exhibit C1-2, p. 7; Exhibit C20-2, p. 7

Measurement Canada

On page 7 of Exhibit C1-2, BC Hydro states:

> The introduction of a new standard is expected to take some time, and in BC Hydro's view a Measurement Canada approved DC standard is several years away. Therefore, time-based rates for DC fast charging may be the only interim option.

On page 7 of Exhibit C20-2, AddÉnergie submits "that as of March 6, 2018, Measurement Canada has not certified any commercially available DCFC device to bill on the basis of energy (kWh) or time-related demand (kW)."

20.1 Has FBC sought Measurement Canada certification for any DCFC devices to bill on an energy-basis?

Response:

FBC has not sought Measurement Canada certification for any DCFC devices to bill on an energy-basis. Typically, Measurement Canada certification for measurement devices identified under the *Weights and Measures Act* is pursued by the vendor of the measurement device, and not the purchaser or operator of the measurement device. FBC would be responsible for compliance monitoring and testing to ensure the continued accuracy of any Measurement Canada certified measurement devices, as is the case for FBC's electric revenue meters.

FBC is currently preparing a Request of Proposals (RFP) to identify prospective vendors to supply DC fast charging equipment to FBC. Part of the RFP review will include an evaluation of whether a vendor has Measurement Canada certification to measure and bill customers on electrical energy and/or demand using the metering internal to the DC fast charging station. Given the potentially significant costs that can be associated with accrediting a measurement device with Measurement Canada, FBC has no plans at this time to independently seek Measurement Canada certification of the internal metering in the five DC fast chargers currently owned and operated by FBC as these costs would likely exceed FBC's net capital investment for these stations.

20.1.1 If so, please provide application status update on such processes.

Response:

Please refer to the response to BCUC-FBC IR 1.20.1.

20.1.2 If not, does FBC have any plans to file a request in the future?

Response:

Please refer to the response to BCUC-FBC IR 1.20.1.

20.2 Please explain what difficulties exist in certifying DCFC billing devices for commercial use purposes. Is it unique to EV charging stations?

Response:

The difficulties in certifying DCFC billing devices as approved measurement devices under the *Weights and Measures Act* relate to the nature of the electrical supply being provided, namely DC power as opposed to the more conventional AC power typically provided to utility customers. Although the use of DC electricity is not unique to EV charging stations, FBC is unaware of any form of Measurement Canada approved DC metering for any DC-supplied equipment.

20.2.1 Are AC Level 2 chargers certified by Measurement Canada to charge by energy?

Response:

FBC understands that certain vendors may be able to provide Measurement Canada approved metering integrated within an AC Level 2 station. This is feasible given the existing multitude of Measurement Canada approved AC metering devices which may be integrated with a Level 2 station or may be installed as a separate sub-meter.

20.3 With respect to a rate design that differentiates time-based charges to vary based on vehicle capacity, would such rate design be possible without Measurement Canada's certification on an approved DC standard?

Response:

Based on FBC's current understanding of the *Weights and Measures Act*, such a rate may be possible in absence of Measurement Canada certification on an approved DC standard. Despite this, FBC is not aware of any station vendor currently offering functionality to charge customers a rate that varies based on vehicle battery capacity.

21.0 Reference: Exhibit C12-2, p. 19; Exhibit C24-2, p. 37; Exhibit C20-2, p. 8

Rate design – utility to charging station

On page 19 of Exhibit C12-2, FBC states:

> FBC recommends that a new rate should be developed for electricity supply to EV charging stations, since its existing retail and wholesale rate schedules contain components, such as demand charges or high customer charges that would make them inappropriate to support the development of EV charging infrastructure in the province. The rate should reflect the unique characteristics of the service being provided.

On page 37 of Exhibit C24-2, CEC states:

> The CEC notes that electric vehicle charging applies to both commercial and residential customers, and as such, the costs are appropriately included in the rate class cost of service analysis.

On page 8 of Exhibit C20-2, AddÉnergie states:

> The Commission can support the development of DCFC public charging by providing a demand charge-free charging rate. This approach has been used in Québec in a 5-year pilot (the Québec BR rate) and has substantially reduced some of the economic barriers to providing public DCFC charging.

21.1 Please explain the relevance of demand charges for EV charging stations in a business model where the public utility is selling electricity to a site host. What are the pros and cons of having demand changes at EV charging stations?

Response:

At FBC, Demand Charges are applicable to commercial customers with capacity requirements in excess of 40 kW, and are intended to reflect the costs associated with the resources (power supply and electrical infrastructure) required to serve a customer with a certain level of peak electrical demand.

The pros of applying Demand Charges for service to EV charging stations include adherence to the principle of cost causation, and the sending of a price signal related to system capacity costs. The cons of applying demand charges for service to EV charging stations, particularly where station usage is initially low, include potential difficulties for station operators in recovering Demand Charges as the rate ultimately charged to drivers may be less competitive with the costs of other energy sources used for transportation such as gasoline. Demand Charges may result in a barrier for prospective EV charging station operators, particularly while the overall number of EVs remain relatively low, and may ultimately hinder EV adoption.

Once sufficient data has been collected regarding service to EV charging stations, it is expected that the cost of peak demand on grid infrastructure would be appropriately modeled through a cost allocation study and reflected in a new rate specific to utility supply to DCFC station owners/operators.

21.2 Please elaborate on how a new EV-specific rate would be designed in a business model where the public utility is selling electricity to a site host.

Response:

FBC expects that the outcome of this Inquiry will inform the development of rates specific to the supply of electricity to EV Charging stations, whether owned by a third party or the electric utility.

It may be that existing retail rates will be the remaining viable option, or, to the point of the first reference to this IR, a rate that does not include a demand charge may be deemed appropriate to spur EV adoption. In the view of FBC, these options represent the bookends of EV rate design for the supply of electricity to charging station owners (regardless of whether or not they are a public utility).

With respect to a site host which is not a public utility, FBC suggests that no limitations be placed by the Commission on the rates that are charged to end users.

21.3 What is FBC's view of an alternative EV-specific rate class such as the current Québec BR rate?

Response:

FBC understands the Québec BR rate as a mechanism to reduce the potentially significant effect of a demand charge which is traditionally included as a component of electric utility rates for commercial customers. For DCFCs, demand charges can be significant given that a single EV charge event in a billing period may result in the same level of demand charges that would result from continuous use of a station throughout the same billing period. Given that DCFC station operators may see few or no customers in a billing period, the applicability of conventional demand charges may result in higher rates to EV drivers for DCFC service, which may ultimately hinder EV adoption if not absorbed over a longer time period. Rate options like the Québec BR rate have the potential to reduce this barrier to market entry for third-party

participants providing DCFC charging services as utility price signals will be more closely tied to the energy supplied to (and the overall use of) the DCFC station.

FBC recommends that station owners (including public utilities) are billed at the appropriate existing commercial tariff rate schedules until such time an EV-specific rate is developed.

21.4 Has FBC considered alternatives to demand charges specific to EV charging in a business model where the public utility is selling electricity to a site host? What are the pros and cons of such alternative? Please explain.

Response:

FBC has not considered alternatives to demand charges in the sale of electricity to site hosts at this time. However, a cursory review of the Quebec BR Rate suggests that it would be one approach that could support EV adoption.

21.5 Has FBC considered a TOU rate design in selling power to the site host? What are the pros and cons of a TOU rate design?

Response:

To date FBC has considered TOU rates at a cursory level. Once the market becomes more developed it is believed in the future that a TOU proposal could be submitted for the Commission's review.

Pros

Time of use rates provide different rates for different times of day and as a result send appropriate market signals to station owners as to the cost of peaking resources being used to supply energy for EV charging services. In turn, this may prompt station owners to adjust end-user rates based on when charging is occurring, promoting off-peak charging.

Cons

To the extent that station owners that are being billed on a TOU rate schedule decide to adjust end-user rates based on when charging is occurring, there is a potential for end-user confusion

or frustration. In particular, drivers transitioning from gasoline to electricity as their fuel source may find this to be an annoyance when refueling at DCFC stations.

22.0 Reference: Exhibit C19-2, p. 12; Exhibit C35-2, pp. 4; Exhibit C1-2, p. 15

Cross-subsidization

At the Vancouver Community Input Session on April 16, 2018, Toronto Hydro stated:

> EV charging decreases --and I emphasize, decreases --the rates for all utility customers. The utility bills of EV customers more than offset the costs incurred by the utility to deliver the electricity to charge the vehicles.[22]

On page12 of Exhibit C19-2, MEMPR states:

> a public utility may be able to demonstrate that the cost of public EV charging infrastructure can appropriately be recovered from revenue obtained through electricity sales at all EV charging stations within their service territories (i.e., through both public and private Level 1, 2 and 3 charging stations combined).

22.1 Please comment on Toronto Hydro and MEMPR's statements.

Response:

Toronto Hydro's statement refers to the work done by E3 (an electric vehicle consulting firm). FBC has not reviewed E3's work and is therefore unable to comment on the statement, but does consider that the particular circumstances of a utility needs to be taken into account, and such blanket statements may not have general applicability. As indicated in response to question 7 of the evidence submitted by FBC in the EV Inquiry[23], it is likely that in the early years of operation, for FBC, costs will exceed revenues and could result in small deficits based on the conventional components of cost of service analysis. However, as the demand grows over the coming years, the service may generate a net benefit to general ratepayers over time and when considering the potential for low carbon fuel credits, this could occur even in the early years.

With regard to MEMPR's statement, FBC has not completed any analysis at this point that can demonstrate that the cost of public charging infrastructure can be appropriately recovered from revenue obtained through electric sales at all EV charging stations within its service territories.

As mentioned in response to question 5 of the evidence submitted in the EV Inquiry[24], FBC believes that the power supply rate for public EV charging service should accommodate both third party or utility ownership and operation of the EV charging station. This suggests using the same utility rate for electricity supply to the EV charging station whether there is utility or third

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[22] Transcript, Volume 8, p. 373.
[23] Exhibit C12-2, page 20
[24] Exhibit C12-2, page 19

party ownership of the station. The common rate would be for the cost of electricity in the EV charging service (i.e., an input cost).

On page 15 of Exhibit C1-2, BC Hydro states:

> Structuring the provision of these activities under a non-regulated affiliate would add additional cost and complexity to the delivery of services outside of the traditional role of regulated public utilities.

22.2 If the BCUC established regulation to prohibit or limit any cross subsidization between EV user and non-EV users, please discuss FBC's alternative course of action

Response:

FBC is concerned that such a regulation would not be practical to develop and would inhibit the growth of the emerging EV market by making it difficult for regulated utilities to participate in and support development of this market. As discussed in the response to BCUC-FBC IR 1.7.1, FBC believes that the potential for significant cross-subsidization from other ratepayers is small and the issue of cross-subsidization can be re-evaluated after a period of 5-10 years. The primary focus at this time should be to help facilitate the expansion of this emerging market to support BC's climate action goals.

Further, there is no similar regulation affecting service offerings in any of FBC's other customer classes, even though the costs to serve individual customers within a particular rate class vary for a number of reasons and rates do not perfectly recover costs imposed by individual customers. The Commission reviews rates and rate structures in a rate design process but once the rates are established and approved, the Commission does not constrain any real or perceived intra-class or inter-class subsidies that may already exist or that may arise because of future changes in customers' consumption behavior (subject to future rate applications that may be filed to address particular issues).

As discussed in response to CEC-FBC IR 1.3.1, prescribed undertakings under the GGRR and section 18 of the Clean Energy Act establish projects, programs, contracts or expenditures that public utilities are permitted to undertake for the purpose reducing greenhouse gas emissions. The Commission must allow the public utility to collect sufficient revenue in its rates to recover the costs of carrying out these prescribed undertakings. The existence of prescribed undertakings for electrification initiatives, such as EV charging service, constrains the

Commission's ability to prohibit cross-subsidization and would add further complexity and impracticality to any proposed regulation to limit cross subsidization between EV charging service and other customers or rate classes.

22.2.1 Identify the additional cost and complexity aspects of a non-regulated affiliate.

Response:

FBC would not consider owning EV charging stations in its service territory as a non-regulated affiliate at this time as it would nullify the benefits of utility participation in this sector and restrict the space for third parties to provide public charging. As FBC is not proposing to own these charging stations as a part of its non-regulated business, it has not explored and identified any additional costs and complexities.

Further, as discussed in FBC's response to Question 3 in its Evidence[25], FBC believes that there are a number of potential benefits resulting from utilities providing regulated EV charging services, which include:

- the adoption of practices to support reliable EV charging service, particularly in those areas where there are very limited choices available to EV customers;
- planning for the adequacy of the local distribution system and upgrades to infrastructure in advance of deployment of the station(s)26;
- Long-term pricing stability and reliability, as utilities will not be entering and exiting the market according to the current market opportunities; and
- Costs associated with various locations can be blended so that the higher cost to serve locations are mitigated by the lower cost to serve locations.

[25] Exhibit C12-2, page 15

[26] As noted in FBCs 2016 Long Term Electric Resource Plan (FBC 2016 LTERP) at pages 90-91, proactive utility involvement in the deployment of EV charging infrastructure is critical to ensuring that any resulting system impacts are mitigated through asset management and/or system design practices.

23.0 Reference: Exhibit C35-2, pp. 5–6

EV charging stations – proposed changes to the BC Hydro Electric Tariff

On page 5 of Exhibit C35-2, for Alternating Current Electric Vehicle Charging Services (Level 1 and Level 2 AC), Victoria EVA states:

> That the charges for electricity consumption comply with the British Columbia Hydro and Power Authority (BC Hydro) Electric Tariff Terms and Conditions for the Resale of Electricity, Subsection 9.2 of the BC Hydro Electric Tariff Terms and Conditions which states as follows (with suggested revisions underlined):
>
> *i. If a Customer wishes to sell Electricity which the Customer has purchased from BC Hydro to a tenant, of that Customer at the same Premises* ***or to an owner or operator of an electric vehicle*** *on a metered basis, then the Customer shall agree that the selling price for such Electricity shall not exceed the price which BC Hydro would have charged had that tenant* ***or owner or operator of the electric vehicle*** *been a Customer of BC Hydro. This requirement shall be included in an agreement for resale between BC Hydro and the Customer.*

Similarly, on page 6 of Exhibit C35-2, for DCFCs:

> *i. If a Customer wishes to sell Electricity which the Customer has purchased from BC Hydro to an electric vehicle owner or operator on a metered basis at the same Premises, then the Customer shall agree that the selling price for such Electricity* ***shall not exceed a multiplier (TBD) of the price*** *which BC Hydro would have charged had that owner or operator of the electric vehicle been a Customer of BC Hydro. This requirement shall be included in an agreement for resale between BC Hydro and the Customer.*

23.1 In FBC's view, please discuss whether Victoria EVA's two proposals on the BC Hydro Electric Tariff are feasible.

Response:

Both of the proposals put forward by the Victoria EVA are possible approaches to establishing a reselling price for EV charging, but there are issues that would need to be resolved before adopting the Victoria EVA's suggested tariff language.

The first issue, applicable to both cases, is that BC Hydro does not have a rate schedule that pertains directly to recipients of EV charging service. One or more rate schedules would need to be developed to put Victoria EVA's proposals into effect.

Another issue that would need to be resolved pertains to Measurement Canada accreditation of EV charging measurement devices. EV charging service may be limited to charging on a time basis until appropriate accreditation of EV charging measurement devices is achieved.

A further issue from FBC's perspective is that FBC does not have similar tariff provisions for the resale of electricity, so the Victoria EVA proposals would not be applicable in FBC's service territory.

23.1.1 Please indicate whether FBC is amenable to similar changes to its own electric tariff. If so, explain how?

Response:

Other than for large volume wholesale customers (municipal utilities and BC Hydro), FBC does not have standard provisions in its tariff that provide for the resale of electricity by its customers. Section 3.7 of the FBC Electric Tariff does contemplate the possibility. However, FBC is concerned that such a blanket provision may provide customers that take service on different rate schedules to in turn provide EV charging service to end-users at different rates. This may be in contravention of determinations made during this Inquiry. As such, FBC believes, generally speaking, that it would be appropriate to wait for the Commission's findings in this Inquiry and any subsequent orders that may result from the findings before making any applications for tariff changes pertaining to electric vehicle charging. It is too early to say whether something similar to the Victoria EVA proposals would make sense for FBC to propose.

E. STORAGE AND GRID STABILITY

24.0 Reference: Exhibit 24-2, p. 37; Exhibit C4-2, p. 15; Exhibit C19-2, p. 13; Exhibit C12-2, Appendix A, p. 55; Exhibit 25-2, pp. 6, 15

Grid optimization and impact

On page 37 of Exhibit C24-2, Commercial Energy Consumers Association of British Columbia (CEC) states:

> [Fast] DC charging stations utilize a great amount of power for short periods of time, potentially meaning that additional upgrades will be required to the distribution network.

On page 15 of Exhibit C4-2, Flintoff states:

> There is a financial risk of substation, and distribution upgrades that most likely to occur since the EV charging stations will add significant load on the system which, in some cases, has not been designed to accommodate the new load. Because of the high power requirements of up to 240 kWatts per station, they can't just be connected to the grid anywhere.

24.1 Please discuss whether EV uptake will require distribution system upgrades on FBCs system.

Response:

As with any new load, the addition of EV charging stations has the potential to drive the requirement for distribution system upgrades. However, FBC is unable to speculate on the impact that specific levels of EV uptake will have on distribution system infrastructure or the cost. The potential for charging station installations to trigger the requirement for a system growth project is highly location-specific, as it is dependent on the amount of available capacity on existing upstream infrastructure. In many locations, no offsite upgrades will be required to accommodate a new charging station. However, in locations where there is limited available capacity, upgrades to items such as distribution transformers, primary overhead or underground distribution conductor, or even substation equipment could be required in order to accommodate the new load. The cost of these upgrades could vary significantly based on the magnitude of new loads and the specific locations.

24.1.1 What level of EV adoption would trigger the need for improvements to the distribution system?

Response:

Please refer to the response to BCUC-FBC IR 1.24.1.

24.1.2 What type of upgrades would be necessary to support various levels of EV adoption? And what are the associated expected costs.

Response:

Please refer to the response to BCUC-FBC IR 1.24.1.

24.1.3 What strategy or tools has FBC contemplated to identify EVs load requirements and their effects on the distribution and grid system?

