

British Columbia Utilities Commission Inquiry into the Regulation of Electric Vehicle Charging Service

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1.1. SUMMARY

In my submission, I support:

- the use of FortisBC Non-Regulated Business (NRB) to supply this service, operating in a competitive environment, and providing consumer choice;
- Ministerial exemption from regulation of DCFC charging station rates which can be withheld/cancelled on complaint. Any exemptions should expire after five years and another inquiry should be held to determine if the exemptions are working in the public interest.
- the application of energy-base rates;
- the rate design of EV charging stations separated from the public utility's traditional cost of service model;
- the supply service rate to the EV charging stations based on the public utility's commercial retail rate or variant thereof; and
- EV charging stations not being included in the public utilities rate base.

Further, I oppose:

- cross subsidization from other rate classes to support the new entrepreneurial service for DCFC charging stations, and
- any inclusion of the DCFC station costs in the public utilities rate base.

Is there really a need for FortisBC to engage in the building of DCFC charging stations?

In my opinion, I believe that there are sufficient charging stations within the FortisBC service area and market forces will provide even more as the demand increases.

The remainder of my submission provides further insight as to my reasons for the position taken on this matter.

1.2. BACKGROUND

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.

However, the AES Report dealt with alternative energy solutions and other new initiatives such as: thermal energy services, LNG services, CNG services, and biomethane services and may not be applicable to the resale of electric energy for charging EVs.

By Order G-9-18 dated January 12, 2018, the British Columbia Utilities Commission (Commission) issued an order relating to the FortisBC Inc. Application for Approval of Rate Design and Rates for Electric Vehicle (EV) Direct Current Fast Charging (DCFC) Service. A time-based rate of \$9.00 per 30-minute period for EV charging at FBC-owned DCFC stations was approved on an interim basis, effective January 12, 2018;

In Order G-9-18, the Commission notes that the rate design and rates for EV charging, including the services provided by DCFC stations, are currently in an early development stage in the province of British Columbia and other entities may emerge over time to provide EV charging service. The Commission found there are merits for a general inquiry to explore the potential regulatory issues in the EV charging stations market which may have broader stakeholder impacts.

1.3. INTRODUCTION

Under the Utilities Commission Act, it is the regulator's function to prevent the abuse of monopoly power, so that customers have access to the utility product or service at a fair price, but at the same time allow the utility the opportunity to earn a fair return on its investment so

that it can continue to operate and attract the capital required to sustain and/or grow its business.

1.3.1. The Utilities Commission Act

The Utilities Commission Act (UCA) defines a “public utility” as meaning:

a person... who owns or operates in British Columbia, equipment or facilities for

(a) the production, generation, storage, transmission, sale, delivery or provision of electricity, natural gas, steam or any other agent for the production of light, heat, cold or power to or for the public or a corporation for compensation, or...

but does not include...

(c) a municipality or regional district in respect of services provided by the municipality or regional district within its own boundaries,

(d) a person not otherwise a public utility who provides the service or commodity only to the person or the person's employees or tenants, if the service or commodity is not resold to or used by others, ...

Ministerial Exemption

Clearly, the operators of the DCFC charging stations are a public utility. Through the Commission, the operators of DCFC stations may be able to seek a ministerial exemption from regulation which can be withheld/cancelled on complaint. Any exemptions should expire after five years and another inquiry should be held to determine if the exemptions are working in the public interest. Further discussion on this matter assumes the Commission can obtain the necessary exemption from the Ministry.

Also, the current operators of Level 2 charging stations are, by definition, a public utility. For instance, ChargePoint and others as operators of Level 2 charging stations in Richmond and elsewhere are public utilities even though they may deliver energy to EVs at no charge, they still

meets the definition of a public utility. Similarly, the definition also applies to Tesla supercharging stations even though it operates its supercharging stations at cost.