Response:

When a new service or a service upgrade is requested for an EV charging station, FBC requires that a connected load form be submitted by the customer's electrician. The project scope for such an extension or upgrade will include any measures necessary to ensure that the distribution network can safely and reliably serve both new and existing load.

In broader terms, FBC is monitoring charging station installations and will analyze the impact on its distribution networks as detailed in Section 6.4.2 of the FBC 2016 Long Term Electric Resource Plan (2016 LTERP).[27]

24.1.4 From FBC's perspective, who should bear the costs of these necessary upgrades and why?

[27] http://www.bcuc.com/ApplicationView.aspx?ApplicationId=565

Response:

Extensions or additions to the FBC distribution system are governed by Schedule 74 of the FBC Electric Tariff. This Schedule contains provisions that protect other customers from bearing the costs associated with such additions or extensions, while providing a contribution to the cost of the extension equivalent to what existing customers receive through rates. FBC views the addition of new EV charging stations to be consistent with other extensions or additions which should continue to be treated under the terms of this Schedule, as with any other extension requiring more than a drop service.

24.2 Please discuss whether FBC has conducted any load forecast analysis related to EV charging. What is the proportion of EV charging relative to FBC's total load forecast? Please summarize the assumptions.

Response:

FBC's load forecast does not specifically include a component relating to EV uptake and the resulting EV charging load. The FBC load forecast is based on modelling of the various rate classes, such as residential and commercial customer segments, based on historic actual data, population, gross domestic product growth and other factors, rather than specific end uses, such as EVs. At the current time, FBC believes that EV charging represents an immaterial portion of the current system load as EV penetration in the FBC service area is low.

However, FBC recognizes that EV growth may be significant over the longer term, and has developed load scenarios as part of its 2016 LTERP, discussed in Chapter 4. Under the high EV penetration scenario, EV charging could increase annual energy requirements by 11 percent and peak demand requirements by 15 percent by 2035, relative to the reference case load forecast. FBC had not developed load scenarios, estimates or forecasts which included the impacts from EVs in previous LTERPs.

In the 2016 LTERP, five load scenarios were developed by Navigant Consulting, Ltd. (Navigant) and included different levels of EV penetration and other load drivers, such as rooftop solar and fuel switching, over the twenty-year planning horizon (2016 to 2035). These load scenarios were developed to help determine the potential impacts of non-historical load drivers compared to the reference case load forecast, which is based on historical load drivers, in order to inform FBC's potential future resource requirements. The various load scenarios are not considered forecasts but rather potential future load outcomes, more likened to a "what if" analysis, based on certain assumptions. Scenario 1 included load drivers that increased load relative to the reference case load forecast while Scenario 5 included only those load drivers that decreased

load relative to the reference case load forecast. Scenarios 2 to 4 included a combination of load drivers that increased and decreased load, resulting in energy and peak load demand impacts in between Scenarios 1 and 5.

The five load scenarios assumed different levels of EV penetration, from zero percent in Scenario 5 up to 50 percent of new vehicle sales being EVs by 2035 in Scenario 1. Other assumptions included in Navigant's development of the EV load driver included the following[28]:

- The distribution of home charging type (i.e., Level 1 or Level 2) is assumed to be a function of EV penetration. It is assumed that by the time half of all vehicles purchased are EVs, then three quarters of all home charging will be delivered using a Level 2 charger.
- It is assumed that there is an average of 1.4 vehicles per residential customer in the FBC service territory. This is derived from the assumption that there are 1.4 vehicles per household in B.C.[29]
- Personal vehicle stock is assumed to turn-over at a rate of 7.1% per year. This is based on:
    - Estimated new motor vehicle sales in B.C. for 2014[30]
    - The total number of BC road vehicle registrations in 2014[31]
- Battery EVs continue to be sold in same proportion (relative to Plug-in Hybrid EVs) as 2015: two-thirds Battery EVs, the remainder Plug-in Hybrid EVs.[32]

For the highest level of EV penetration in the FBC service area, under Scenario 1, the EV growth assumption is as follows (PHEV refers to plug-in hybrid EV, BEV refers to battery EV):

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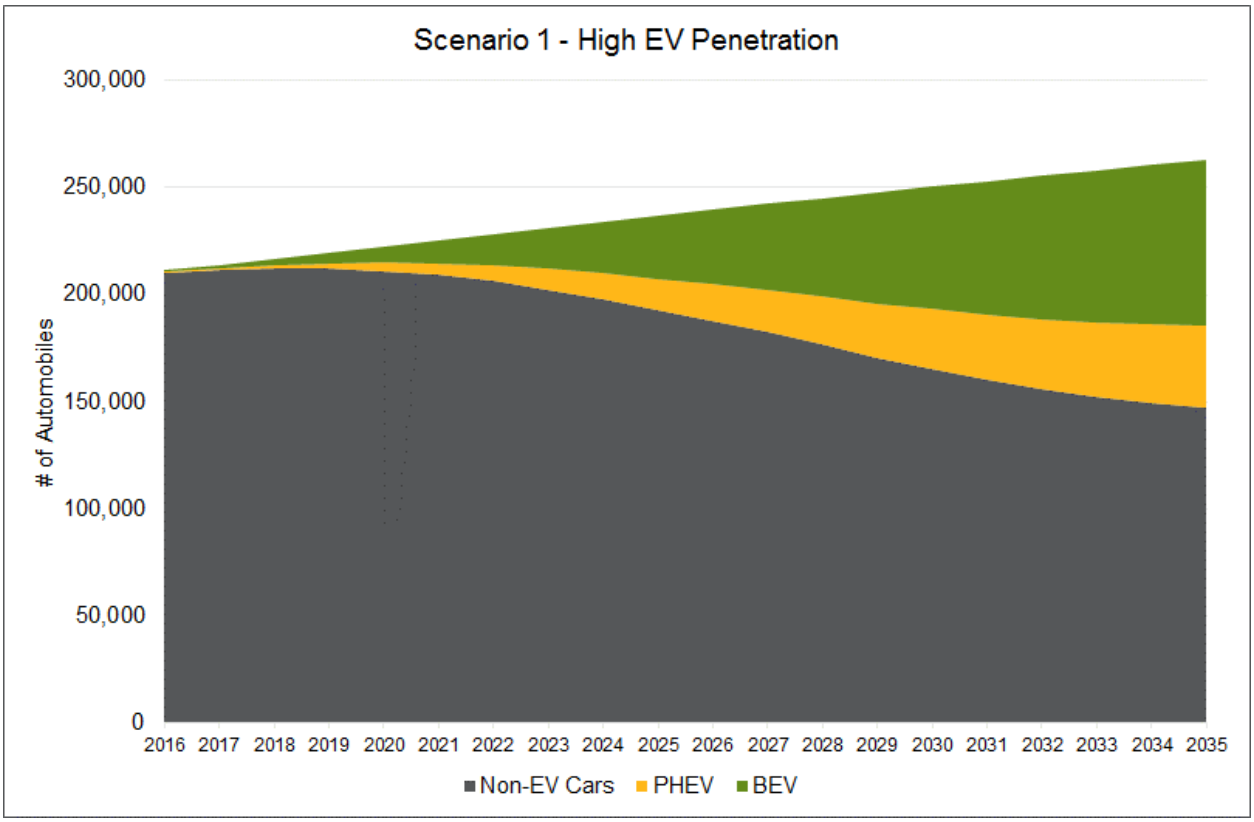
[28] FBC 2016 LTERP, Appendix G, Section 3.2.2.

[29] Natural Resources Canada Office of Energy Efficiency, *Canadian Vehicle Survey: 2009 Summary Report*, 2010
http://oee.nrcan.gc.ca/publications/statistics/cvs09/pdf/cvs09.pdf
See Figure 10

[30] Statistics Canada, CANSIM Table 079-0003 New motor vehicle sales by province (British Columbia), accessed February 2016
http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/trade36j-eng.htm

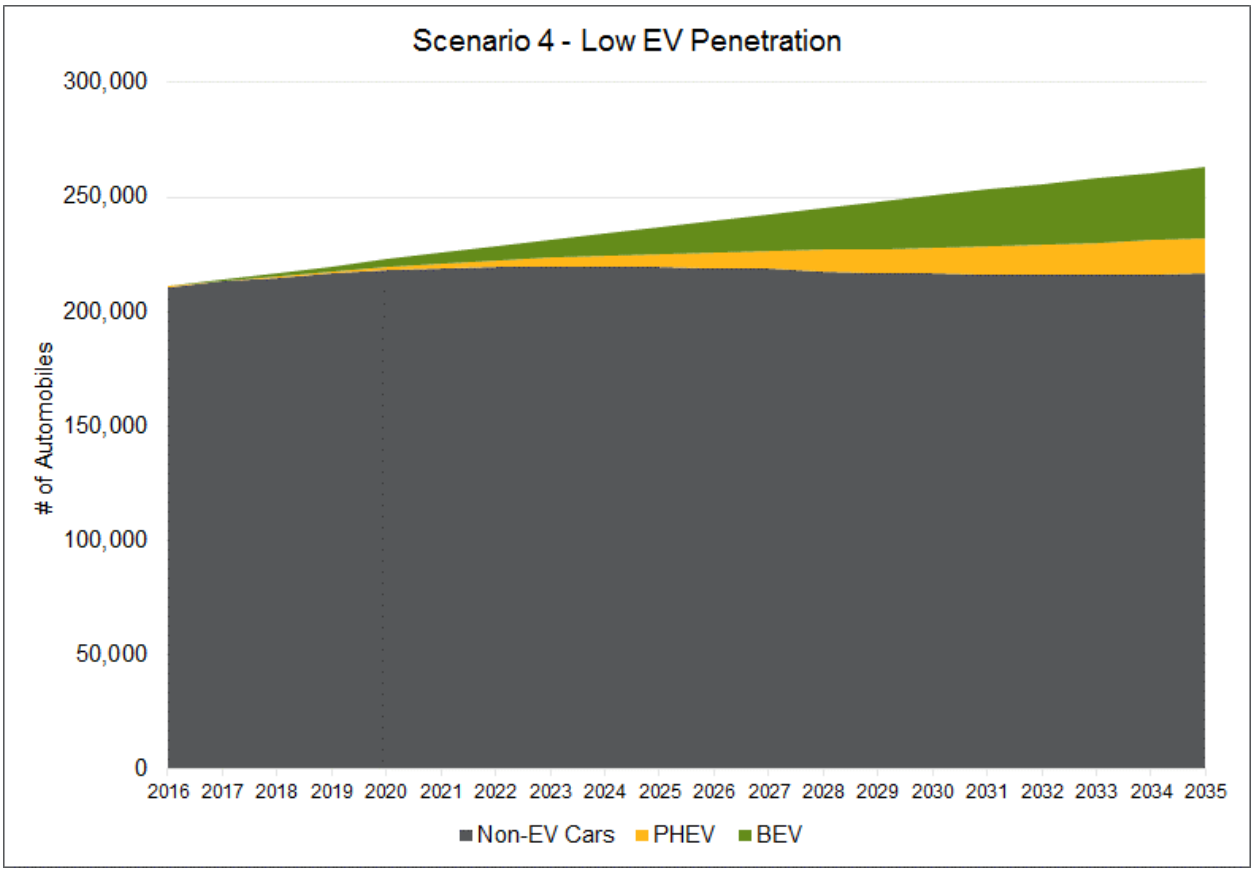
[31] Statistics Canada, CANSIM Table 405-0004 Motor vehicle registrations, by province and territory, accessed February 2016
http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/trade14c-eng.htm

[32] Klippenstein, Matthew, *Canadian Plug-In Electric Vehicle Sales*, GreenCarReports, accessed February 2016
https://docs.google.com/spreadsheets/d/1dLFJwZVdvNLRpmZqPznlzz6PB9eHMe5b-bai_ddRsNg/edit#gid=25
NB: vehicle sales are listed by vehicle make and model, not by BEV/PHEV classification. Vehicles were classed as BEVs, PHEV10s, PHEV20s and PHEV40s by Navigant staff.



The figure above shows EVs represent 15 percent of automobiles by 2024. By 2030, EVs represent 34 percent and by 2035, 44 percent of all automobiles are EVs, which could be considered mass adoption of EVs.

For the lowest level of EV penetration (other than the zero EV case), under Scenario 4, the EV growth assumption is as follows:



Under this Scenario 4, EVs represent 6 percent of automobiles in 2024 and EVs do not represent 15 percent of automobiles until 2031.

Navigant estimated the load impacts of EVs based on the following factors:

- The average annual consumption of electricity by type of vehicle[33];
- Navigant's estimated charging load profiles, developed based on modeled results for California[34] and the survey findings of an EV-specific study conducted in B.C.[35]; and,
- The typical charging capacity of Level 1 and Level 2 charging stations.[36]

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[33] ICF International and E3 on behalf of California Electric Transportation Coalition, *California Transportation Electrification Assessment – Phase 2: Grid Impacts*, October 2014. Drawn from Table 1. http://www.caletc.com/wp-content/uploads/2014/10/CalETC_TEA_Phase_2_Final_10-23-14.pdf

[34] Ibid, Figure 6

[35] Axsen, Goldberg, et al, *Electrifying Vehicles (Early Release): Insights from the Canadian Plug-in Electric Vehicle Study,* Energy and Materials Research Group, Simon Fraser University, August 2015 http://rem-main.rem.sfu.ca/papers/jaxsen/Electrifying_Vehicle_(Early_Release)-The_2015_Canadian_Plug-in_Electric_Vehicle_Study.pdf

[36] National Research Council, Overcoming Barriers to Electric Vehicle Deployment: Interim Report, 2013

Navigant's load charging profiles included consideration of residential home charging as well as workplace charging, due to differences in the profiles for these two segments in terms of the timing and magnitude of the EV charging. More details are provided in the FBC 2016 LTERP Appendix G, Section 2.2.

Based on these assumptions for the EV load driver, Navigant determined the potential long term energy and peak demand impacts within the five scenarios, relative to the reference case load forecast. For Scenario 5, with the highest level of EV penetration, EV charging added 494 GWh per year relative to the reference case energy forecast of 4,334 GWh (including system losses) by 2035, or about 11 percent.[37] Under the same scenario, EV charging added about 132 MW to the reference case peak demand forecast of 885 MW in winter and 716 in summer by 2035, or about 15 percent and 18 percent, respectively.[38] This assumes that the EV charging occurred during the peak demand hours of the day and so the impacts on peak demand would be less if EV charging occurred during non-peak times.

Navigant did not specifically model the impacts from EV public charging stations in the load scenarios and so FBC is not able to differentiate the load scenarios demand between home EV charging and public EV charging stations. Instead, Navigant modelled charging by level 1, 2 and direct current (DC) fast charging and assumed that DC fast charging is a function of overall EV penetration and increases through time, accounting for 15 percent of charged energy at its peak penetration. DC fast charging could be applicable to some public charging stations as well as some residential and workplace charging units.

As discussed in the 2016 LTERP, FBC owns and operates five public DC fast charging stations in its service territory. Over time, FBC will be able to collect and assess the data regarding public charging usage to identify charging patterns and help predict future EV usage growth. This information may be able to help inform future load forecasts or scenario development in terms of EV public charging station impacts in the future.

While FBC does not expect the cost to develop a long term EV charging forecast to be significant, it is important that there is an appropriate amount of historical EV charging data in order to enable extrapolation of the date into a forecast. Relying on the experiences of other jurisdictions can provide directional indicators but is not relevant enough on its own to provide a reliable forecast specific to EV charging in the FBC service area.

http://www.nap.edu/catalog/18320/overcoming-barriers-to-electric-vehicle-deployment-interim-report

[37] FBC 2016 LTERP, Appendix I, page 4.

[38] Ibid, page 5.

24.2.1 If available, please compare FBC's current load forecast related to EV charging against previous estimates.

Response:

Please refer to the response to BCUC-FBC IR 1.24.2.

24.2.2 Is FBC able to differentiate the load forecast demand between home EV charging vs. public EV charging stations? Please discuss.

Response:

Please refer to the response to BCUC-FBC IR 1.24.2.

24.2.3 If there is no load forecast analysis available, please explain why. Discuss the information and costs required to conduct one.

Response:

Please refer to the response to BCUC-FBC IR 1.24.2.

On page 13 of Exhibit C19-2, states "MEMPR encourages utilities and the Commission to explore innovative pilots such as time-of-use rates for EV charging, incentives from utilities for home and workplace charging, control of charging software and system network capability."

24.3 What considerations has FBC made with respect to incentives for home and workplace charging, control of charging software and system network capability? Please summarize any analysis or report if available.

Response:

FBC at this time does not provide any incentives for home or workplace charging, but is exploring various options it may provide in the future.

FBC is aware that EV charging station rebates are currently available through Plug In BC for single/duplex, multi-unit residential and workplaces, for up to 75% of the cost of the installations. Additionally, the province is incenting EV purchases until March 31, 2020 or until funds are exhausted.

A June 2016 report by Esource indicates utilities are using a variety of approaches to support EV adoption:

> … common offerings such as time-of-use (TOU) rates, rebates, workplace charging challenges, infrastructure support, and outreach and education campaigns. We also found some unique offerings, including EV on-bill financing from Illinois Rural Electric Cooperative and an innovative group purchase discount supported by two Colorado municipal utilities. New Brunswick Power offers free charging at utility-owned charging stations and Hydro Québec conducted Canada's largest EV demonstration project. Altogether, we've seen most utilities taking a multipronged approach to … [EV] barriers.[39]

An October 2017 report by Esource addressed utility load management of EVs, many of which were pilots:

> TOU rates provide a simple incentive for EV owners to shift charging to off-peak times. Smart (utility-controlled) charging represents a next step forward for EV demand response (DR) and load management programs, wherein utilities communicate with EV supply equipment to suspend charging or reduce the rate of charging during peak events.

FBC is aware of controlled charging pilots run by Toronto Hydro, Pacific Gas and Electric Co., Xcel Energy, and Southern California Edison. In addition, San Diego Gas and Electric Co. runs a pilot aimed at the multifamily and workplace charging markets, using day-ahead dynamic hourly prices to influence smart EV charging during off-peak hours. Also, Consolidated Edison offers incentives for residential customers who charge their EVs during utility-preferred times."[40]

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[39] How Utilities Are Taking Charge of Electric Vehicle Adoption. Katie Albee, Ryan Odell. June 17, 2016. https://www.esource.com/DSM-RB-20/EV-Adoption#toc_2 (Note: Esource is a subscription based consultancy).