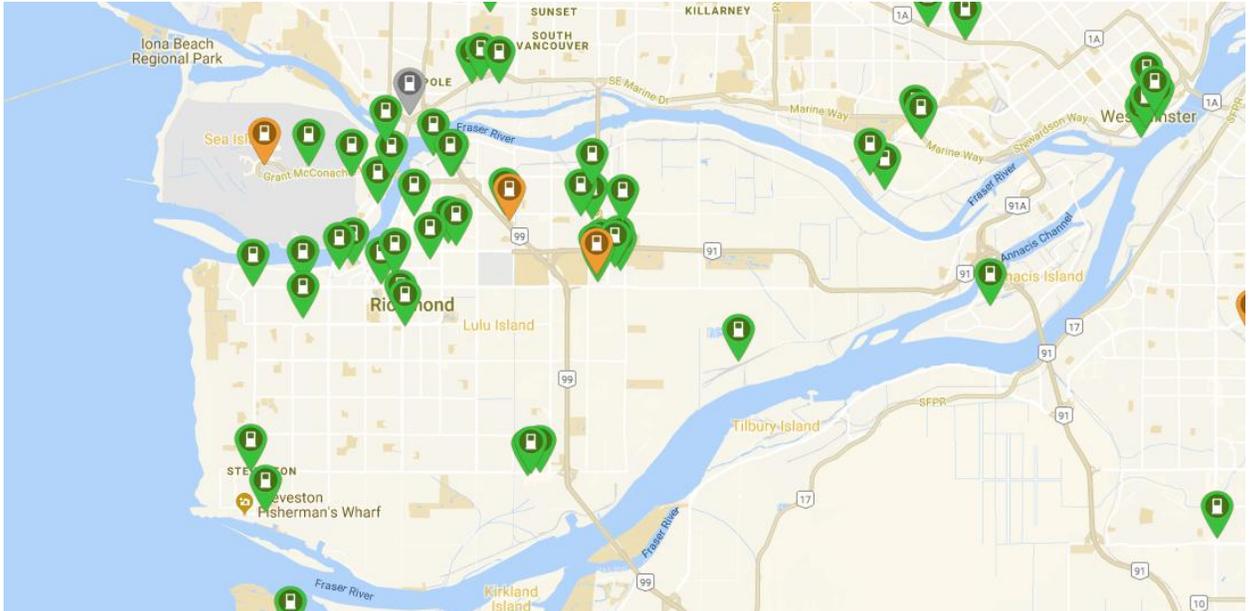


Figure 1 -Richmond Charging Stations <https://www.plugshare.com/>

1.3.2. REQUIREMENT TO REGULATE

In PowerTech's view¹, DCFC stations in BC are gradually adopting a price of \$0.35/kWh, placing the price comfortably below parity with gasoline, while still applying a premium fee for the fast charging service.

However, the resale of electricity in BC is regulated by the BC Utility Commission, and so the application of usage fees for EV charging must be carefully considered by the BCUC. While in other locations, time-based usage fees have avoided the scrutiny of regulatory bodies, it is not clear whether this would still be considered resale by the BCUC.

The Commission also should decide the status for the regulation of Level 2 charging stations owned by municipalities and operated by others for the municipalities.

¹ FortisBC Inc. Inc Rate Design and Rates for Electric Vehicle DCFC Service Exhibit B-1, RPT0001-01406-D01 EV Technology and Market Overview Powertech Labs Inc. p. 48

Under the UCA, a requirement to regulate exists when a person operates facilities for the sale, or delivery of energy to the public. Since a person operates an EV charging facility for the delivery of electric energy to the public, I would assume that a requirement to regulate exists unless an exemption from regulation to operate a DCFC station as a NRB is granted to the person. To protect the public, any exemption should be time-limited (5 years in duration) and subject to review by the Commission on complaint.

To avoid regulation, some municipalities are providing charging stations operated by a third party. To the best of my knowledge, these charging stations are not currently regulated by the Commission and appear to allow free EV charging.

While there is a requirement to regulate the energy sold by the operators of the charging stations, is it really in the public interest to regulate the sale price?

As almost all other electric energy sales are already regulated then the public interest is protected at the wholesale level and the public utilities should leave the retail component to the operators of the EV charging stations be they non-regulated business (NRB) entities of the public utilities or independent private sector operators. The existing public utilities should determine a new wholesale rate schedule for supplying these EV charging stations from distribution or transmission voltages.

1.3.3. Retail Markets Downstream of the Utility Meter Guidelines

If the decision is to leave the retail resale of electricity at the EV charging stations to the NRBs, then the public utilities could use its NRB arm to compete with the private sector operators of the EV charging stations. This removes the assets and financial risks from the rate base and ratepayers.