[40] Electric Vehicle Charging Programs for Load Management. Ryan Odell. October 27, 2017.

On page 6 of Exhibit C25-2, ChargePoint states that "…we have designed the network to allow other parties, such as electric utilities, the ability to access charging data and conduct load management to enable the most efficient load integration with the grid."

On page 15 of Exhibit C25-2, ChargePoint states:

> Smart, networked charging provides new flexibility to enable more grid benefits than traditional load management, and valuable data can be collected to inform better utility planning decisions and help maintain reliability and affordability. Based on the data collected from smart charging stations, new processes can be created to better integrate EV charging utilization with available electrical capacity – helping balance loads and reduce the costs of providing clean energy.

24.4 Please comment on the benefits of utility participation with respect to smart metering, load management and efficient grid utilization under various scenarios of utility participation.

Response:

FBC currently receives hourly or 15 minute data (depending on the size of the electric service) from the AMI meters at electric vehicle charging stations. However, if more detailed consumption data from each charging head is available from a charging network, FBC can better understand how a station is used and can work with station owners to design and implement demand reduction strategies. It is not clear whether this data would be available from third-party stations.

FBC expects demand reduction strategies would generally take the form of incenting consumption at off-peak times, or reducing the vehicle charging usage rate during peak times.

1.0 Reference: Preamble:

Exhibit C12-2, page 13 (lines 35-38) and page 18 (lines 8-9)

Preamble: The Evidence states (p. 13) that: "The level of regulation and Commission involvement can be less than under traditional utility monopoly regulation".

The Evidence also states (p. 18) that: "If EV charging is to be provided by a utility, it is appropriate to continue to use the cost of service model as the starting point to establish rate design and adapt it to the emerging market"

1.1 Please reconcile the statement that "the regulation and Commission involvement can be less than under traditional utility monopoly regulation" with the statement "it is appropriate to continue to use the cost of service model as the starting point to establish rate design".

Response:

FBC does not see conflict between these two statements. Using a cost of service model as a starting point for rate design for utility-owned EV charging service is not inconsistent with taking a more light-handed approach to regulation. The cost of service model itself is well known and understood and therefore provides a familiar and useful starting point for rate design considerations. However, using a cost of service approach for utility owned charging stations does not mean that related regulatory processes have to be complicated or extensive.

FBC believes that electric utility participation in the provision of EV charging service, and the appropriate level of regulation by the Commission, is important in this emerging market. The Commission could consider different levels of regulation, such as light-handed regulation or traditional monopoly regulation with some changes, to support the expansion of the EV market in BC. While regulation is needed to ensure the safety, inter-operability, and reliability of the EV service providers, strict adherence to traditional cost-based regulation on how providers price their charging services could stifle growth and investment in the EV charging infrastructure. Therefore, it might be appropriate to use the cost of service model as a starting point to establish rate design but the pricing model needs to consider other factors that can promote the expansion of the EV market. As discussed in response to Question 4 of FBC's evidence on the EV Charging Inquiry[1], to address the possible negative consequences of very high initial rates, the Commission has accepted approaches like adopting levelized rates in the context of new

[1] Exhibit C12-2, page 18

utilities or new services with growing load over a long term. FBC believes that rate-setting approaches such as these should be adopted in the context of EV charging service. A levelized approach was utilized by FBC in its Application for Approval of the Rate Design and Rates for EV DCFC Service (the FBC EV Application) (Exhibit C12-2, Appendix 3) and resulted in a rate that falls reasonably in the range of other Level 3 charging stations in the marketplace, and also makes it competitive with the cost of gasoline.

FBC believes that in an emerging EV market, there is room for both public utilities and non-regulated entities to participate and that any concerns can be mitigated through appropriate oversight by the Commission, such as through the establishment of guiding principles that would allow utilities to support the development of EV markets in BC. Please also refer to the response to BCUC-FBC IR 1.1.6.

1.2 Please provide more details on how FBC envisions public utility-owned EV charging stations being regulated and, in particular, what involvement the Commission would have in that or those scenarios in the setting of both the overall level of costs to recovered and pricing options for the services provided.

Response:

Please refer to the response to BCOAPO-FBC IR 1.1.1.

2.0 Reference: Exhibit C12-2, page 13 (lines 14-18) and page 16, (lines 5-8)

2.1 Given that "a competitive environment for services provided by EV charging stations does not currently exist in BC", should one of the objectives of public utility participation be to foster the development of a competitive market for EV charging services?

Response:

FBC agrees that one of the objectives of utility participation should be to foster the development of a competitive market for EV charging services. However, as noted in response to BCUC-FBC IR 1.1.1.1, in today's emerging EV market, it is challenging for third-party service providers to be profitable. This is because of financial barriers due to the cost of EV charging station ownership and low demand. FBC believes that until the time that the EV market becomes competitive, utilities play an important role in supporting the growth of the EV market by facilitating the deployment of EV Charging Infrastructure to meet BC's climate action goals in reducing GHG emissions.

2.1.1 If not, why not?

Response:

Please refer to the response to BCOAPO-FBC IR 1.2.1.

2.2 Would third-party (private sector) providers incur higher costs (e.g. cost of capital) to install and maintain EV charging station infrastructure than public utilities?

Response:

FBC cannot be certain whether third-parties would incur higher costs for EV charging station infrastructure than public utilities. Costs will depend on the specific third-party and the specific utility involved, and will also be influenced by situation-specific factors.

2.2.1 If not, why not?

Response:

Please refer to the response to BCOAPO-FBC IR 1.2.2.

2.2.2 If yes, how does setting the rates for EV charging services provided by public utilities at (or initially below) the cost incurred by those public utilities to provide such a service promote the entry of third-party providers and, thereby, foster a competitive market for EV charging services (i.e., the existence of charging stations owned/operated by public utilities offering services at or below their "cost of service" could prevent other parties from entering the market)?

Response:

As stated in the response to BCOAPO-FBC IR 1.2.2, FBC cannot be certain whether third-party providers would incur higher infrastructure costs.

FBC established its EV rate based on its cost of service, effectively setting an initial floor price for EV service, inclusive of subsidies from government and other parties and an earned return component. The cost breakdown provided by FBC provides potential investors with information useful for evaluating whether their company will enter the marketplace.

With market competitive cost of service rates, EV adoption is supported as drivers will save money as compared to the price of gasoline, which in turn should help enable growth in EV adoption. As discussed in response to BCUC-FBC IR 1.1.2, substantial EV adoption is a critical element to third-party entrant decision making and subsequent participation. Without it, it is unlikely third parties will enter the marketplace. A competitive market requires lots of buyers and many participants. Charging stations owned and operated by utilities will help to increase the demand from EV drivers, and will help to grow mass EV adoption and as a result more third-party provider participation as EV adoption grows. This is because, depending on the

site/location of the third-party owned/operated EV station, there will already be an existing and growing market to serve with the potential for high station usage which is a key component of improving EV economics. The early investment by utilities in charging facilities can be considered as planting the seeds for future EV growth and market development.

2.2.3 How should the Commission address this issue?

Response:

Please refer to the response to BCOAPO-FBC IR 1.2.2.2.

3.0 Reference: Exhibit C12-2, page 18 (lines 13-19)

3.1 What are the barriers to charging stations having a meter that is approved by Measurement Canada? Are the barriers different for public utilities versus private owners?

Response:

Please refer to the response to BCUC-FBC IR 1.20.1.

4.0 Reference: Exhibit C12-2, page 8 (lines 2-4) and page 18 (lines 30-35)

4.1 In FBC's opinion, would an EV charging service which used a time-based rate that charged for the use of the space (regardless of whether the EV charging service was actually used or not) be considered a public utility?

Response:

Yes, it would be. The UCA contemplates compensation as being much broader than a charge per unit of energy, and the mere fact that time occupying a space is being used as the basis for calculating a charge would not preclude that service from being regulated. For reference, "compensation is defined as:

> "compensation" means a rate, remuneration, gain or reward of any kind paid, payable, promised, demanded, received or expected, directly or indirectly, and includes a promise or undertaking by a public utility to provide service as consideration for, or as part of, a proposal or contract to dispose of land or any interest in it;

The key point is that space to park the vehicle is a necessary component of the service.

Charging for a charging space location regardless of use is intended to remove the incentive for a customer to use the EV charging locations as preferred parking spots. Premium pricing for the service based on the time the space is occupied can be conceived of in traditional rate design terms as a form of value of service pricing, or a capacity-based cost allocation that recognizes the provider's cost of the space and/or opportunity cost.

In the context of Exhibit C12-2 and the pages referenced, FBC's EV service is based on assets that are placed into service to deliver energy to EV drivers that need refueling. It is important for EV stations to allow as many charging sessions as possible in a day and maximize the customer throughput. Often EV charging stations are located with parking spots close to buildings, or other preferred locations, so having a time based rate is intended to encourage customers to charge and immediately leave the EV charger, similar to a gas station.

5.0 Reference: Exhibit C12-2, page 19 (lines 12-16)

FBC's 2017 RDA, page 4

5.1 Please explain further why the existing retail rates are inappropriate to support the development of EV charging infrastructure in the province (per page 19).

Response:

Please refer to the response to BCUC-FBC IR 1.21.1 which discusses some of the challenges associated with existing retail rates for service to DCFCs, including the potential for demand charges to result in a barrier for prospective EV charging station operators.

5.2 Please reconcile the approach proposed for the rate design applicable to electricity sold to EV charging stations with the principles for rate design that FBC has used in its current 2017 RDA.

Response:

FBC does not believe there is a need to reconcile the rate design principles that underpin the 2017 RDA with those that factor into the development of a rate for supply to EV charging stations. Both utilize a cost-of-service methodology that seeks to properly recover cost directly from the appropriate customer to the extent possible. In the case of the EV supply rate, consideration is also given to the relatively immature state of the EV marketplace and the policy environment that exists to promote EV adoption. This has resulted in FBC proposing a rate that is levelized over a longer term, which is not typical for the setting of rates generally.

1.0 Topic: AES Inquiry principles

Reference: Exhibit A2, p.1

"In 2012, the Commission issued a Report on the Inquiry into the Offering of Products and Services in Alternative Energy Solutions and Other New Initiatives (AES Report)1 for regulated public utilities who provide products and services outside traditional utility activities. Principles were established in that inquiry in which the Commission would only regulate where necessary, and regulation should not impede competitive markets. The Commission intends to adopt these key principles in this Inquiry."

1.1 Would FBC agree that the context of the EV charging inquiry is somewhat different than the context of the AES inquiry in that the underlying need for EV charging service by EV drivers is very small and is expected to quickly grow substantially, whereas the need for thermal energy services (e.g., space and water heating within buildings) is already a fully developed existing need and what was addressed in the AES Inquiry was new methods of meeting the need?

Response:

The objectives of the AES Inquiry were set out on page 2 of the AES Inquiry Report (Order G-201-12) as follows:

a) Provide guidance to future Commission Panels dealing with applications related to new business activities;

b) Provide guidance to FEU and other utilities dealing with or entering into new business activities outside of the traditional gas distribution utility business;

c) Provide clarity as to the Commission's views on activities that should be regulated and activities that should be kept outside the regulatory umbrella;

d) Provide guidance as to how new activities that are to be regulated should be structured so as to be fair to the traditional ratepayer, the user of the new service and the utility;

e) Provide direction as to how EEC or other incentive funds should be administered to ensure fair, effective and non-discriminatory treatment;

f) Address specific issues referred to the Inquiry Panel from other proceedings; and

g) Provide direction to FEU as to a process to deal with the Thermal Energy Services Deferral Account.

Items a) to d) above are quite general and the AES Inquiry Report guidance in these areas should be considered in this Inquiry for their relevance and applicability.

The EV Charging Inquiry context has some differences relative to the context of the AES Inquiry. The anticipated growth rate in the EV charging market may be greater than the growth anticipated in the thermal energy services (TES) market mentioned in the question but growth was expected for the TES market at the time of the AES Inquiry. FBC provides the following comments on differences in the context for these two inquiries:

1. The customers of EV charging service (i.e., EVs) are mobile and have access to charging service in various ways and locations while the thermal energy services market is about the energy services required in a fixed location such as a home, a condo building or a particular area of a municipality.

2. EV charging service available to the public can be provided by a variety of public and private entities, including self-provision by the EV owner at home, private businesses, municipalities, other government entities and NGOs, and public utilities. For thermal energy services, there is generally only one service provider at any given location (although thermal energy systems may be owned and operated by various parties).

3. The EV charging market is characterized by a greater variety of business models than the thermal energy services market. Some parties in the EV charging market are prepared to provide EV charging service for free or below cost. Others, such as municipalities, are motivated by achieving environmental objectives and may settle for simple cost recovery or less. Parties with a profit motivation are expected to emerge over time. In contrast, the thermal energy services market in BC is by and large for profit with some variations based on the party owning the thermal energy system.

1.2 Would FBC agree that the EV charging inquiry differs from the AES Inquiry in that in the EV charging situation there is arguably a strong public interest in facilitating and encouraging the growth of overall demand for the EV charging services, whereas in the AES Inquiry there was no corresponding public interest objective in increasing the overall demand for, e.g., space and water heating within buildings?

Response:

FBC does not agree with the proposition in the question that the public interest is broader in regard to expansion of EV adoption and the necessary EV charging infrastructure than it was in the AES Inquiry. The AES Inquiry involved more areas than just thermal energy services – it also included consideration of Biomethane (Renewable Natural Gas), natural gas for transportation (CNG and LNG) and aspects of Demand Side Management.

There were strong public interest considerations in all of the areas of the AES Inquiry, motivated by the recent provincial energy policy and legislation targeting energy efficiency and conservation and GHG emission reductions. At the time of the AES Inquiry, demand growth was expected in all of the areas reviewed; for thermal energy service the goal was to pursue low carbon energy solutions in the built environment to displace conventional energy solutions. So while overall growth in space and water heating was not in view, there were definite goals for low carbon thermal energy systems to capture a growing share of overall demand in these areas.

One notable difference between public involvement in the current EV Charging Inquiry and the AES Inquiry is the greater level of interest in the issue from the general public. Public interest in EV adoption and EV charging infrastructure extends to the level of individual EV owners or prospective purchasers of EVs, as well as grassroots-type organizations, while the public involvement in the AES Inquiry was confined more to the level of governments, utilities and corporations such as energy services companies.

1.3 Would FBC agree that the Commission's AES Inquiry Report does not directly address how regulatory principles ought to apply where growing the end use of the energy, e.g., charging EVs, is itself a public interest objective and there are insufficient existing non-regulated services to meet the need?

Response:

As noted in the response to BCSEA-FBC IR 1.1.2, FBC believes that there were strong public interest considerations pertaining to the services reviewed in the AES Inquiry and anticipated growth in demand for the services, analogous to the circumstances being considered for EV charging in this Inquiry. That being said, there are unique qualities of EV charging service and EV charging service markets that distinguish this Inquiry from the specific services reviewed in the AES Inquiry. Most of the AES Inquiry determinations and recommendations were specific to the services reviewed (Biomethane, CNG and LNG service, thermal energy service and some demand-side management issues). As such, the findings of the AES Inquiry Report may provide

general guidance in this Inquiry, but whether they are applicable or not, would have to consider the specific circumstances with respect to EV charging service in BC.

2.0 Topic: Emerging market

Reference: Exhibit C12-2, FBC Evidence, p.11

"EV charging and the adoption of EVs can be characterized as being in an emerging market that is closely connected to public utility activity by virtue of using electricity from the grids of public utilities such as FBC and BC Hydro.

The market is emerging (and not competitive) because:

- There are financial barriers to entities entering the market due to demand being low and therefore infrastructure is not cost effective, even when considering subsidies and incentives from government and other agencies;
- There are few buyers and sellers; and
- The few customers have limited choice in who they buy from.

"To promote the development and growth of the deployment of EVs and EV charging infrastructure in BC, electric utilities are playing an important role. This is evidenced by the current ownership of existing stations in the Province, and in particular the ownership of Level 3 charging stations. Table 3-1 below shows that of the Level 3 or DCFC stations in the Province, 74.5 percent are owned by a Utility and 19.6 percent owned by Tesla. After removing Tesla's stations (which can only be utilized by Tesla vehicles), virtually all stations are owned by utilities."

2.1 Does FBC foresee a future transition from DCFC stations in B.C. being generally provided by either public utilities or Tesla to a situation in which DCFC stations are also provided by other parties?

<u>Response:</u>

FBC does foresee a transition whereby DCFC station ownership and operation is also provided by other parties, as the market for EV charging services becomes mature and competitive. Please refer to the responses to BCUC-FBC IRs 1.1.1.3 and 1.1.2.

2.2 If so, in FBC's view, would one approach to the transition be for the public utility to play a larger role in providing 'make-ready' service and the private sector to play a larger role in the public-facing component?

Response:

One approach to the transition of station ownership and operation could be the use of "make-ready" services from utilities to lower the costs of infrastructure investment. Please refer to the response to BCUC-FBC IR 1.9.1 for a discussion of the pros and cons associated with the "make-ready" model.

3.0 Topic: Revenue grade DC metering

Reference: Exhibit C12-2, pp.18-19

"Customer Pricing Options

The possible rate structures for EV charging could include time-based, energy-based, demand based or customer-based components. However, the energy-based and demand-based options are limited at this time, particularly since FBC is not aware of any station vendors that have Measurement Canada accreditation for metering internal to EV charging stations. Once an accredited Measurement Canada meter becomes available, an energy-based or demand-based rate, possibly in combination with a time-based rate, would be a preferred solution. As described in an information bulletin issued by Measurement Canada (provided as Appendix 6), charging stations using an energy or demand based rate must use a meter that is approved by Measurement Canada: [...]

With this background, FBC believes that the time-based rate structure is the most reasonable and practical option at this time. For time-based rates, the charging fee is based on the length of time a station is occupied (i.e. the time connected to the charger). Charging a rate for the amount of time the space is occupied generally encourages turnover and increases availability so that charging stations are used by those who need them for EV charging and not simply as parking spaces. Hourly fees are simple to understand by customers, and mirror existing rate structures for parking meters. However, time-based rates may result 1 in more costly charging on an energy consumed-basis for vehicles with a lower charging capacity."