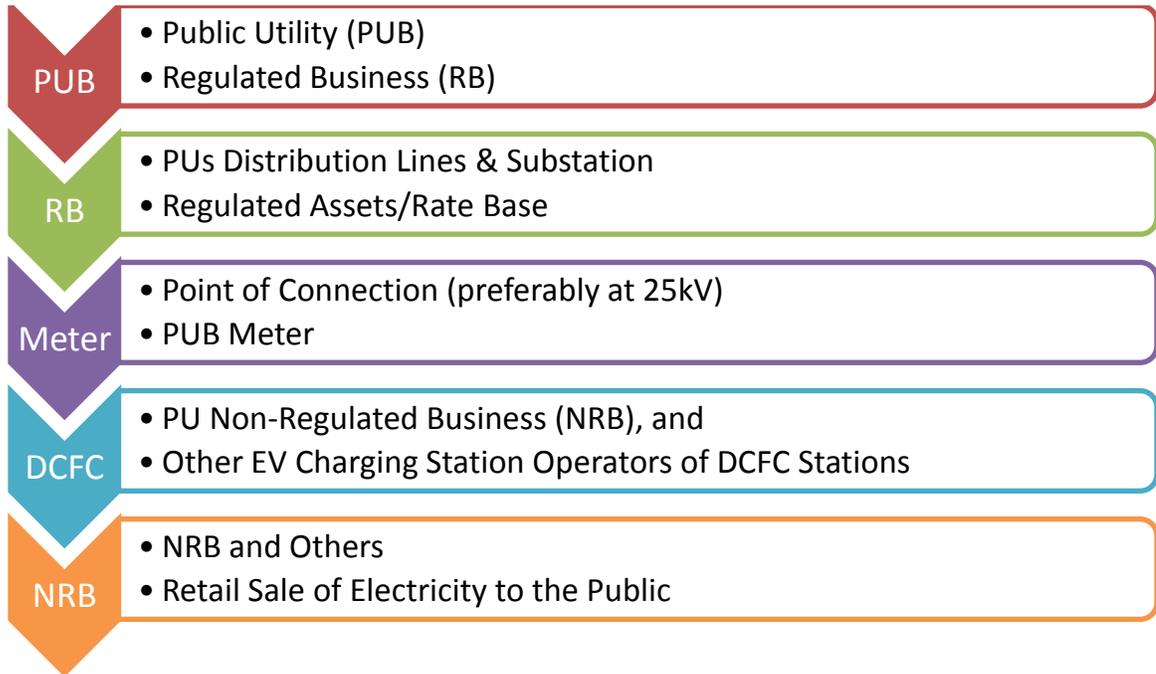


Figure 2 – BCUC’s Retail Markets Downstream of the Utility Meter – Guidelines

Figure 2 demonstrates how the Commission could resolve the matter. If the Public Utility’s NRB operates the DCFC charging station then other competitors can compete with the Public Utility’s NRB. All DCFC charging station operators will require an exemption that should be time limited for about 5 years.

1.3.4. ELECTRIC VEHICLE (EV) CHARGING STATIONS

The three or four different levels of charging stations are:

- **Level 1** - Single Phase Alternating supply rated 16 Amps at 120 Volts delivering 1.9 kW.
- **Level 2** - Single or Three Phase Alternating supply rated 80Amps at either 208-240V delivering up to 20 kW.
- **Level 3** - Direct Current (DC) charging, or “fast charging.” rated up to 400 Amps at voltages up up to 600Volts DC delivering 240kW.

A new ultra-fast charger has been developed with charge rates between 150 kW and 350 kW capable of charging a 400 km range battery in only 20-30 minutes.

Level 1 is usually deployed at single family homes. Level 2 is usually deployed at condominiums, townhouses and commercial sites. Level 3 is usually deployed as a commercial retail charging station.

Technology in this area is changing quickly and induction charging may be available in the future.

1.4. Scope A: Basis for regulation

1.4.1. (1) Do EV charging stations operate in a competitive environment in BC or are they a natural monopoly service?

Currently, EV charging stations in Richmond operate charging station for the Municipality and therefore operate in a non-competitive environment. Currently there are a limited number of charging station operators; thus, the current operators may create an appearance of a natural monopoly. However, I would not refer to them as being a natural monopoly but rather an opportunistic monopoly created by the municipal exemption from the UCA.

1.4.2. (2) Are the customers of EV charging stations captive or do they have a choice?

At the moment, I don't believe that the customers of EV charging stations are captive, but their choices are limited by Municipal charging services provided and because the charging station operators have established agreements with some Municipalities as the Municipalities are exempt from BCUC regulation.

Figure 3 shows the EV charging stations available within the FortisBC service area.

Is there really a need for the public utility to engage in this service?