3.1 If not addressed in FBC's responses to the Commission's questions about the absence of a process for certification of revenue grade DC metering, is there any 'work around' that would enable the operator of a DCFC service in B.C. to charge customers on the basis of kilowatt-hours pending resolution of the issue through Measurement Canada?

Response:

FBC is not aware of a means of reselling electricity without complying with the *Weights and Measures Act*.

3.2 To FBC's knowledge, do any DCFC stations in other provinces sell charging service by the kWh? If so, how do they deal with the Measurement Canada requirement for a revenue grade DC meter?

Response:

The information that FBC has from Mogile Technologies (Exhibit C12-2, Appendix 4, Table 3) indicates that almost no DCFC stations in other provinces are billing customers on a per kWh basis[1]. FBC does not know how the small number of stations billing on this basis are dealing with the Measurement Canada issue.

[1] The Mogile Technologies information on DCFC stations indicates that outside of BC, only three stations in Ontario are billing on a per kWh basis.

4.0 Topic: Market Share and Growth

Reference: Exhibit C12-2, FBC evidence, Appendix 1, 2016 Powertech Labs EV Technology and Market Overview:

Table 1: BC and Lower Mainland EV sales estimates based on Navigant Research forecast for Canadian EV sales through to 2024, p.17, pdf p.46;

Table 2: BC and Lower Mainland EV sales estimates based on SFU forecast for EV market share in BC, p.18, pdf p.47

Table 1: BC and Lower Mainland EV sales estimates based on Navigant Research forecast for Canadian EV sales through to 2024.

Year 2024	Canada		BC		Lower Mainland	
	Low	High	Low	High	Low	High
Annual EV sales	**74,000**	**91,000**	12,000	14,500	8,300	10,000
Market Share	3.7%	4.6%	5.4%	6.6%	6.3%	7.8%
Cumulative EV sales	350,000	420,000	56,000	67,000	39,000	47,000
Percent of Fleet	1.8%	2.1%	2.5%	3.1%	3.0%	3.6%

Numbers in bold are directly pulled from Navigant Research's forecast, all other values are derived.

Table 2: BC and Lower Mainland EV sales estimates based on SFU forecast for EV market share in BC.

Year		BC		Lower Mainland	
		Low	High	Low	High
2024	Annual EV sales	13,000	35,000	9,300	25,000
	Market Share	**6%**	**16%**	7.1%	19%
	Cumulative EV sales	56,000	120,000	40,000	85,000
	Percent of Fleet	2.6%	5.5%	3.0%	6.4%
2030	Annual EV sales	44,000	50,000	30,000	35,000
	Market Share	**20%**	**23%**	24%	27%
	Cumulative EV sales	224,000	380,000	160,000	270,000
	Percent of Fleet	10%	17%	12%	20%

Numbers in bold are directly pulled from SFU's forecast, all other values are derived.

4.1 Does FBC expect that 2024 and 2030 EV sales within its service territory will approximate, pro rata, the 2024 and 2030 EV sales estimates made by Powertech Labs based on forecasts from Navigant Research and SFU researchers?

Response:

Please refer to the response to BCUC-FBC IR 1.24.2 which discusses five load scenarios of EV penetration from between zero percent up to 50 percent of new vehicle sales by 2035.

5.0 Topic: Proponents of DCFC infrastructure

Reference: Exhibit C12-2, FBC Evidence, pp.2, 13

"Additional EV charging infrastructure is important in advancing the adoption of EVs in the province. Without adequate charging infrastructure deployed throughout the province, it is unlikely that the progression of EVs market share will progress quickly." [Exhibit C12-2, p.2, pdf p.7]

"Achieving BC's energy objectives will require continued cooperation and collaboration between utilities and municipalities, but must also include businesses who so far have largely been limited to only supporting Level 2 charging infrastructure, primarily due to the significant costs involved in installing and operating Level 3 charging stations. Despite this, and as demonstrated by Tesla's supercharger siting model, businesses can play a critical role in facilitating cost-effective siting options for both Level 2 and Level 3 charging sites, the continued deployment of which are critical to accelerating EV adoption in support of BC's energy objectives." [p.13, underline added]

5.1 With reference to the Tesla model of EV charging stations aimed at providing service to owners of Tesla EVs, is FBC aware of any other EV manufacturers who are participating in developing EV charging networks?

Response:

FBC is aware of Volkswagen's Electrify America initiative which involves the installation of non-proprietary electric vehicle chargers (CCS, CHAdeMO and J1772 standards) at over 650 community-based sites and nearly 300 highway sites across the U.S. by 2027. As well, FBC is aware of Nissan's "No Charge to Charge" program which has resulted in the deployment of Level 2 stations (J1172 connectors) as well as Level 3 fast charging stations throughout the U.S. supporting both CHAdeMO and CCS connectors. Under this program, qualifying Nissan EV owners are provided with two years of free charging and the option to enrol in the Nissan preferred program once the two year period has ended. FBC is not aware of any other manufacturers actively involved in deploying charging infrastructure at this time.

5.2 Apart from the Tesla EV charging network, is FBC aware of any business, other than BC Hydro and FBC, facilitating the development of a network of Level 3 charging stations in B.C.?

Response:

Aside from Tesla, FBC, and BC Hydro, FBC is not aware of any business or EV manufacturer involved in the development of a network of Level 3 charging stations in B.C. FBC notes that organizations such as the not-for-profit Community Energy Association have been involved in facilitating the planning and development of Level 3 charging infrastructure in BC, however ownership and operation of these assets has been left to electric utilities such as FBC and BC Hydro.

5.3 In FBC's view, is the Tesla DCFC network sufficient to achieve the additional charging infrastructure that FBC says is necessary to allow the EV market share to progress quickly in B.C.? What is FBC's understanding of the availability of the Tesla charging network to drivers of non-Tesla EVs?

Response:

FBC understands that the Tesla charging network is not permitted for use by drivers of non-Tesla EVs. Although there are a number of Tesla DCFC charging sites throughout the province, they have been located based on the range of a Tesla EV, and not necessarily for a non-Tesla EV which may have a smaller battery capacity (e.g., Nissan Leaf). As such, it is unlikely that the current Tesla DCFC network would be sufficient on its own to provide the required charging infrastructure necessary to allow EV adoption to progress quickly in BC, nor is such use currently permitted by Tesla.

5.4 Setting aside Tesla EVs and the Tesla charging network, if additional DCFC infrastructure is to be deployed in B.C. to the extent necessary to allow the non-Tesla EV market share to progress quickly, is FBC aware of any feasible alternative to BC Hydro and FBC as the proponents of DCFC infrastructure development?

Response:

Given the current economics associated with installing DCFC charging infrastructure, FBC is not aware of any feasible alternative to BC Hydro and FBC acting as proponents of DCFC

infrastructure development. Please also refer to the responses to BCUC-FBC IRs 1.1.1.2 and 1.1.1.3.

6.0 Topic: MURBs

Reference: Exhibit C19-2, MEMPR Evidence, p.10

"...there are well-documented hurdles for residents of multi-unit residential buildings to install and access charging facilities in their buildings."

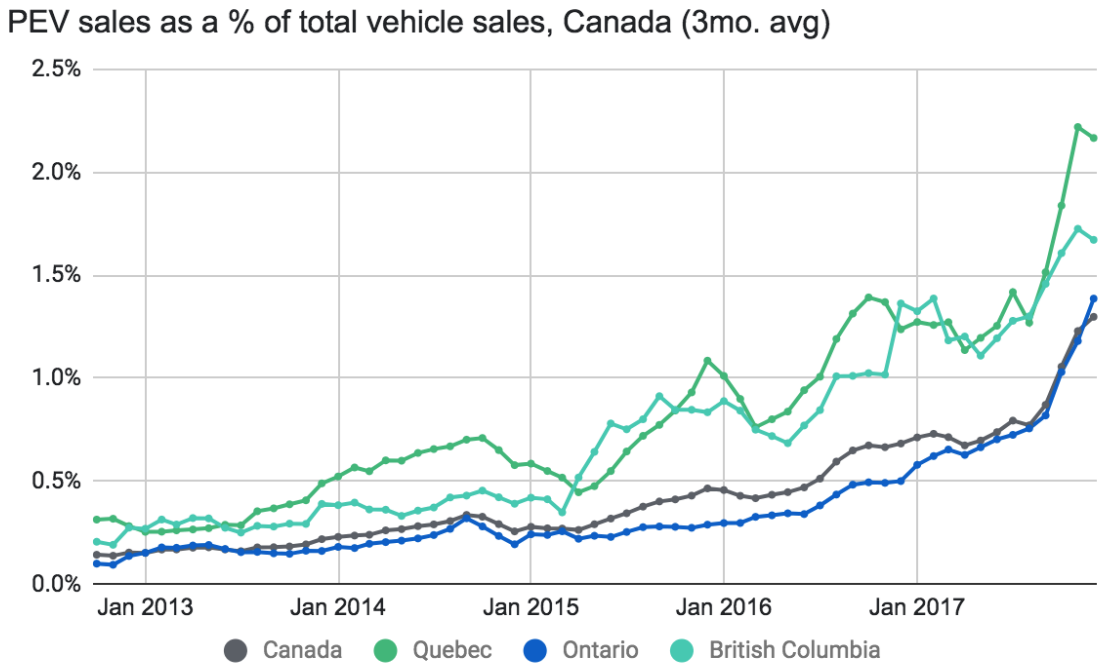
6.1 What measures is FBC taking to help overcome the barriers to the provision of EV charging infrastructure in strata corporation buildings and multiple unit rental buildings.

Response:

FBC is attempting to better understand the various potential barriers that may affect the installation of EV charging infrastructure in strata corporation buildings and multiple unit rental buildings, including the costs to install EV charging stations within existing buildings where electric service may not be readily available, as well as proper allocation of the EV charging costs for both common property stalls as well as for exclusive stalls. FBC does not currently have any programs available to customers to help address these potential barriers.

1. Reference: Exhibit C12-2, Page 3

Figure 2-1: PEV Sales as a Percentage of Total Vehicle Sales, Canada [4]

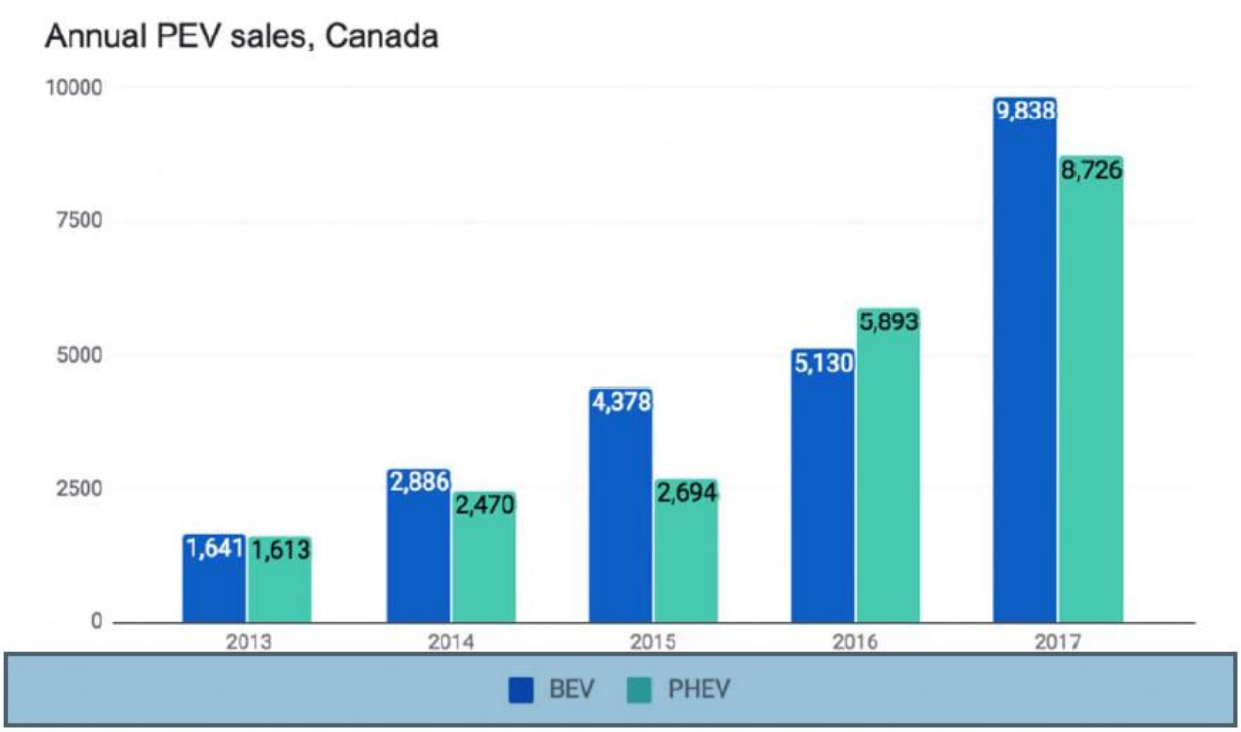


1.1 Please confirm that the evidence on the breakdown of PEVs between PHEVs and BEVs is that roughly ½ of each are represented in the total as of 2017 and that BEV's were a lesser fraction in the past.

Response:

Based on the 2017 Fleetcarma EV Technology Report and Market Overview provided as Appendix 2 to FBC's evidence, the breakdown of annual Canadian PEV sales between PHEVs and BEVs for 2017 is shown in the following figure[1]. In 2017, there were 9,838 BEV sales as compared to 8,726 PHEV sales in Canada. BEV sales comprised a lesser fraction of sales as compared to PHEVs in 2016 but a greater fraction of sales in 2013 to 2015.

[1] Exhibit C12-2, FBC Evidence, Appendix 2, page 4 - 2017 Fleetcarma EV Technology Report and Market Overview


Annual PEV sales, Canada
10000
7500
5000
2500
0
1,641
1,613
2,886
2,470
4,378
2,694
5,130
5,893
9,838
8,726
2013
2014
2015
2016
2017
BEV
PHEV

2. Reference: Exhibit C12-2, Page 4

Table 2-1: EV Charging Types

Type of Charging	Charging Level	Time to Charge	Vehicle Type	Typical Locations	Costs to Install
Level 1	AC (120 volt)	Four hours for 30 minutes of driving	PHEV or BEV	Residences, some public	$200-$2,000
Level 2	AC (240 volt)	Four hours for full charge	PHEV or BEV	Residences, Municipal locations, office towers, parks, recreational facilities, shopping malls	$1,000 - $2,500
Level 3	Direct Current Fast Charging (DCFC)	30 – 60 minutes for full charge	BEV only	Highway corridors	$50,000 - $100,000

2.1 Please explain why BEV's are the only type of vehicle that can access Level 3 DCFC charging.

Response:

Aside from the 2018 Mitsubishi Outlander, which is the first PHEV available in North America with fast charging capabilities, PHEVs typically do not support DC fast charging capabilities as PHEVs include the use of an internal combustion engine to charge the battery and/or directly assist with propelling the vehicle. As a result, there is limited need for fast charging capabilities that would justify the additional cost of the vehicle equipment required to support DCFC charging where extended driving range is already provided by the internal combustion engine.

It should be noted that the small battery capacity (12 kWh) of the 2018 Outlander limits the ability of the vehicle to accept a fast charge at rates averaging greater than 20 kW for a charge session, resulting in a charge session length of 20-30 minutes to add approximately 28 - 35 kilometres of additional range. As a matter of convenience, FBC believes that drivers are more likely to rely on the internal combustion engine to extend the driving range of a PHEV like the Outlander as opposed to spending 20 minutes fast charging for every 28-35 km driven.

3. Reference: Exhibit C12-2, Page 10

> The development of EV charging infrastructure stations is consistent with the intent of these prescribed undertakings, particularly considering that these stations will enable customers to use electricity for transportation rather than more carbon-intensive fuel sources. These considerations with respect to Section 4 (3) of the GGRR and the strong alignment with government policy discussed above confirm the merits of utilities providing EV charging service and stimulate market demand in the province.

3.1 Please confirm or otherwise explain that the GGRR does not provide direction with respect to how much subsidy a utility should provide to support fuel switching from gasoline and diesel to electricity for transportation.

Response:

Confirmed.

The GGRR is a regulation under section 18 of the *Clean Energy Act* that establishes various prescribed undertakings for projects, programs, contracts or expenditures that public utilities are permitted to undertake. The purpose of section 18 prescribed undertakings is to reduce greenhouse gas emissions. The Commission must allow the public utility to collect sufficient revenue in its rates to recover the costs of carrying out the prescribed undertakings. Any parameters or constraints for a particular prescribed undertaking are set out in the relevant sections of the GGRR. The Commission has the jurisdiction as to how the prescribed undertaking costs are recovered in the public utility's rates. In certain cases, as is the case with EV charging service, there is an incremental revenue source associated with the prescribed undertaking, but it is possible that a prescribed undertaking project or program for reducing greenhouse gas emissions may have costs but no incremental source of revenues (e.g., a program to replace a type of utility equipment that is fuelled with a higher emitting fossil fuel with another type that uses a lower emitting energy source).

3.2 Please confirm that the assertion that the merits for utilities being confirmed is a qualitative opinion and not a direction or a quantitative assessment of how much utilities should spend and that at this time such a decision would be in the purview of the Commission in its rate setting role, which is why FBC has applied for rate setting.

Response:

For any project, program, contract or expenditure that qualifies as a prescribed undertaking, the spending amounts and any other parameters or constraints for a particular prescribed undertaking are as set out in the GGRR and the Commission's role is limited to determining how the prescribed undertaking costs are recovered in rates.

4. Reference: Exhibit C12-2, Page 11

> The market is emerging (and not competitive) because:
>
> - There are financial barriers to entities entering the market due to demand being low and therefore infrastructure is not cost effective, even when considering subsidies and incentives from government and other agencies[20];
> - There are few buyers and sellers; and
> - The few customers have limited choice in who they buy from.

4.1 Is FBC asserting that having an uneconomic product for which there is low demand is the criteria for defining a market as not competitive versus being a natural monopoly service?

Response:

No, the purpose of the quoted section from FBC's Evidence (Exhibit C12-2) was to demonstrate that the EV charging service market is not currently competitive and was not intended to imply that EV charging service must therefore be a natural monopoly service. Please refer to the response to BCUC-FBC IR 1.5.1 in which the Commission provides a diagram with a continuum showing natural monopoly service at one extreme and fully competitive markets at the other, with the possibility of products and services in various markets falling in between the extremes. The EV charging service market and any subcomponents of it are not at either extreme.