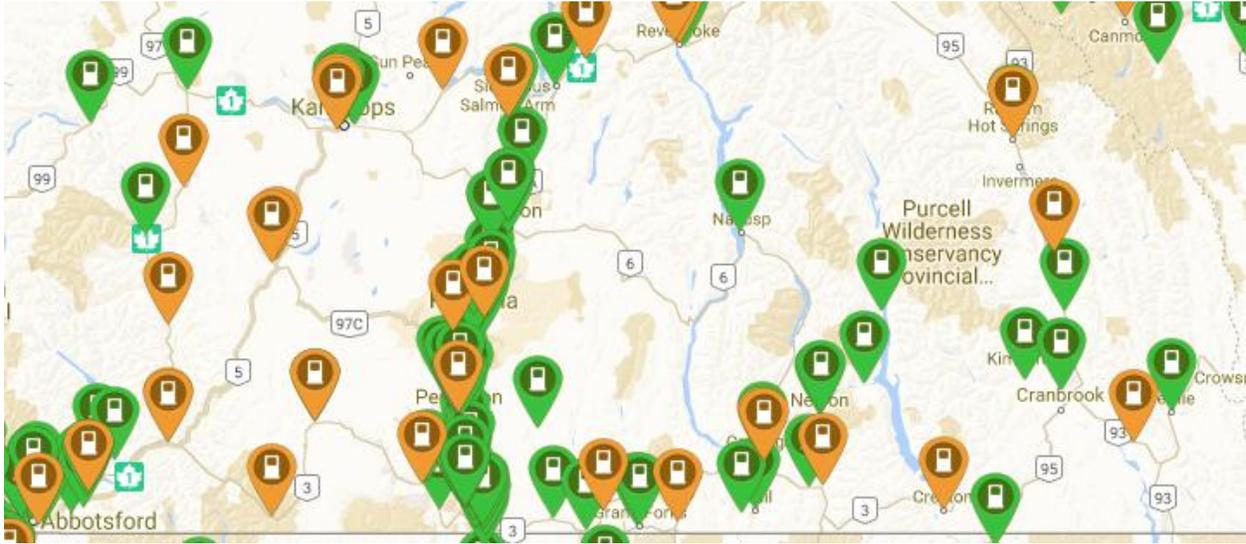


Figure 3 FortisBC Service Area Competition - <https://www.plugshare.com/>

1.4.3. (3) Should the Commission regulate the services provided by EV charging stations? What are benefits and detriments to such regulation?

Under the UCA, the Commission must regulate the services provided by EV charging stations.

The benefits are to ensure fair and equitable treatment of all parties. However, a detriment to regulation is the ability of the public utility to make use of the rate base to capitalize its investment, and through cost of service rates ensure itself a profit.

Benefits: The benefits are small in that the Commission will regulate the price at the pumps across BC.

Detriments: The detriments are the DCFC stations will be allowed into rate base and the risk and assets will be carried by the existing ratepayers.

Also, how will the Commission determine cost of a unit of energy in the lower mainland could be different then a unit of energy Salmon Arm?

Would postage stamp rates be required or would it be better for the NRB arm of a public utility and private operators to sort out the charging station pricing and the Commission only regulate the supply cost of energy to the charging stations?

If the Commission was to allow the NRBs of the public utility to compete freely against all other suppliers, and all parties were granted a temporary 5 year exemption from regulation, the free market forces would determine the appropriate charges for the services provided by EV charging stations. After 5 years, the Commission can decide to continue the exemption or commence regulation at its discretion.

1.5. Scope B: Rate design and rate setting

1.5.1. (4) Should the rate design of EV charging stations be established under a public utility's traditional cost of service model or some other model? And within that context, what are the customer pricing options (e.g. energy-based rate vs. time-based rate)?

The rate design of EV charging stations should be established under some other model and not under a public utility's cost of service model. If the EV stations are not profitable or become stranded assets, the entrepreneurial and financial risks will fall back on the ratepayers. This does not imply that the Commission should not regulate the rates charged by EV stations.

The calculation is based on FortisBC's (FBC) incremental cost of power purchase or about \$50/MWh (\$0.05/kWh.) and is used as an input to the cost of service. I've two issues with this approach.

- First, is this amount the cost of energy delivered to the EV charging stations over transmission and distribution line and substations included?*
- Second, does this involve the use of purchased power that may have a CO_{2e}/tonne amount associated with it?*

Instead of using FBC's incremental cost of power purchase as an input to the cost of service, would it not have been more appropriate to use FBC's Commercial Service Rate as it would have covered the cost of delivering energy to the EV charging stations. The Commercial Service Rate could also be applied to other charging station operators. As FBC is not totally hydro-electric (CO_{2e} free), since it purchases power from the US grid and other sources; the component of CO_{2e} should be added to the Commercial Service Rate.

The rate of \$0.87/kWh or greater should be used as an input to the cost of service for supplying energy to EV charging stations. It should be noted that the Commercial Service Rate has a demand charge of \$8.60/kW associated with it. Although I do not recommend the Small Commercial Service rates, it should be noted that the cost is \$0.10195/kWh or about twice the amount used by FBC as an input to the cost of service calculation. Commission staff should redo FBC's financial calculation using the commercial service rate as an input to the cost of service. By using the Commercial Service rate, the cost of energy delivered to the EV charging stations has accounted for FBC's electrical infrastructure involved in supplying energy to the EV charging stations.