Further, the reasons mentioned in the preamble are not the only ones that characterize the current EV market as not competitive. As explained in the response to BCUC-FBC IR 1.1.1.1, FBC believes that indicators of market maturity or competitiveness will have to be developed as the market unfolds. One indicator for a mature and competitive marketplace is when third-party owners/providers of EV charging services start becoming profitable, which in turn depends on the cost, utilization and price.

Also as discussed in FBC's Evidence, another important aspect in assessing the competitiveness and maturity of the markets for EV adoption and EV charging infrastructure is to consider the effects of government policy and programs in the overall EV marketplace. Governments at both federal and provincial levels are involved in promoting EV adoption and public EV charging infrastructure through providing incentives and other support to EV purchasers and infrastructure developers. These programs recognize that although EVs will deliver desirable environmental benefits in the transportation sector, they are currently more expensive than conventional gasoline or diesel-fuelled vehicles and that expanded charging infrastructure (that may not be fully economic on its own) is necessary to serve the unique needs of the EVs. The presence of such government involvement in this marketplace is evidence that the market is still emerging.

5. Reference: Exhibit C12-2, Page 12

> FBC believes that the main barriers to the mass adoption of EVs for personal transportation are:
>
> - concern by prospective EV buyers that they might not be able to make it to where they want to go or that they might not have charging infrastructure close by when needed[23]; and
> - the current number of EV owners (buyers) and estimated demand for EV Level 3 charging service does not support recovery of the infrastructure and service costs, particularly in the earlier years.

5.1 Please confirm that a vehicle owner has the choice of acquiring a PHEV or EREV and being able to make it to wherever they need to go as far as personal vehicle transportation is concerned.

Response:

Confirmed that vehicle owners are free to decide if they want to purchase an EV whether it be a BEV, or a PHEV or EREV.

5.2 Please provide any evidence FBC has with respect to the expansion of BEV sales in BC caused by the expansion of DCFC charging stations on highway corridors.

Response:

FBC does not have direct evidence that BEV sales in BC have increased as a result of the deployment of DCFC charging stations on highway corridors. However, there has been a notable shift in 2017 towards BEVs in Canada. As detailed in Appendix 2 of Exhibit C12-2 and summarized in the table below, 2017 BEV sales as compared to 2016 BEV sales increased by greater amount, both on a percentage and absolute basis, as compared to PHEV sales for the same period.

Table 1

	2016	2017	Increase No. of Sales	Increase %
BEV	5,130	9,840	4,710	92%
PHEV	5,893	8,730	2,837	48%

Also, as noted in Appendix 2 of Exhibit C12-2, over twice as many BEVs have been sold in BC from 2011 – 2017 as compared to sales of PHEVs for the same period (5,861 BEVs sold compared to 2,801 PHEVs sold). Given the importance of DCFC charging stations for enabling highway travel within the province, FBC believes that the increasing purchases of BEVs and the increasing availability of DCFC stations in BC are related.

5.3 Please provide FBC's quantitative assessment of the actual costs for Level 3 charging infrastructure and the level of cost recovery that these services currently recover or could recover based on actual usage to date and how those match the projected levelized approach to recovery costs over time.

Response:

The forecast provided in Exhibit C12-2, FBC Evidence submission, Appendix 3 provides the best evidence the Company has at this time for evaluating the EV Service.

For convenience, a partial excerpt of the cost of service, and a comparison of the total cost of service to revenue is reproduced below. The present value of the cost of service for recovery is $278 thousand over ten years. While in the first five years the revenues will be less than the cost of service, in the last five years of the 10 year evaluation period revenues will be greater than the cost of service; such is the nature of a levelized rate. This is based on FBC's five DCFC stations, and rates of $9.00 per half hour charging session that were calculated based on operating and capital costs net of a contribution that reduces overall capital costs[2]. Without the contribution, the $9.00 per half hour rate would be approximately $21.00 because the contribution lowers the capital costs by approximately two thirds.

Although not included in determining FBC's EV rate, low carbon fuel credits have the potential on a levelized basis to exceed the under recovery of cost of service. As a frame of reference, each 20 kWh charging session has the potential to generate between $1.00 and $3.25 in carbon credits depending on negotiated sale prices for the credits of between $50 and $170 per tonne.

Additional detail is provided in response to BCUC-FBC IR 1.8.1.

[2] All FBC EV charging stations are situated on either municipal or provincial lands, so there is no land acquisition cost embedded in the analysis.

1

Table 1: Cost of Service

FortisBC Inc.
EV - Electric Vehicle Charging Stations (DCFC)
January 2018
($000s), unless otherwise stated

Line	Particulars	Reference	2018
1	Cost of Service		
2	Power Purchase Expense		2
3	Operation & Maintenance	Line 39	6
4	Property Taxes	Line 44	-
5	Depreciation Expense	Line 70	32
6	Amortization Expense on CIAC	Line 84	(22)
7	Income Taxes	Line 127	2
8	Amortization		4
9	Earned Return	Line 109	10
10	**Incremental Annual Revenue Requirement**	Sum of Line 2 to Line 9	**35**
11	PV of Revenue Requirement (After-tax WACC of 5.88%)	Line 10 / (1 + Line 111)^Yr	33
12	**Total PV of Annual Revenue Requirement**	Sum of Line 11	***278***
13			
14	Stations		5
15	PV of Rev Requirement per Station ($)	Line 12 x 1000 / Line 14	55,660
16			
17	Charge Events per day		1.0
18	Charge Events per year	Line 15 x 365	365
19	PV of Charge Events per year	Line 18 / (1 + Line 111)^Yr	345
20	Sum of PV of Charge Events per year	Sum of Line 19	7,342
21	**$ Charge per Event to recover Cost of Service**	Line 15 / Line 20	**7.58**
22	Transaction Fee percentage		15%
23	**$ Charge per Event to recover Cost of Service + Txn Fee**	Line 21 / (1 - Line 22)	***8.92***
24			

2

3

6. Reference: Exhibit C12-2, Page 13

> Customers of EV charging stations have limited access to public charging service when compared to the availability of gasoline and diesel for internal combustion engine vehicles. In the vast majority of the province, and even significant parts of the Lower Mainland, there is not even one public charging station conveniently available to EV owners. Where private charging stations are available to the public they are generally Level 2, and therefore charging times are longer and EV owners may be subject to restrictions imposed by the owners. These limited choices mean that for many users, only home charging is a viable option.

6.1 Is FBC suggesting that the standard for an emerging market should be the same availability of refueling service as the gasoline and diesel stations?

Response:

No, FBC is not suggesting that the standard for an emerging market like EV charging services should be solely based on the comparative availability of refueling services for gasoline and diesel stations. Rather, FBC is simply noting that EV drivers wishing to "fast charge" can generally be considered captive given the limited number of DCFC stations available within the province, with only home charging or Level 2 community-based charging typically available as viable choices. Given that the end-uses of EV and internal combustion vehicles generally remain the same, the availability of refueling services for EVs as compared to internal combustion vehicles is an important consideration as it relates to the Commission's question as to whether customers of EV charging stations are captive or whether they have a choice.

6.2 Can FBC confirm that home charging is in fact a viable option for EV owners who have suitable schedules to take advantage of overnight home charging for their vehicles?

Response:

Not confirmed. Although home charging is likely to suffice for many EV owners, the ability to rely solely on home charging is a function of both the battery capacity of an EV, as well as the average daily distance driven. For vehicles with smaller battery capacities, as well as for drivers travelling in excess of a certain number of kilometers, there may be a need to rely on community-based charging resources to enable sufficient daily driving range.

7. Reference: Exhibit C12-2, Page 14

> The Commission has indicated in other decisions or reports such as the Alternative Energy Services Report (Order G-201-12) and the Proposed Regulatory Framework and Guide for Thermal Energy Service Utilities (Order G-231-13A) that it will be guided by key principles such as: "where regulation is required use the least amount of regulation needed to protect the ratepayer" and "the benefits of regulation should outweigh the costs". The Commission has discretion in how it chooses to regulate public utility activities, and in this case, as in others, the degree and nature of the regulation should be appropriate to the circumstances. FBC believes that, regardless of what level of regulation the Commission ultimately determines is appropriate for EV Charging Stations, utilities have an important role to play in the development of the EV market and should be encouraged to provide this service to facilitate the deployment of EV charging infrastructure in this province and support the BC climate action goal of reducing GHG emissions.

7.1 Does FBC agree with the Commissions principle that "the benefits of regulation should outweigh the cost"?

Response:

In the section of the AES Inquiry Report from which the quote is drawn, the discussion focuses on the fact that, "Regulation in and of itself imposes significant costs on the utility ratepayer." In the context of ratepayer impact, FBC agrees with the Commission that the benefits should outweigh the costs. The Company does consider however, that other non-monetary benefits should also be considered. It is a key element of the current EV Charging Inquiry that societal benefits, as reflected in the province's clean energy goals, also need to be considered and may mean that it would be acceptable for strictly monetary benefits to not outweigh costs, at least in the short term.

7.2 Does FBC consider that the benefits of EV charging should outweigh the costs for the charging?

Response:

Please refer to the response to CEC-FBC IR 1.7.1.

7.3 Does FBC consider that its quantitative projection evidence in its rate design as to when in the future the benefits of EV charging infrastructure might outweigh the cost represents that the benefits should outweigh the costs in the near future.

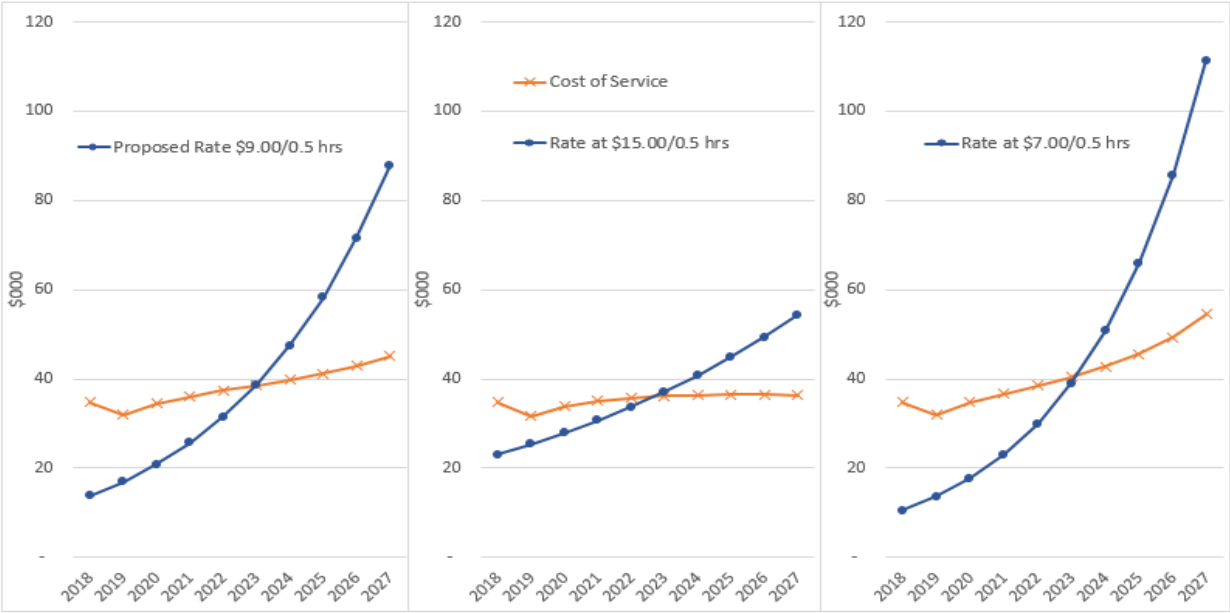
Response:

FBC believes it is important to take a longer term view and not to look only at the short term when evaluating the EV charging business opportunities. FBC's evaluation looks at both quantitative and qualitative factors to make its determination and based on its expectation of growth. In FBC's Application for Approval of the Rate Design and Rates for EV DCFC Service (the FBC EV Application), included in Appendix 3 FBC's Evidence (Exhibit C12-2), the Company set its tariff rate based on recovery of the cost of service for providing its EV service. In its evaluation within the 10 year period the Company anticipates that around the sixth year the quantitative benefits will begin to outweigh the quantitative costs through to the tenth year.

With fast-growing EV adoption, the increasing load contributes to lowering rates for all ratepayers because the incremental revenues contribute to the fixed costs of the existing infrastructure. In addition, there will also be a reduction in greenhouse gas emissions.

The following is an excerpt from the FBC EV Application with corresponding table to provide additional information.

The figures below show the under and over recovery of the cost of service in each year using the $9 per half hour rate. It is also important to note that revenues from low carbon credits have not been included in the analysis below and would make the shortfall in the early years lower if applied.



Additional detail is provided in response to BCUC-FBC IR 1.8.1.

7.4 Does FBC agree that one of the benefits of regulation of utilities would come from stopping utilities from imposing costs on their customers for subsidizing uneconomic services and supply after consideration of the appropriate values for the public interest issues?

Response:

FBC believes that it is incorrect to characterize EV charging services as “uneconomic services”. As shown in the FBC EV Application[3], it is expected that as the demand for EV charging service increases in future the utility owned DCFC stations may generate a net benefit to general ratepayers over time. Further, for third party owned charging stations, the utility will receive incremental revenues from the supply of electricity to those stations.

FBC agrees that one of the benefits of regulation is to ensure that utilities do not impose unreasonable costs on their ratepayers. However, FBC believes that this needs to be balanced against the need to develop the EV market, to support government policy and the potential for net benefits to be provided to utility ratepayers. As explained in response to Question 7 of FBC’s written evidence[4], utilities’ investment in EV charging service is required to develop the market, and in consideration of the potential public benefits associated with EV DCFC stations, as well as the alignment with BC government policy objectives regarding GHG emission reduction objectives and adoption of clean energy vehicles.

7.5 Does FBC have a position on where the limits for cost and investment in uneconomic activity should be set by the Commission and does FBC expect to

[3] Exhibit C12-2, Appendix 3, Section 3.4.6, Pages 21-22

[4] Exhibit C12-2, page 20

be held accountable for the prudence of their projections of profitable operation in the relatively near term.

Response:

FBC does not make any recommendation as to specific limits for utility investment in EV charging stations. FBC states in its Evidence (Exhibit C12-2, page 13, lines 15-17) that the emerging EV market requires the involvement of utilities along with other entities, and in response to BCUC-FBC IR 1.1.1 elaborates upon its belief that public utilities should be both permitted and encouraged to own and operate EV charging infrastructure. As the EV market develops, demand for EV charging service may increase to levels that could support full cost recovery (i.e., even without continued government incentives and support programs for the EV sector).

Given the immature nature of the EV market, the degree of customer use and cost recovery can not be accurately forecast at this time, however the prudence of utility participation in the EV charging market is supported by provincial government legislation and policy, including the Greenhouse Gas Reduction Regulation, as described on pages 9-10 of its Evidence. FBC would support a review of the EV market and the role of public utilities after a period of time to assess market development and the role of utilities going forward from that point.

7.6 Has FBC assessed and developed quantitative evidence on whether or not this investment in fuel switching for GHG reduction is at an appropriate level of cost for GHG reduction or are there better and more cost-effective alternatives?

Response:

The Company has not considered its EV investment in the context asked in the question.

Section 4 of the GGRR (the electrification section) establishes a number of measures to promote the use of electricity for the purposes of reducing greenhouse gas (GHG) emissions. Projects or programs respecting technology that may enable a utility's customers to use electricity instead of other sources of energy that produce more greenhouse gas emissions are considered to be a prescribed undertaking for the purposes of section 18 of the *Clean Energy Act.*

FBC's investment in EV charging stations is intended to support those prescribed undertakings, and is not based on a comparative analysis of all other GHG reduction alternatives. Any benefit attributable to EV operations beyond the recovery of cost of service will accrue to all ratepayers.

Additional information on the cost effectiveness of FBC's five EV charging stations can be found in response to CEC-FBC IR 1.5.3.

7.6.1 Please confirm that at the proposed charging rates in FBC's applications that the fuel savings for customers make the GHG reduction a byproduct benefit and therefore very low cost GHG reduction.

Response:

Although some EV drivers may refuel with electricity for the purpose of saving money, others may choose an EV because they believe it lowers GHG emissions. Another consideration sometimes cited is that the fuel savings for EVs are helping to pay back the price premium for EVs relative to conventional ICE vehicles. As EV adoption increases, the amount of GHG emission reductions will be substantial and should be viewed as a direct benefit in the public interest as opposed to a by-product benefit.

7.7 Does FBC agree that the Commission should be concerned with the cost-effectiveness of a utility investment in EV charging?

Response:

Please refer to response to CEC-FBC IR 1.10.1.

8. Reference: Exhibit C12-2, Page 17

> In consideration of these factors, in the early years of implementation, it will be necessary for some recovery of costs to come from general ratepayers. Strict adherence to a cost-of-service model on a year-by-year basis may result in prohibitively high EV charging rates in the early years that would discourage EV customers from using the charging stations.

8.1 Please provide any quantitative analysis FBC has with respect to assessing when in the future EV charging rates would become economic for EV customers and or confirm that FBC expects that its proposed levelized charging rates would be economic for customers from the outset.

Response:

Please refer to the responses to CEC-FBC IR 1.7.3 and BCUC-FBC IR 1.8.1.

9. Reference: Exhibit C12-2, Page 18

> FBC recommends that a new rate should be developed for electricity supply to EV charging stations, since its existing retail and wholesale rate schedules contain components, such as demand charges or high customer charges that would make them inappropriate to support the development of EV charging infrastructure in the province. The rate should reflect the unique characteristics of the service being provided.

9.1 If a customer is using electricity during peak times, why does FBC consider it inappropriate that a tariff rate with the relevant demand charges should not apply?

Response:

FBC would consider Demand Charges to be inappropriate in EV charging rates if they were to contribute to suppressing the adoption of EVs and third party participation in the EV charging market. Under normal circumstances Demand Charges are employed because it is a matter of good rate making practice to charge those who add incremental peaking capacity costs to the overall grid infrastructure.

However, an extensive introduction of EV charging may not be considered a normal circumstance. In BC, FBC believes the provincial government has a strong preference for promoting electrification of the transportation sector and with climate action initiatives because it is in the public interest to develop the transportation sector to significantly reduce greenhouse gases on a mass scale. The transportation sector is believed to contribute approximately 35 percent of the province's GHG levels.

DCFC stations require significant electric power to deliver quick charging in a short period of time. If Demand Charges were to be applied to DCFC stations, the project economics could be adversely affected while the number charging events are small. Demand Charges would apply even if a station only had one charge event in the past year, meaning that charging stations will require numerous charging events to break even and cover fixed costs.

In summary, FBC generally supports the recovery of fixed costs through Demand Charges, however, the Provincial Government's goal of enabling electrification of the transportation sector requires alternative cost-based rate structures to be explored.

9.2 Would FBC support TOU rates for EV charging during low load hour times and if not please explain?

Response:

Yes. Please refer to the responses to BCUC-FBC IRs 1.19.4 and 1.21.5.

10. Reference: Exhibit C12-2, Page 19

> for utility ownership and operation of CNG and LNG fueling stations. The intent of the GGRR is to reduce greenhouse gas emissions in BC in the transportation and other sectors. The GGRR is a regulation under section 18 of the Clean Energy Act. The Commission must allow a utility carrying out a prescribed undertaking to recover the costs in rates. As discussed above in section 2.5, the 2017 "electrification" amendments to the GGRR provide a basis for EV charging infrastructure to be counted as prescribed undertakings and support utilities being able to include the costs in utility rate base and cost of service.

10.1 Please confirm that the CEA's GGRR provisions do not establish cost-effectiveness for electrification investment and would leave the regulation of cost-effective investment to the Commission.

Response:

Not confirmed – section 4 (1) of the GGRR contains a "cost-effective" definition that applies to certain electrification prescribed undertakings. For electrification prescribed undertakings that the cost-effectiveness definition does not apply to there is no cost effectiveness test to be applied. As long as a particular project, program, contract or expenditure qualifies as a prescribed undertaking the Commission must allow the public utility to recover the related costs in rates. The Commission still determines how the costs may be recovered in rates (i.e., from all customers or from only specific customers or rate classes). However, according to section 18 (3) of the *Clean Energy Act "(t)he commission must not exercise a power under the Utilities Commission Act in a way that would directly or indirectly prevent a public utility … from carrying out a prescribed undertaking*." This provision limits the Commission's ability to set rates for recovery of prescribed undertaking costs that would thwart the utility's ability to carry out the prescribed undertaking. An example of a rate determination that might have such a thwarting effect would be a prescribed undertaking that involved the granting of incentives where it was required that the incentives be recovered only from the customers that received them.

10.2 Please confirm that the CEA's GGRR provisions for electrification cost recovery do not establish the allowed methods for cost recovery.

Response:

Please refer to the response to CEC-FBC IR 1.10.1.

10.3 Please confirm that the FBC application for EV charging rate setting is intended to have the Commission establish the regulatory basis for FBC's proposed transportation electrification initiatives.

Response:

The FBC EV Application will establish the rates and cost recovery methodology for the Level 3 DCFC charging stations in FBC's service territory.

However, the EV DCFC Stations Project is being undertaken by FBC to reduce GHG emissions in British Columbia in support of the GGRR[5]. Section 4 of the GGRR sets out GHG reduction initiatives under several electrification prescribed undertakings that encourage the use of electricity as a means to reduce GHG emissions.

FBC believes that while establishing the regulatory basis for FBC's proposed EV DCFC service, the Commission needs to consider and balance the need to develop BC's EV market to support government policy.

[5] The Regulation was initially established on May 15, 2012 by OIC 295/2012 (B.C. Reg. 102/2012) and, after several intervening amendments was amended to include an electrification section on March 22, 2017 by OIC 101/2017 (B.C. Reg. 114/2017).

11. Reference: Exhibit C12-2, Page 20

> As discussed above, FBC's proposed rate to recover the capital and operating costs of its EV charging station service is based on the cost of service of stations, net of contributions in aid of construction received from other parties. It is likely that in early years of operation, costs will exceed revenues and could result in small deficits based on the conventional components of cost of service analysis. However, as the demand grows over the coming years, the service may generate a net benefit to general ratepayers over time. And when considering the potential for low carbon fuel credits, this could occur even in the early years.

11.1 Please confirm that FBC's analysis with respect to the revenues and costs for FBC's proposed charging stations is at page 22 of their rate design application.

Response:

Confirmed, with the referenced "rate design application" being the FBC EV Application. Additional detail is provided in response to BCUC-FBC IR 1.8.1.

11.1.1 Please confirm that the Level 3 DCFC charging costing is on Page 20.

Response:

Confirmed.

11.1.2 Please provide the cost structure breakdown for the costing included to confirm that the cost inclusion is comprehensive.

Response:

The cost structure breakdown is provided in Exhibit C12-2, Appendix 3 – the FBC EV Application, and within Appendix 3, Appendix C - Financial Schedules. The list is comprehensive, and for convenience a partial excerpt is provided below.

FortisBC Inc.
EV - Electric Vehicle Charging Stations (DCFC)
January 2018
($000s), unless otherwise stated

Line	Particulars	Reference	2018
1	Cost of Service		
2	Power Purchase Expense		2
3	Operation & Maintenance	Line 39	6
4	Property Taxes	Line 44	-
5	Depreciation Expense	Line 70	32
6	Amortization Expense on CIAC	Line 84	(22)
7	Income Taxes	Line 127	2
8	Amortization		4
9	Earned Return	Line 109	10
10	**Incremental Annual Revenue Requirement**	Sum of Line 2 to Line 9	**35**
11	PV of Revenue Requirement (After-tax WACC of 5.88%)	Line 10 / (1 + Line 111)^Yr	33
12	**Total PV of Annual Revenue Requirement**	Sum of Line 11	***278***
13			
14	Stations		5
15	PV of Rev Requirement per Station ($)	Line 12 x 1000 / Line 14	55,660
16			
17	Charge Events per day		1.0
18	Charge Events per year	Line 15 x 365	365
19	PV of Charge Events per year	Line 18 / (1 + Line 111)^Yr	345
20	Sum of PV of Charge Events per year	Sum of Line 19	7,342
21	**$ Charge per Event to recover Cost of Service**	Line 15 / Line 20	**7.58**
22	Transaction Fee percentage		15%
23	**$ Charge per Event to recover Cost of Service + Txn Fee**	Line 21 / (1 - Line 22)	***8.92***
24			

Additional detail is provided in response to BCUC-FBC IR 1.8.1.

11.1.3 Please comment on any likely cost variation factors FBC may expect as sensitivities to these numbers.

Response:

The primary variable cost is power purchase which is dependent on energy (kWh) and demand (kW) delivered. In aggregate approximately 84 percent of the cost of service is fixed once built and in operation. The key driver of the variable cost is growth in annual demand.

11.2 Please provide FBC's assessment of the carbon fuel credit opportunity for the future.

Response:

The following is a partial excerpt from the FBC EV Application, Section 3.2.8 (Exhibit C12-2, Appendix 3):

> With FBC's assumed demand projections for these stations, FBC will generate low carbon fuel credits of 104 tonnes of CO2e annually on average, and assuming a price at the high end of $170 per tonne, would receive on average over the ten years $17,700 per year which FBC is proposing be amortized into FBC customer rates. In the first year the monetized value of the carbon credits could be as much as $6,000 while in the tenth year, based on forecast demand growth, the value could be six times higher than in the first year. As a frame of reference, each 20 kWh charging session has the potential to generate between $1.00 and $3.25 in carbon credits depending on negotiated sale prices for the credits of between $50 and $170 per tonne.

The value of these low carbon fuel credits has not been included in the evaluation of the EV project economics due to uncertainty of the actual price that will be received. For further reference, fuel suppliers in BC that do not meet the thresholds of the Renewable and Low Carbon Fuel Requirements Regulation are subject to a $200 per tonne penalty and are therefore motivated to purchase the verified credits available from lower carbon fuel suppliers.

11.2.1 Please confirm that the FBC cost and revenue analysis does not include potential carbon credit revenues and if it so or not please provide an estimate of the carbon credits that would match these revenue.

Response:

FBC's cost and revenue analysis does <u>not</u> include potential carbon credit revenues. Please refer to the response to CEC-FBC IR 1.11.2 for further details.

To the extent that FBC is able to obtain carbon credits it will do so, improving the economics of the EV charging program.

11.3 Please discuss whether or not the potential for a profitable operation of EV charging would apply equally to the private sector participants as it would to the utility participants.

Response:

FBC confirms that because it intends to base its financial model on the same utility costs (specifically, make-ready and electricity service utility costs) that would be incurred regardless of utility or third party station ownership, that the potential for profitable operation should be similar.

11.4 Please confirm that FBC does not expect that in the future the EV charging service will be a natural monopoly.

Response:

FBC does not believe the EV charging service is currently a natural monopoly service, nor will it become so in the future.

As explained in response to Question 1 of FBC's Evidence[6], currently the EV charging services market can be characterized as being an emerging market that is closely connected to public utility activity by virtue of using electricity from the grids of public utilities such as FBC and BC Hydro. FBC expects this market to become competitive and mature at some point in future. However, as explained in response to BCUC-FBC IR 1.1.1, the particular qualities of what might constitute a mature or competitive market and how long it will take to reach that state are difficult to predict at this point. Additionally there may be subcomponents of the EV charging service market (such as Level 1 or Level 2 stations, or Level 3 stations in urban areas) that move to an acceptably competitive state more quickly than others (such as Level 3 DCFC stations in less populated areas). As such, it would be appropriate for public utilities to continue to be involved in the provision of EV charging service for a longer period to ensure adequate service continues to be provided.

[6] Exhibit C12-2, page 11

11.5 Please outline FBC's intent with respect to EV charging investment, is it to bridge and accelerate the transition of transportation to electricity as a fuel running in an open and competitive market or is it to have a long-term participation in the EV charging market beneficial to its ratepayers and to its EV charging customers alike.

Response:

Please refer to the response to BCUC-FBC IR 1.1.1.

11.6 Please discuss whether or not FBC's investment in EV charging stations and operation at a loss for a period of time could have the potential of undercutting development of the competitive market and its ability to provide such services and benefits to the public.

Response:

FBC does not believe that its investment in the EV charging infrastructure would undercut the development of the competitive market. On the contrary, FBC believes that utility involvement in creating a reliable, well-planned high speed charging network will accelerate development of the EV market and more quickly make it competitive.

In an emerging EV market both utilities and non-utility participants can co-exist and the Commission can mitigate the concerns with an appropriate oversight such as through the establishment of guiding principles that would allow utilities to support the development of EV markets in BC. FBC also believes that continued participation in this sector by all parties, whether municipalities and government bodies, public utilities or non-regulated third parties will accelerate the adoption of EVs and hasten the day when competitive markets are found to exist and a more hands-off approach to regulation can be taken. Please also refer to the response to BCUC-FBC IR 1.1.6.

FBC believes that the primary focus of all participants at this time should be to facilitate the deployment of EVs and charging infrastructure in this province to reduce GHG emissions consistent with BC's climate action goals.

12. Reference: Exhibit C12-2, Page 21

> In alignment with the experience elsewhere, FBC believes that a public utility should provide EV charging Service within its regulated business to achieve the goal of reducing GHG emissions in accordance with the Government clean energy goals and initiatives. The primary focus at this time should be to facilitate the deployment of EV charging infrastructure.

12.1 Does FBC expect that the Commission would or may set limits on the extent of FBC's proposed investments in EV charging structure and the degree to which FBC's customers should subsidize this electrification transition?

Response:

Please refer to the responses to CEC-FBC IR 1.7.5, and BCUC-FBC IRs 1.7.1 and 1.7.2.

1. Reference: Exhibit C12-2, FBC Written Evidence, pp. 1 & 5

FBC Direct Current Fast Charger (DCFC) Infrastructure Deployment Plans

FBC's submission indicates that investment by utilities and government are needed in the near term to support growth in EVs and charging infrastructure, and that there is a role for non-utility participants and government to play in developing the charging market.

On page 1 of Exhibit C12-1 FBC states:

> "FBC believes that public utilities, non-utility participants and government have an important role to play in developing the market for public EV Charging Service and supporting the expansion of the use of EVs in BC. These entities are best positioned to support the growth in EV adoption, and in particular EV Charging infrastructure."

On page 5 of Exhibit C12-1 FBC states:

> "Based on the current state of the EV market and projections for the near future, FBC believes that investment by both utilities and government is required to encourage growth."

1.1 Please discuss FBC's future plans for the deployment of DCFC infrastructure in its service territory.

<u>Response:</u>

FBC has recently applied to Natural Resources Canada Electric Vehicle and Alternative Fuel Infrastructure Deployment Initiative for funding to support the deployment of 12 additional DCFC stations across nine communities in FBC's service territory in 2018. FBC is still developing DCFC deployment plans for 2019 onward, but anticipates the deployment of additional DCFC stations to meet customer demand and further enable EV travel throughout the Southern Interior of BC.

1.2 For future DCFC infrastructure deployment, does FBC intend to allow site host choice in station equipment and network services? If not, how does FBC intend to determine which station equipment and network services will be used for infrastructure it makes investments in?

Response:

Based on FBC's current model for investing in DCFC infrastructure, site hosts are only involved in providing land for the station and equipment to be located on, and are not directly involved in either technology selection or operation of the equipment. As such, there are no current plans to involve site hosts in the selection of charging station equipment or network services.

For the DCFC deployments planned for 2018, FBC will be issuing a request for proposals later this year which will be used to select the appropriate DCFC equipment and associated network services for use in FBC DCFC deployments.

1.3 For future DCFC infrastructure deployment, does FBC intend to allow site hosts to set pricing of their choice to drivers?

Response:

Under FBC's current DCFC investment model, FBC is responsible for owning and operating the charging infrastructure, with service provided under an existing (interim) approved tariff rate (Rate Schedule 96). As such, there are no plans at this time to allow site hosts to set pricing for FBC owned and operated DCFC stations.

1.4 Please fully discuss the role FBC sees for both (i) government and (ii) private investment in the deployment of DCFC infrastructure in its service territory.

Response:

Please refer to the response to BCUC-FBC IR 1.1.1 which discusses FBC's perspective on utility investment in DCFC infrastructure. FBC believes that based on the current absence of a competitive market for DCFC services, regulated utilities ought to be involved in providing charging services. Although it is difficult to predict how the market for EV charging services will evolve, it is expected that continued growth in EV adoption will improve the economics for third-party participants looking to provide charging services. Please also refer to the response to

BCUC-FBC IR 1.9.1 for a discussion of possible business-models that may be used by utilities to help foster private investment in charging infrastructure.

2. Reference: Exhibit C12-2, FBC Written Evidence, p. 14-15

California Public Utilities Commission Decisions & Ratepayers

In Section 3 of Exhibit C12-2, FBC makes several references to a number of California Public Utilities Commission's decisions related to electric vehicle charging.

On page 14 of Exhibit C12-2 FBC notes that "this Inquiry deals with similar issues and questions related to EV charging service regulation and rate design as already dealt with by California Public Utilities Commission" and that "FBC believes there is a lot to learn from the California experience".

Also on page 15 of Exhibit 12-2, FBC states that:

> "The CPUC in its recent decisions has directed California's electric utilities to include EV charging infrastructure in their rate base and has allowed rate recovery from all ratepayers of any revenue shortfalls from these activities (or the refunding of surpluses when revenues exceed costs). Consistent with recent CPUC Decisions, FBC believes that there are a number of potential benefits resulting from utilities providing regulated EV charging services."

2.1 Please confirm that:

- in 2009, California passed legislation that amended the PUC Code concerning the definition of "utility" and, subsequently, the CPUC issued rules prohibiting utilities from owning and operating charging stations;
- in 2011, the CPUC determined that utility owner/operatorship of charging stations was premature while the charging market continued to develop; and
- in 2014, the CPUC determined that a limited level of utility investment in charging stations was appropriate.

If not confirmed in either case, please fully explain your response.

<u>Response:</u>

FBC is unable to confirm the statements mentioned in the preamble as it does not have the context and specific references to confirm these statements. California's EV market has a significant amount of history and background that has evolved over the period of the last ten years or more. FBC believes that the CPUC has already dealt with similar issues and questions as raised in the EV Charging Inquiry. Some of these issues pertaining to the development of the EV market in California are directly applicable to BC's emerging EV market.

Based on its research on California's EV market, FBC believes that electric utilities need to play a key role in the development of EV charging infrastructure in BC. As discussed in response to Question 7 in FBC's evidence[1], utility investments in EV charging infrastructure in California are quite significant as compared to BC. For example, San Diego Gas and Electric Company is permitted to install about 3,500 charging stations as part of their pilot program, Pacific Gas and Electric Company is approved to support up to 7,500 EV charging ports in multi-unit dwellings. The CPUC has approved the ownership of EV charging infrastructure by electric utilities as part of their regulated business. California has already dealt with similar regulation and rate design issues related to EV charging services. FBC sees value in learning from their experience.

2.2 Please confirm that (i) Commission jurisdiction to regulate EV charging station infrastructure as a public utility service under the *Utilities Commission Act*, and (ii) the appropriateness of existing electric distribution public utilities investing in charging station infrastructure, are two distinct issues. If not confirmed, please fully explain FBC's view regarding the relationship between the two.

Response:

The two issues identified are distinct but related, in that they will both be affected by the Commission's determinations in this Inquiry regarding the regulation of EV charging service.

[1] Exhibit C12-2, page 20

3. Reference: Exhibit C12-2, FBC Written Evidence, p. 19

Rate Based Investment

On page 19 of Exhibit 19-2, FBC states:

> "To support the development of EV charging infrastructure in the province, utilities should include EV charging stations in their regulated rate base."

3.1 Please confirm that FBC would <u>not</u> seek to include charging infrastructure in its rate base if doing so was likely to discourage private investment in charging infrastructure. If not confirmed, please fully explain your response.

<u>Response:</u>

FBC believes that in this emerging EV market, there is room for both third-party service providers and utilities to participate. FBC will seek to include its charging infrastructure in rate base in keeping with BCUC determinations in this EV Charging Inquiry and other regulatory proceedings or government regulations relevant to EV charging. That said, FBC expects that the Commission will give due consideration to the impacts on third-party investment in charging infrastructure as it make its determinations regarding public utility investment in this area.