Time-based pricing is misleading since the amount of energy delivered to the EV will vary depending on the state of charge (SoC) of the EV's batteries and the ambient temperature. Since most ratepayers are familiar with their electric bills, energy-based rates are preferable over time-based billing plus energy-based rates more accurate. "FBC is proposing to use a time-based rate structure, as it is easy for customers to understand and simple to administer." I would dispute that an EV owner can easily understand energy-based rates. In terms of competitiveness, a \$9.00 per half hour charging session correlates to an EV rate (excluding transaction fees) of 38 cents per kWh, 38 cents per kWh is comparable to the 35 cents per kWh other BC hosts charge as EV refuelling rates. FBC has provided the Commission with the energy-based equivalent charge and this is the charge, \$0.38/kW.h that could be used instead of \$9.00/30min. assuming the updated financial calculations don't cause a significant change in the rate to be charged.

The DCFC station's supply pricing structure must have a time-of-use component so not to impact the current electrical distribution system. Further, the DCFC supply pricing structure

must include a demand charge to avoid excessive load on the distribution lines. In addition, a power factor penalty must be included and the harmonics addressed.

1.5.2. (5) Should the EV charging station service rate be based on a public utility's existing wholesale or commercial retail rate or some other rate?

The EV charging station service rate should be based on some other rate to reflect the cost of operation and the conversion of energy to DC. Hence, the preference for private operators and NRB arms of a public utility to be engaged in providing the service.

No, the DCFC supply charging station rate should not be based on public utility's existing rates. Instead, a new tariff should be established that bills the DCFC charging stations on demand (kW), energy (kWh), and time-of-use power factor, etc.

Also, consideration must be given to the capital cost of distribution line upgrades to these charging stations and possible substation upgrade costs.

1.5.3. (6) Should public utilities include EV charging stations in their regulated rate base or through a separate non-regulated entity?

The public utilities must not include EV charging stations in their regulated rate base, but rather through a separate non-regulated entity (NRB) to insulate the ratepayers from the risks of business failures, cross subsidization from other rate classes to support this new service, the necessary upgrades to existing infrastructure, and the risk of completion from municipalities who provide free charging at level 2 charging stations,.

1.5.4. (7) If public utilities provide EV charging services within their regulated business, is there a risk of cross subsidization from other rate classes to support this new service and if so, is the proposed rate design potentially unduly discriminatory?

The proposed rate design is potentially unduly discriminatory. Yes, there is a risk of cross subsidization from other rate classes to support this new service. The risk is readily apparent on

the capital expenditure side. 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. The electricity generating utility must provide a dedicated supply line capable of delivering the very high currents demanded.

The rate design is potentially unduly discriminatory as it is favourable to the owners of EVs. Statistic Canada shows the total number of registered motor vehicles in BC is 3,615,373 vehicles. In 2015 the Vancouver Sun² reported that there were 3,200 electric cars and 36,000 hybrids or about 1% of the total number of vehicles on the road is some form of EV. Reference 7 clearly shows how a larger increase in sales is actually just a very small change in the number of EVs when compared to total number of registered motor vehicles in BC.

Even though these EVs may be good for addressing climate change issues, their low numbers support the claim of discriminatory (favours a small group of people owning EVs), and the need to use the NBR arm to provide these EV charging stations to avoid any discriminatory practice within a public utility.

1.6. Other matters

1.6.1. (8) Any other matters that may assist in the effective and efficient review of the Inquiry.

Need

Is there a need for FortisBC Inc. or other public utilities to build supercharging stations within the rate base?

² <http://vancouver.sun.com/news/local-news/electric-vehicle-numbers-growing-in-b-c-but-still-far-behind-gas-powered-counterparts>

Considering the numerical ratio of EVs to gasoline vehicles, it may be some time before these supercharging stations become profitable.

Has a CPCN been submitted by FortisBC Inc. for construction of the DCFC's?

As a public utility, FortisBC Inc. does not need to build DCFC stations within its rate base. FortisBC Inc. can use its non-regulated arm to build the DCFC stations. The BCUC could grant FortisBC Inc. (non-regulated) an exemption from regulation if it is thought to be necessary.

Besides, the Automobile manufacturers are already making commitments to build these charging stations.

“Tesla’s announcement comes as European car makers are mounting a serious challenge to the company’s charging stations in the continent. According to [a Reuters report](#), BMW ([BMW.DE](#)), Daimler AG, Volkswagen AG, and Ford Motor Company ([FFord Motor Co11.65+0.69%](#)) are planning to build 400 next-generation charging stations in Europe. These stations will take minutes, instead of hours, to charge an electric vehicle. The Reuters report notes that Tesla’s Supercharging stations, which are the fastest in Europe right now, take 30 minutes approximately to fully charge an electric vehicle.”³

Experience

What experience does FortisBC have in operating a business of this nature?