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A. EVIDENCE

1.0 Reference: FBC EVIDENCE

Exhibit #C12-2, Section #2.6, p. #8-10 CURRENT REGULATORY FRAMEWORK IN BC

1.1 Does FBC agree that all parties except municipalities and regional districts would be defined as public utilities if they wish to sell or operate DCFC charging stations?

Response:

In general terms yes. However, the party, other than a municipality or regional district, must be providing DCFC charging service for compensation in order to be engaged in public utility activity. The UCA public utility definition also includes an exemption for service that is only provided to a person's employees or tenants, where the product or service is not resold to or used by others. With these exceptions, parties providing DCFC service, other than municipalities or regional districts, would be providing public utility service.

FBC states, "In March 2017, amendments to the Greenhouse Gas Reduction (Clean Energy) Regulation (GGRR) **OIC 101-2017** established a number of prescribed undertakings pertaining to electrification in various sectors of the provincial economy, including the transportation sector." [FBC C12-2, p.9]

1.2 Does FBC believe the Clean Energy Act is applicable in this instance – DCFC charging stations?

Response:

Yes.

1.2.1 If not, then from where does FortisBC derive its mandate to provide DC fast charging services that have a financial risk for its ratepayers, but not for its investors? Please elaborate and explain.

Response:

Even though the response to Flintoff-FBC IR 1.1.2 is yes, and FBC believes that it is appropriate for public utilities, and FBC in particular, to be providing DCFC charging service, FBC provides the following comments in this regard.

As noted in the response to Flintoff-FBC IR 1.1.1, DCFC charging service is public utility activity and FBC is a public utility.

The risks to other ratepayers of FBC providing DCFC charging service are small and not materially different than the risk of various other utility investments. For example, when FBC provides electricity service to residential and commercial customers there is a risk that customers cease taking service or that homes or businesses are vacant for periods of time, or that large volume customers reduce their demand because of an economic downturn affecting their operations. When these things happen the revenue shortfall is recovered from the remaining customers because the overall system is still required to meet their requirements for electricity service. Further, under postage stamp ratemaking where the costs to serve individual customers vary for a number of reasons, the revenues collected do not perfectly recover the costs imposed on the system by each customer – revenues from some customers over-collect their costs while revenues from other customers under-collect their costs.

Utilities are in the business of providing a public service. If there is a growing public need for a public utility service, such as is expected for EV charging, it stands to reason that a public utility should be providing the service.

Offsetting the risks to other ratepayers, which as described above FBC believes are small, is the reasonable possibility that FBC's investments in EV charging service will generate net benefits for other ratepayers. FBC's ability to achieve benefits from EV Charging Service through credits under the province's Renewable and Low Carbon Fuel Requirements Regulation will only improve the EV Charging Service business case.

1.3 Please provide a written legal opinion as to how the Clean Energy Act and its amendment applies in this instance, especially section 18 of the Clean Energy Act and sections 3 & 4 of the amendment (OIC 101).

Response:

FBC respectfully declines to provide the written legal opinion requested, as internal legal opinions are privileged and confidential. FBC's explanation of the applicability of the *Clean Energy Act* and section 4 of the GGRR is as set out in FBC's Evidence (Exhibit C12-2), pages 9 and 10.

FBC states,

"Section 4 of the GGRR (the electrification section) establishes a number of measures to promote the use of electricity for the purposes of reducing greenhouse gas (GHG) emissions. Projects or programs respecting technology that may enable a utility's customers to use electricity instead of other sources of energy that produce more greenhouse gas emissions are considered to be a prescribed undertaking for the purposes of section 18 of the Clean Energy Act. Specifically, section 4(3) of the GGRR establishes several prescribed undertakings in subsections (a) through (e). Subsections (c) and (e) as follows, are those most pertinent to the EV Charging Service Inquiry…" [FBC C12-2, p.9]

1.4 Does FBC believe that providing DCFC charging stations are a prescribed undertaking?

Response:

Yes.

1.5 If the DCFC charging stations are a prescribed undertaking, what is the role of the Commission related to the prescribed undertaking?

Response:

The Commission's role with regard to a prescribed undertaking is to review and approve how the prescribed undertaking costs are recovered in rates. In the case of DCFC stations cost recovery could potentially come from the rates charged for DCFC service or through the rates of

other customer classes. FBC's rate for DCFC service of $9 per half hour is expected over time to recover the costs of providing the DCFC service and to begin to generate net benefits for other ratepayers as EV adoption and the EV charging market matures, although in the early years of providing this service cost recovery in small amounts will come from other ratepayers. FBC has also identified another benefit for ratepayers from EV charging service that has not been counted in the claim above that EV charging service will cover its cost over time. FBC will be eligible to receive credits under BC's Renewable and Low Carbon Fuel Requirements Regulation (RLCFRR) for the electricity used in EV charging. These RLCFRR credits have the potential to significantly reduce any revenue shortfalls from EV charging in the early years of a station's service and to significantly increase the net benefit to other ratepayers in the years after station throughput is recovering costs even without the RLCFRR benefit.

1.5.1 Please elaborate on the scope of the Commission's involvement if it is a prescribed undertaking?

Response:

Please refer to the response to Flintoff–FBC IR 1.1.5.

1.6 If the provision of DCFCs is determined to be a prescribed undertaking:

1.6.1 What is the impact on the ratepayers?

Response:

Based on an interim approved DCFC rate of $9.00 per half hour and FBC's existing DCFC stations, there is a small cumulative rate decrease of 0.004 percent over the ten year evaluation period from 2018 to 2027. The rate decrease is a result of revenues in excess of the costs of service, and is an example of how all customers will benefit from the additional load associated with EV charging services.

1.6.2 What are the costs of risks to the ratepayer for:

1.6.2.1 Grid reinforcement?

Response:

Please refer to the responses to BCUC-FBC IRs 1.24.1 to 1.24.4.

1.6.2.2 Cross-subsidization?

Response:

Please refer to the response to Flintoff-FBC IR 1.6.1 and BCUC-FBC IR 1.8.1.

1.6.2.3 Load shape and load demand changes?

Response:

FBC does not yet have sufficient data on consumption patterns related to service to DCFC stations to determine if any unusual risks are associated with EV charging stations. FBC notes that the existing new connection tariff will ensure that any required local system upgrades will be funded appropriately by the station owner.

In addition, load-related risks can be mitigated with rates applicable specifically to service to DCFCs. Such a rate may include the use of price signals (e.g. time-based, capacity based, etc.) intended to minimize the risk associated with DCFC loads and ensure a sufficient revenue to cost ratio for that specific customer class.

1.7 What is the impact on the non-regulated businesses that may have provided the DCFC charging stations after obtaining an exemption from regulation?

Response:

FBC is unclear on what is being asked in the question. Assuming it is asking about the effect that prescribed undertakings for public utilities might have on non-regulated provision of charging services, FBC notes as a first point that the establishment of a prescribed undertaking does not exempt the public utility from regulation in regard to the prescribed undertaking expenditures or activities – the Commission must still set the rates that allow the public utility to recover the prescribed undertaking costs. Clearly in this EV Charging Inquiry, the Commission is giving consideration to the interests of non-regulated providers of EV charging service as well as those of public utilities.

FBC believes that there is little or no impact on the non-regulated business providing the EV charging station services from the prescribed undertakings established in section 4 of the GGRR as mentioned in the preamble to this question. As explained in response to CEC-FBC IR 1.11.6, FBC feels that in an emerging EV market both regulated and non-regulated businesses can co-exist and the Commission can mitigate the concerns with an appropriate oversight such as through the establishment of guiding principles that would allow utilities to support the development of EV adoption and charging service markets in BC.

1.8 Does FBC have a business case for the installation of DCFCs in their service area?

Response:

Please refer to FBC's Application for Approval of Rate Design and Rates for Electric Vehicle Direct Current Fast Charging Service (the FBC EV Application), provided in Appendix 3 to Exhibit C12-2, for detail on FBC's business case for installing DCFCs in FBC's service territory.

1.9 Has or will FBC provided a business case for the installation of DCFCs in their service area?

Response:

Please refer to the response to Flintoff-FBC IR 1.1.8.

1.10 What is the estimated installation cost of a DCFC charging station in FBC's service area?

Response:

In the FBC EV Application, Section 3.2.1 (Exhibit 12-2, Appendix 3) the total capital expenditure for 5 DCFC chargers was $492 thousand. This results in a cost of $98.4 thousand for one DCFC EV charger.

1.11 Other than the prescribed undertaking is there an urgent need for DCFC charging stations in its service area?

Response:

Yes, FBC does believe there is a need for additional DCFC charging stations in its service area. As illustrated in the Mogile Report provided as Appendix 4 to Exhibit C12-2, the majority of DCFC stations in BC are deployed outside of FBC's service territory. As a result, there is an inconsistent highway grade charging network for drivers either transiting through or within FBC's service territory. FBC believes it important to provide these critical charging facilities so as to not impede the continued growth in EV adoption, particularly considering the impact that "range anxiety" may have on a consumer's decision to purchase a BEV.

1.12 Currently, how many PHEVs and BEVs are estimated to be in FBC's service area?

Response:

FBC does not have an estimate of how many PHEVs and BEVs are in FBC's service territory. FBC is working with ICBC to determine if anonymized vehicle registration data aggregated by postal code can be provided to FBC to help develop such an estimate.

1.13 How many DCFCs does FBC plan on installing or operating within its service area?

Response:

FBC is still developing its overall plans for both the timing and number of DCFCs to be installed. However, in addition to the five stations currently operated by FBC, an additional 12 stations are tentatively planned for deployment in 2018/2019.

1.14 Does FBC believe that these stations can be operated at a profit or breakeven costs?

Response:

Please refer to the responses to BCUC-FBC IRs 1.7.3.1 and 1.7.3.2.

2.0 Reference: CURRENT REGULATORY 1 FRAMEWORK IN BC

Exhibit C12-2, Section #, p. # Municipal Exemption

The exemption for municipalities and regional districts in item (c) above enables these entities to offer EV charging service at municipally-owned facilities, either free of charge or for compensation without Commission oversight of the rates or terms and conditions of service.[Exhibit C12-2, p.9]

2.1 In FBC's opinion, is a municipality still exempt from the UCA if it owns or operates a DCFC station through its municipal corporation or wholly owned government business enterprise (GBE)?

Response:

Yes, FBC believes that the UCA exemption for municipalities would apply in the examples cited in the question, provided the station is located within the municipality.

B. SCOPE A QUESTIONS

3.0 Reference: Commission Question 1

Exhibit C12-2, pp. 11- 13 Competitive Environment

FBC believes that the main barriers to the mass adoption of EVs for personal transportation are: concern by prospective EV buyers that they might not be able to make it to where they want to go or that they might not have charging infrastructure close by when needed, and the current number of EV owners (buyers) and estimated demand for EV Level 3 charging service does not support recovery of the infrastructure and service costs, particularly in the earlier years. [FBC C12-2, p. 12]

3.1 In what year does FBC believe mass adoption of EVs for personal transportation will occur within its service area?

Response:

Please refer to the response to BCUC-FBC IR 1.24.2.

3.2 In what year does FBC believe a 15% adoption rate for EVs for personal transportation will occur within its service area?

Response:

Please refer to the response to BCUC-FBC IR 1.24.2.

3.3 As location matters, will the non-regulated businesses be disadvantaged since all the preferred locations have been taken by the public utilities and therefore they may be even less likely to provide DCFCs with FBC's service area?

Response:

FBC does not believe non-regulated businesses will be disadvantaged, particularly since the majority of publicly available DCFC stations in BC have been sited on municipally-owned land. Although these sites are typically convenient in terms of public access, there are generally

equivalent or superior options available from privately-owned locations where adequate utility supply may already exist (such as a convenience store with an existing three-phase 600 volt service with sufficient spare capacity for a charging station).

3.4 Provide Table 3.1 Station Ownership in BC populated with actual numbers instead of percentages.

Response:

Please see the following table:

Table 1: Estimate of Station Ownership in BC (Number of charging locations)

Level 2				
Utility	**Municipality**	**Business**	**Tesla**	**Uncertain**
4	157	327	130	45
Level 3 or DCFC				
Utility	**Municipality**	**Business**	**Tesla**	**Uncertain**
38	0	3	10	0

4.0 Reference: Commission Question 2

Exhibit C12-2, p. 13

EV Customers Captive or Choice

4.1 Please explain why, from a cost/risk perspective, FBC believes the cost of EV charging service should be regulated and the related costs should be included in its utility rate base and cost of service.

Response:

FBC's response to Flintoff-FBC IR 1.1.5 describes the Commission's role with regard to this prescribed undertaking. In order to recover the costs of the prescribed undertaking utilities include related costs in their rate base and cost of service. This will allow building charging stations that may have long payback periods that are too long for non-regulated entities. From a cost perspective, one of the benefits is that costs associated with various locations can be blended so that the higher cost to serve locations are mitigated by the lower cost to serve locations.[1]

In terms of risk, FBC believes that as the EV demand grows over the coming years, the EV charging service may generate a net benefit to general ratepayers over time. And, when considering the potential for low carbon fuel credits, this could occur even in the early years.[2] As explained in FBC's Evidence (Exhibit C12-2), including the EV charging service infrastructure in its rate base is not uncommon in North America. It is consistent with what has been approved by the CPUC in California. This approach is also consistent with the treatment afforded to compressed natural gas (CNG) or liquefied natural gas (LNG) stations owned by FortisBC Energy Inc. (FEI). Utility ownership of CNG and LNG fueling stations and inclusion in utility rate base was confirmed by the province's establishment in 2012 of the GGRR. [3]

4.2 Would FBC consider supplying the DCFC charging stations using its non-regulated business?

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[1] Exhibit C12-2, page 15

[2] Exhibit C12-2, page 20

[3] Exhibit C12-2, page 19

Response:

As mentioned in response to BCUC-FBC IR 1.22.2.1, FBC would not consider owning DCFC charging stations as a non-regulated business at this time. Such a model would nullify the benefits of utility participation in this sector and restrict the space for third parties to provide public charging.

4.2.1 If no, please explain why not?

Response:

Please refer to the response to Flintoff-FBC IR 1.4.2.

5.0 Reference: Commission Question 3

Exhibit C12-2, pp13-16

Regulation, & Benefits and Detriments

The CPUC in its recent decisions has directed California's electric utilities to include EV charging infrastructure in their rate base and has allowed rate recovery from all ratepayers of any revenue shortfalls from these activities (or the refunding of surpluses when revenues exceed costs).[FBC C12-2, p. 15]

5.1 As per section 18(2) of the Clean Energy Act, can FBC collect sufficient revenue from its interim rate of $9/hr to enable it to recover its costs in each fiscal year with respect to the prescribed undertaking?

Response:

As an introductory comment, section 18(2) of the *Clean Energy Act* does not require that the rates for EV charging service fully recover the costs of EV charging in each fiscal year, or even in any fiscal year. (Please refer to the response to Flintoff-FBC IR 1.6.2 for further explanation of this issue).

In the first five years FBC will not recover the costs of EV charging from EV charging customers, however beginning in the sixth year and each consecutive year thereafter, FBC expects to recover an amount greater than its costs. In other words, a $9.00 tariff will allow for full recovery of costs over the ten year period.

Please also refer to response to BCUC-FBC IR 1.8.1.

5.1.1 If not, what rate should the Commission establish so that FBC can recover its costs in each fiscal year with respect to the prescribed undertaking?

Response:

Please refer to the response to Flintoff-FBC IR 1.5.1.

5.1.2 Has the minister requested a report on the prescribed undertaking?

Response:

FBC has not at this time received any requests from the Minister for reporting on prescribed undertakings pertaining to the electrification section of the GGRR. FBC is aware that its sister company FEI is required to provide reports to the Minister on prescribed undertakings pertaining to CNG and LNG activities set out in other sections of the GGRR but the CNG and LNG prescribed undertakings were established more than four years prior to the electrification section of the GGRR.

5.2 Is FBC aware of a recent Application #17-01-021[4] (Filed January 20, 2017) before the Public Utilities Commission of the State Of California by the Joint Response of the Alliance of Automobile Manufacturers and General Motors to Southern California Edison's SB 350 Transportation Electrification Application?

Response:

FBC is unaware of the Application mentioned in the question.

In the Application, it states,

> "The Alliance commissioned Crossborder Energy (CE) to study residential utility prices last year. The CE study found that Californians with flat-rate electricity rates (over 90% of Californians) would often pay more to charge their PEVs than they would pay to fuel a similar 40-mile per gallon gasoline vehicle. In fact, for every case but one, driving electric cost significantly more than driving one of many high-mileage gasoline cars."

5.3 How does FBC propose the Commission set rates that are fair and just to the ratepayers if this situation occurs in BC?

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[4] http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M179/K240/179240342.PDF

Response:

In the opinion of FBC, “fair and just” rates are those that are designed to recover EV charging station costs over a reasonable period of time. Rates should not be set solely based on the economics of EV car owners, although it can be considered a factor in rate design.

That said, FBC does not believe a situation similar to that described in California is likely to occur in BC. California has much higher electricity rates than those in BC (the referenced study included the highest PG&E tiered flat rate of US$0.391 per kWh) and gasoline prices in California are lower than in BC, so a situation where charging an electric vehicle would be more costly on a sustained basis than fuelling a similar gasoline-powered vehicle is a low probability situation. Nevertheless, if such a situation was to occur, the Commission would have to go about setting the rates for EV charging service using the same principles and approaches as it normally employs in setting utility rates. The cost of a competitive fuel has sometimes been used in Commission rate setting applications but most often it is the approved costs of the utility in question and accepted cost allocation and rate design principles that are used to establish the rates for the various customer classes and service offerings. FBC does not see any reason that the circumstance described in the question would cause a need for the Commission to depart from its normal rate-setting practices in setting EV charging rates, including giving consideration to competitive fuel costs if the Commission believes that is relevant evidence to consider in the process.

C. SCOPE B QUESTIONS

6.0 Reference: Commission Question 4

Exhibit C12-2, pp. 17-19 Traditional Cost of Service Model

FBC states, "However, the rate itself needs to consider a reasonable recovery of the cost of service itself;…" [FBC C12-2, p.18}

6.1 If the prescribed undertaking requires cost recovery within each fiscal year, what does FBC mean by the term "reasonable recovery of the cost of service"?

Response:

As noted in the response to Flintoff-FBC IR 1.8.1, prescribed undertaking status under section 18 of the *Clean Energy Act* (section 4 of the GGRR in this case) does not impose a requirement of 100 percent cost recovery in any year. For "reasonable recovery of the cost of service" FBC has taken guidance from the "cost-effective" definition in section 4 (1) of the GGRR as follows:

> cost-effective means that the present value of the benefits of all of the public utility's undertakings … exceeds the present value of the costs of all of those undertakings when both are calculated using a discount rate equal to the public utility's weighted average cost of capital over a period that ends no later than a specified year.

Specifically, FBC's cost of service analysis includes the following cost components:

1. Power purchase expense;
2. Operating and maintenance;
3. Property taxes;
4. Depreciation;
5. Amortization of Contribution in Aid of Construction (CIAC);
6. Income taxes; and
7. Earned return.

In consideration of these factors, in the early years of implementation, it will be necessary for some recovery of costs to come from general ratepayers. Strict adherence to a cost-of-service model on a year-by-year basis may result in prohibitively high EV charging rates in the early years that would discourage EV customers from using the charging stations. [FBC C12-2, p.17}

and

Clean Energy Act: Greenhouse Gas Reduction

18 (1) In this section, **"prescribed undertaking"** means a project, program, contract or expenditure that is in a class of projects, programs, contracts or expenditures prescribed for the purpose of reducing greenhouse gas emissions in British Columbia.

(2) In setting rates under the Utilities Commission Act for a public utility carrying out a prescribed undertaking, the commission must set rates that allow the public utility to collect sufficient revenue in each fiscal year to enable it to recover its costs incurred with respect to the prescribed undertaking.

(3) The commission must not exercise a power under the *Utilities Commission Act* in a way that would directly or indirectly prevent a public utility referred to in subsection (2) from carrying out a prescribed undertaking.

(4) A public utility referred to in subsection (2) must submit to the minister, on the minister's request, a report respecting the prescribed undertaking.

(5) A report to be submitted under subsection (4) must include the information the minister specifies and be submitted in the form and by the time the minister specifies.

6.2 How does FBC propose the Commission create a rate (fair and just) that does not comply with section 18(2) of the Clean Energy Act?

Response:

Section 18(2) of the *Clean Energy Act* is referring to the overall rates and revenues of the public utility, not to the specific rates applicable to a particular prescribed undertaking. The purpose of prescribed undertakings under section 18 is to reduce greenhouse gas emissions as noted in section 18(1). It is possible that a prescribed undertaking may only have costs but no additional revenues (although in this case, EV charging service is a new service offering and does generate a source of additional revenue). Section 18(2) requires the Commission to allow the public utility to collect sufficient revenues overall to recover the costs of prescribed undertakings in addition to all the other costs of service that the Commission approves in a revenue requirement proceeding. If there are no revenues from a prescribed undertaking then the

Commission must approve rate increases for the utility's customers so that the prescribed undertaking costs are recovered. Please also refer to the response to CEC-FBC IR 1.3.1.

6.3 How could FBC, through its non-regulated arm and Commission approved rates, provide these DCFCs to assist in the early years of implementation and avoid section 18(2) of the Clean Energy Act?

Response:

FBC does not see section 18(2) of the *Clean Energy Act* as something to be avoided. In general the establishment of a prescribed undertaking provides assurance to a public utility that cost recovery will be approved as long as the utility's GHG reducing initiatives comply with the provisions of the prescribed undertaking.

For a non-regulated arm of FBC or a third party non-regulated entity the current legislative context muddies the picture with respect to EV charging service. DCFC charging service is a public utility activity so an otherwise non-regulated entity would become a public utility in respect of providing this service. As such, either Commission rate approval or some form of an exemption is needed to facilitate participation in this sector by non-regulated entities.

7.0 Reference: Commission Question 5

Exhibit C12-2, p. 19

Existing Wholesale, Commercial Retail Rate or Some Other Rate

FBC states, "This suggests using the same utility rate for electricity supply to the EV charging station whether there is utility or third party ownership of the station. The common rate would be for the cost of electricity in the EV charging service (i.e. an input cost). [FBC C12-2, p.19]

7.1 Is FBC proposing of capturing the following energy input costs to the DCFC stations:

7.1.1 kVA.hrs (includes Power Factor and Demand charges)?

Response:

FBC has not yet made a determination on the applicability of Demand Charges to a future rate for service to DCFC stations, however it is expected that once sufficient data has been collected regarding service to DCFC stations, the cost of peak demand on grid infrastructure would be appropriately modeled through a cost allocation study and reflected in a new rate specific to utility supply to DCFC stations owners/operators which may include the applicability of a separate Demand Charge. Although kVA Demand Charges inherently penalize customers with a poor power factor, FBC retains the right to require a customer, at their expense, to install power factor corrective equipment to maintain a minimum power factor of 90 percent, or alternatively apply an adjustment to the customer's bill to compensate for a poor power factor.

7.1.2 harmonic correction?

Response:

Harmonic correction is typically resolved with the addition of corrective equipment at the customer's expense, and not explicitly recovered through a prescribed rate. To date, FBC has not encountered any issues related to harmonics and DCFC stations, however the Company intends to continue to monitor power quality along local feeder segments in close proximity to DCFC facilities, and will work with customers as required to provide harmonic correction if necessary.

7.1.3 grid reinforcement?

Response:

Please refer to the responses to BCUC-FBC IRs 1.24.1 to 1.24.4.

7.1.4 Connection costs?

Response:

Connection costs are typically collected as part of the normal CIAC process for providing service to customers, and are generally not collected as part of an explicit rate for service.

8.0 Reference: Commission Question 7

Exhibit C12-2, pp. 20-21

Cross Subsidization & Potentially Unduly Discriminatory Rates

Depending on how demand materializes over the coming years, there is the potential for some cross- subsidization from other rate classes to support this new service. This needs to be balanced against the need to develop the EV market, to support government policy, and the potential for net benefits to be provided to other rate classes. . [FBC C12-2, p.20]

As discussed above, FBC's proposed rate to recover the capital and operating costs of its EV charging station service is based on the cost of service of stations, net of contributions in aid of construction received from other parties. It is likely that in early years of operation, costs will exceed revenues and could result in small deficits based on the conventional components of cost of service analysis. However, as the demand grows over the coming years, the service may generate a net benefit to general ratepayers over time. And when considering the potential for low carbon fuel credits, this could occur even in the early years. [FBC C12-2, p.20]

8.1 As the Clean Energy Act does not allow for this type of cost recovery, cost exceeding revenues, how does FBC propose to comply with the Clean Energy Act?

Response:

FBC disagrees with the assertion in the question that the *Clean Energy Act* (specifically section 18) does not permit cost to exceed revenues. In fact the opposite is correct. As stated previously, the purpose of prescribed undertakings under section 18 is to reduce greenhouse gas emissions. Section 18 of the *Clean Energy Act* recognizes that initiatives to reduce greenhouse gas emissions may require utilities to increase costs to achieve the desired greenhouse gas reductions. The establishment of a prescribed undertaking through a regulation such as the GGRR provides direction to the Commission that public utilities must be permitted to undertake a particular project, program, contract or expenditure and recover the costs in rates even though the program results in increases to the utility's costs. Some prescribed undertakings, such as those pertaining to the transportation sector (where lower emitting fuels such as natural gas or electricity are displacing higher emitting gasoline or diesel fuel) have the beneficial aspect of creating a new revenue stream for the utility, meaning that some or all of the incremental costs of the prescribed undertaking can be recovered through the new revenue stream. Other prescribed undertakings may have costs only but no revenue stream. In either situation the Commission must allow the public utility to recover the prescribed undertaking costs in rates, but the Commission must still determine how the cost are recovered in rates (i.e. what type of charge, from which customers or customer classes, etc.)

8.2 In what year does FBC envision, the service may generate a net profit to its general ratepayers?

Response:

Based on FBC's current DCFC stations, FBC anticipates that EV service may generate a positive contribution in the sixth year exclusive of any offsetting revenues from low carbon fuel credits. Please refer to the responses to CEC-FBC IR 1.7.3 and BCUC-FBC IR 1.8.1.

Because of this, FBC believes that the potential for significant cross-subsidization from other ratepayers is small. [FBC C12-2, p.20]

8.3 Based on the number of stations envisioned, what is the estimated amount in dollars referred to as being "small"?

Response:

As filed in the FBC EV Application (Exhibit C12-2, Appendix 3) and shown in the table below, the initial under recovery in year 1 was forecast at $21 thousand and decreasing to zero in year 6. Subsequent years going forward resulted in over recoveries of $8 thousand in year 7 and increasing up to $43 thousand in year 10 on an undiscounted basis.

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
COS	35	32	34	36	37	39	40	41	43	45
PV COS	33	28	29	29	28	27	27	26	26	25
Sum PV	278									
Scenario 1 Revenue	14	17	21	26	31	39	47	58	72	88
PV Rev	13	15	18	20	24	27	32	37	43	50
Sum PV	278									
COS Under(Over) Recovery	21	15	14	10	6	(0)	(8)	(17)	(29)	(43)
Rate Impact	0.006%	0.004%	0.004%	0.003%	0.002%	0.000%	-0.002%	-0.005%	-0.008%	-0.012%
Cumulative Rate Impact	0.006%	-0.002%	0.000%	-0.001%	-0.001%	-0.002%	-0.002%	-0.003%	-0.003%	-0.004%

Please refer to the responses to Flintoff–FBC IR 1.6.1, CEC-FBC IR 1.7.3 and BCUC-FBC IR 1.7.1 for additional information.

Potential Cross-Subsidization

1.0 References: a. Exhibit C1-2, p. 15

On page 15 of Exhibit C1-2, BC Hydro states:

> Including fast charging service in a utility's rate base could result in cross subsidization and unduly discriminatory rates when viewed with a narrow lens. As discussed, BC Hydro raises the possibility that those principles could be revisited on the basis of the evidence gained through this Inquiry, including in respect of the benefits of public utilities such as BC Hydro operating in this market as well as the magnitude of the costs being considered.

b. Exhibit C35-2, pp. 4, 9–10,

Utility Investment in the Electric Vehicle Charging Grid:

"Key Regulatory Considerations" Report dated November 2017, p. 16 Potential cross-subsidization

On page 4 of Exhibit C35-2, Victoria Electric Vehicle Association (Victoria EVA) states:

> EVs contribute to gross BC Hydro revenues and do not currently present a cross-subsidization issue.

and on pages 9 and 10, EVA submits two principles based on:

> That the original purpose of public utilities was to make energy (electricity and natural gas) available to all the citizens of a province or state recognizing that it was in the general public interest for urban area ratepayers to financially support the higher costs of providing the utility to rural areas.

> There is a lower risk of cross subsidization as each EV contributes additional hydro revenues with no immediate additional grid costs. Each block of 10,000 EVs entering service adds as much as $ 2.3 million per year to gross BC Hydro revenues with minimal cost impacts on the existing electricity grid infrastructure.

c. Transcript, Volume 8, p. 373.

At the Vancouver Community Input Session on April 16, 2018, Toronto Hydro stated:

> EV charging decreases -- and I emphasize, decreases -- the rates for all utility customers. The utility bills of EV customers more than offset the costs incurred by the utility to deliver the electricity to charge the vehicles.

d. Exhibit C19-2, p.12.

MEMPR states:

> A public utility may be able to demonstrate that the cost of public EV charging infrastructure can appropriately be recovered from revenue obtained through electricity sales at all EV charging stations within their service territories (i.e., through both public and private Level 1, 2 and 3 charging stations combined).

Preamble: The four references quoted above represent a cross-section, but not an exhaustive list, of the views of Interveners regarding potential cross-subsidization of EV owners by utility customers who do not own EVs.

1.1 Does FBC expect that including fast charging service in a utility's rate base could result in cross subsidization and unduly discriminatory rates when viewed with a narrow lens. Please explain.

Response:

This response also addresses VEVA-FBC IR 1.1.2.

FBC does not expect that including the DCFC service stations in its rate base would result in significant cross-subsidization or unduly discriminatory rates. Please refer to the responses to BCUC-FBC IRs 1.7.1 and 1.7.2.

1.2 Does FBC believe that determinations of whether including fast charging service in a utility's rate base could result in cross subsidization and unduly discriminatory rates would be most appropriately viewed through a broad lens, taking account of all relevant trade-offs and offsets? Please explain.

Response:

Please refer to the response to VEVA-FBC IR 1.1.1.

1.3 Has FBC done an analysis to identify and quantify the net economic costs and benefits to FBC and its customers under different scenarios of EV adoption? If so, what are the results of that analysis?

Response:

FBC has not performed a large scale analysis of economic costs and benefits for its customers using different EV adoption scenarios or construction costs. FBC has produced an economic analysis based on its five DCFC stations as provided in Appendix 3 of Exhibit C12-2.

The following table from Exhibit C12-2 indicates with a 23 percent annual growth in station use the rate impact will be 0.006 percent in year 1, while in the tenth year the revenue surplus over the cost of service will result in a rate decrease of 0.004 percent. With a 10 percent escalation in annual growth, the rate impact will be 0.003 percent in year 1 while in the tenth year the surplus over the cost of service will result in a decrease of 0.002 percent. Lastly, a growth rate of 30 percent results in similar results with surpluses in the second half of the ten-year evaluation period.

Table 3-3: Rate Impact Sensitivity

	Proposal 23% escalation	Sensitivity 10% escalation	Sensitivity 30% escalation
Max Rate Change	0.006%	0.003%	0.007%
Min Rate Change	-0.004%	-0.002%	-0.006%

In addition, please refer to the response to CEC-FBC IR 1.7.3. for more details.

1.4 If FBC has not completed a net economic cost/benefit analysis, what are the reasons for that decision? Please discuss the expected time and cost that would be required for FBC to complete such a net economic cost/benefit analysis. Include a discussion of the most significant challenges or obstacles to completion of such analysis.

Response:

FBC has not completed a comprehensive net cost/benefit analysis using potential EV charging stations throughout its service territory, because the EV market is in the early stages of

development. Key considerations such as government policy development have yet to be fully formed, and supply and demand factors as well as form of regulation, if any, are still evolving.

In five years' time, the Company will be in a better position, once the above considerations are more evolved, to provide a meaningful net economic cost/benefit analysis, based on facts and direct experience in BC. Undertaking an analysis prematurely introduces many uncertainties that affect the final conclusions that could be drawn from such analysis.

Benefits of EV Fast Charging to Utilities and Customers

2.0 References: Multiple Exhibits

Preamble: Throughout the record of Written Evidence Interveners have identified a number of benefits of EV fast charging for individual electrical utilities and for customers of a utility.

2.1 Please prepare a comprehensive table of the benefits of EV fast charging identified in Interveners' Written Evidence as well as any other benefits that FBC identifies. Please list all such benefits ranked in order of perceived importance to FBC. Please also indicate who (e.g. FBC, all customers, EV-owner customers, customers who are not EV owners, etc.) FBC expects would be the main beneficiaries of each listed benefit.

The Table below provides an example of the suggested format.

Rank of Importance	Description of Benefit	Reference(s) in Evidence	Main Beneficiaries
1	Increase in electricity sales	Exhibit X, p.	All customers
2	Improved opportunities to manage grid loads	Exhibit Y, p.	FBC, all customers
3	Enhanced reliability and range of EV vehicles	Exhibit Z, p.	EV-owner customers

Response:

The following table details the benefits of EV fast charging as identified in Interveners' and FBC's written evidence.

Table 1

Rank of Importance	Description of Benefit	Reference(s) in Evidence	Main Beneficiaries
1	Support for provincial energy and climate objectives	Exhibit C12-2, p. 10, C19-2, p. 9	All customers
2	Increased utility revenues from additional electricity sales	Exhibit C1-2, p. 4	All customers
3	Enhanced reliability and range of EV vehicles	Exhibit C20-2, p.3	EV-owner customers
4	Foster EV adoption	Exhibit C12-2, p. 2	EV-owner customers

2.2 Please identify any aspects of the Table requested above that FBC would expect to be different if the EV charging infrastructure was owned or operated by a private sector party rather than by a utility regulated by the Commission. Please include a discussion of any changes in the nature of the benefit, the rank of importance to FBC, or the main beneficiaries of the benefit that FBC would expect to arise from a utility investment in EV charging infrastructure vs. private sector investment.

Response:

Although FBC doesn't believe any of the benefits listed in Table 1 provided in the response to VEVA-FBC IR 1.2.1 would change if fast charging infrastructure was owned or operated by a private sector party, the timing for realizing these benefits will likely be delayed due to the challenging economics for private sector involvement in providing EV fast charging services and the resulting lack of a competitive market for these services. As discussed in response to Question 1 in FBC's Evidence (Exhibit C12-2, pages 11 to 13), the emerging EV market is currently not competitive and requires involvement by governments, utilities, businesses, municipalities and other third party entities to increase the adoption of EVs and develop the necessary infrastructure to meet provincial energy and climate objectives.

Infrastructure Development and EV-Specific Rates

3.0 Reference: Exhibit C12-2, p. 19

3.1 What are FBC's plans to support future deployment of Direct Current Fast Charging (DCFC)? Does FBC have any plans to support the deployment of Level 2 charging stations, for example providing support for business and home owners to install charging stations through rebates or otherwise? If so, please explain.

Response:

For 2018, FBC has applied to Natural Resources Canada Electric Vehicle and Alternative Fuel Infrastructure Deployment Initiative for funding to support the deployment of 12 additional DCFC stations. The installation of additional stations in 2019 and onwards will be based on a number of factors including locations of existing DCFC infrastructure, customer demand, as well as provincial gap analyses used to identify areas that require DCFC deployment to facilitate electric vehicle travel within BC.

As discussed in the response to BCUC-FBC IR 1.24.3, FBC currently does not provide any incentives for home or workplace charging (Level 2 charging stations), but is exploring various options it may provide in the future. These may include incentives provided to customers who agree to certain conditions, such as installing separately metered charging equipment with service provided under a particular rate (e.g. Time-of-Use), or for providing FBC the ability to implement load-control on the customer's EV charging station. Commercial/workplace incentives may involve providing incentives to customers who are underserved or can demonstrate a need for charging infrastructure.

3.2 Does FBC plan to develop programs to support smart charging and load management? If so, please outline the anticipated nature of those programs and the related timeframes for implementation.

Response:

Please refer to the response to VEVA-FBC IR 1.3.1. The timing for implementation of programs of this nature is likely to occur sometime in 2020 – 2024.