This would be an obvious reason for removing EV charging services from their regulated business to its non-regulated business. Allowing EV charging stations into FortisBC Inc.'s ratebase may facilitate cross-subsidization with FortisBC Inc. core utility business. For this reason, I believe the non-regulated approach should be favoured.

³ <https://www.investopedia.com/news/tesla-reveals-pricing-supercharger-network-tsla-f/>

Free Market Approach to Fast Charging Stations (Level 4)

As the battery and charging technology changes, there may even be more and better Level 4+ charging stations available. New higher capacity charging stations⁴ are already being built by BMW, who is leading the project through the 'FastCharge' consortium in partnership with other companies, like Porsche, Allego, Siemens and others, to charge EVs in 15 minutes at a charge rate of 450kW.

Fastned is a fast growing, private sector group, that is already offering these high capacity charging services in Europe. Fastned has two plans: Pay as you go at 0.59€/kWh or a fixed cost of 9.99€/month plus 0.35€/kWh.

At moment in North America only Tesla provides this type of station. However, in Europe, Fastned provide a network of fast charging stations which may migrate to North America. Currently, Fastned stations can charge the Tesla Model S / X, Nissan Leaf, BMW i3, and the Hyundai Ioniq.

As this is the case, I believe that FortisBC Inc. (regulated) should only be in a wholesale position selling its power/energy to its non-regulated retail businesses (the charging stations) under a new tariff suited to these charging stations. This reduces the risk to the ratepayer and allows FortisBC Inc. to develop its charging stations program in a competitive environment. Free competition will control the EV charging pricing and protect the consumer.

Risk of Failure

Certain municipalities, like the City of Richmond, allow you charge your EV vehicle for free at one of 25 ChargePoint Level 2 charging station locations throughout Richmond. These stations are free to use 24/7 and work with most electric vehicle brands, including Nissan, Tesla

⁴ <https://electrek.co/2017/12/05/bmw-porsche-electric-car-charging-450-kw-charge-rate/>

BMW, and Chevrolet. Free is difficult to compete with. Further, Tesla currently operates its supercharging stations at cost.

There is a risk of financial failure if the stations are not strategically located. Tesla Supercharger stations are conveniently located near desirable amenities like restaurants, shops and WiFi hot spots. Each station contains multiple Superchargers to get you back on the road quickly.

As EV owners charge their cars at home more than 90% of the time and use the Superchargers mainly for longer trips when they need extra range, it may diminish FortisBC Inc.'s financial projections significantly.

Temperature Issues

Depending of the temperature, the amount of energy provided to the EV's battery can vary considerably. Effective January 12, 2018, the Commission approved a time-based rate of \$9.00 per 30-minute period for EV charging at FBC-owned DCFC stations on an interim basis. However, the amount of charge accepted by the EV batteries can vary by temperature. This means the amount of energy delivered to the batteries will be different at 20°C than at temperatures below 0°C.

Li-Ion Batteries

Fast charging of most batteries is limited to 5°C to 45°C (41°F to 113°F); for best results consider narrowing the temperature bandwidth to between 10°C and 30°C (50°F and 86°F).

The Li-ion battery's charge temperature range is 0°C to 45°C (32°F to 113°F) with a cautionary note that states, no charge is permitted below freezing. Below 5°C, the charge current should be reduced, and no charging is permitted at freezing temperatures because of the reduced diffusion rates on the anode. During charge, the internal cell resistance causes a slight temperature rise that compensates for some of the cold. The internal resistance of all batteries

rises when cold, **prolonging charge times noticeably**⁵. DCFC at low temperatures also affects the cycle life of EV batteries.⁶⁷

The effect of temperature and state of charge on charging EV batteries is not discussed sufficiently to determine if a time only base rate (30 min) actually delivers the same amount of energy to the EV battery as the same time period would provide at 18°C.

Charging Stations

The Terra 51 Fast Charging Station, ABB -10°C to +40°C unless a low temperature option -35°C to +40°C is purchased. Again, the effect of temperature and state of charge on charging EV batteries is not discussed sufficiently to determine if a time only base rate (30 min) actually delivers the same amount of energy to the EV battery as the same time period would provide at 18°C when one considers the type of charger employed.

Tesla's Supercharging Rates in Canada

Tesla states "Where possible, owners are billed per kWh (kilowatt-hour), which is the most fair and simple method. In other areas, we bill for the service per minute." and "Tesla is committed to ensuring that Supercharger will never be a profit center."⁸ Tesla believes that owners should pay for energy delivered to the vehicle and therefore we price the service on a per kilowatt-hour (kWh) basis for the global network. In some regions, regulations and requirements make it difficult for companies that are not utilities to sell electricity for vehicle charging per kWh. In these places, we offer the Supercharger service at a per minute price, with two tiers to account for the dynamic charge rate (reduced charging rate due to higher terminal voltage – SoC).

The provincial rates are:

⁵ http://batteryuniversity.com/learn/article/charging_at_high_and_low_temperatures

⁶ <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.909.5556&rep=rep1&type=pdf>

⁷ <http://ieeexplore.ieee.org/document/7104480/?reload=true>

⁸ https://www.tesla.com/en_CA/support/supercharging

Province	Rate
Nova Scotia	\$0.28/min >60kW \$0.14/min <=60kW
Quebec	\$0.26/min > 60kW \$0.13/min <= 60kW
Ontario	\$0.26/min > 60kW \$0.13/min <= 60kW
Alberta	\$0.24/min >60kW \$0.12/min <= 60kW
British Columbia	\$0.28/min > 60kW \$0.14/min <= 60kW

Since Tesla states that its supercharging stations will never be a profit centre then these rates should represent the breakeven cost of an EV charging station operation. Tesla also states that in urban areas it can deliver a nearly consistent 72 kilowatts (kW) of power, even if another Tesla begins charging in an adjacent stall.

Further, Tesla charges Idle fees to any car occupying a Supercharger if the station is at least 50% full once the charge session is complete. If the car is moved within 5 minutes of the charge session completion, the fee is waived.

State of Charge

Depending on the state of charge (SoC) of the EV's battery the amount of energy provided and absorbed can vary considerably.

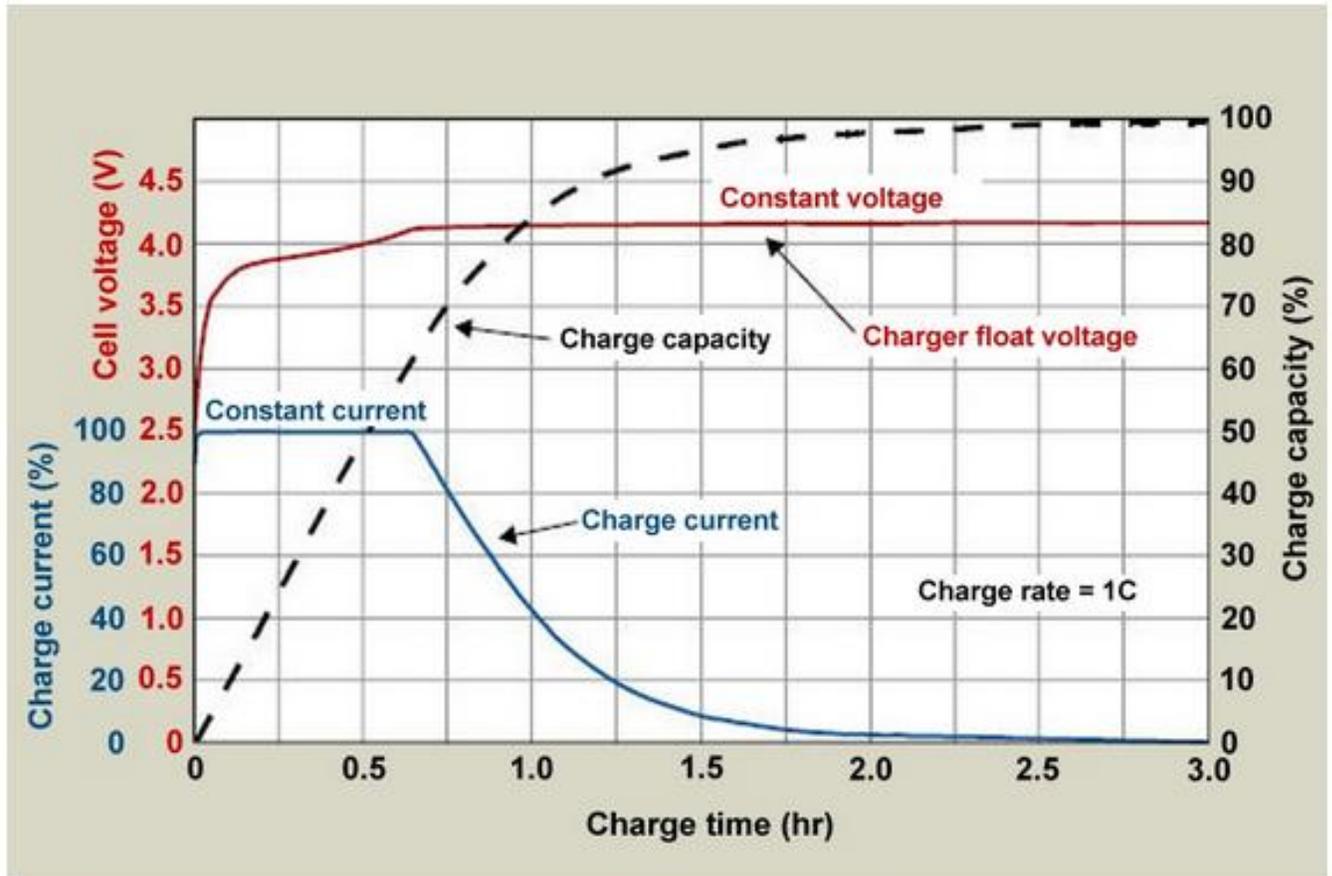


Figure 4 Volts/capacity vs. time when charging lithium-ion⁹.

The flaw with the \$9.00/30min. rate is if one decides to charge his EV at or below a 10% charge capacity (RHS axis), one can charge the EV's battery with a constant current for about ½ hour. However, if one is only topping up the EV's battery starting at about 40% charge capacity, the charging current reduces significantly as does the amount of energy taken. Hence, the \$9.00/30min. rate delivers a reduced amount of energy for the same cost. This is the reason that I would give for not supporting the rate of \$9.00/30min.

⁹ http://batteryuniversity.com/learn/article/charging_lithium_ion_batteries

Additional Components to be Added to Rate Structure

Carbon Tax

Since FortisBC Inc. buys power/energy from other sources than hydro-electric sources, then a carbon tax should be added to the rate schedule when selling electricity to EV charging stations.

Power Factor

Since the charging station power factor of 0.96 is only specified at full load then a power factor penalty should be applied and/or a kVAR/kVARh charge introduced in the EV charging station's rate schedule. The DCFC station should have an input power factor of not less than 0.95 through the capacity range of 0 to 100% of rated input amperes.

1.7. Recommendations

My recommendations are:

- 1.7.1. The EV charging stations should be assigned to the non-regulatory business (NRB) so that the ratepayers can avoid:**
- a. the risk of cross subsidization,**
 - b. Being exposed to a high risk of financial failure since FortisBC Inc. has no experience in the DCFC market and only about 1% of the vehicles in BC are EVs,**
 - c. The risk of public utilities engaging in a business enterprise outside there normal business realm and where they have no experience,**
 - d. Upgrade costs to the electric lines and substations.**
 - e. Finance and carrying costs for the EV charging station program,**
 - f. Creating a natural monopoly in the service area, and**
 - g. Preventing open, free-market competition for other EV charging stations such as: Tesla, ChargePoint, Aerovironment, Blink, the Electric Circuit,**

Fastned, GE Wattstations, Greenlots, SemaConnect, Sun Country Highway, and Volta to name a few.

1.7.2. The future public utility (regulated) proposed rate schedule for selling electricity to the public utility (non-regulated) EV charging stations should include:

- h. Connection costs to a 25kV supply fed directly from a substation (if possible) including any upgrade costs to the distribution system as a result of the EV charging stations.**
- i. Cost of supplying harmonic filtering for protecting the supply lines and other customer from any harmonic output from the EV charging stations.**
- j. A rate schedule for the sale of electricity to the EV charging station that consists of:
 - i. Power factor penalty for $PF < 0.95$,**
 - ii. kW/kWh billing,**
 - iii. kVAR/kVARh billing,**
 - iv. carbon tax.****

1.7.3. The follow existing rate should be modified:

- k. As FortisBC Inc. is seeking a time based rate (\$9.00/30min. charge), it should be noted that the amount of power and energy be supplied may vary during the charging period for several reasons such as: temperature, state of charge of the battery, etc.**
- l. Considering that the EV owner wishes only to pay for the power/energy received, FortisBC Inc. should add the time component into its rates as kWh's.**

1.7.4. Other Considerations should be:

- m. The cost of energy purchased by the DCFC stations should be similar to FortisBC's Commercial Service rate¹⁰ or about \$0.10 kWh. Using the Commercial Service rate takes into account the actual cost of service to supply a DCFC charging station and protects the ratepayers from cross subsidization. This approach somewhat protects the ratepayers from system upgrade costs and may be necessary. A separate DCFC charging station rate schedule should be develop to ensure the protection of ratepayers.**
- n. The equivalent FortisBC resale rate to EV customers has been stated as \$0.38/kWh.**
- o. The installation and connection to the grid. Quebec has produced a technical guide for the installation of DCFC charging stations. I am unable to find a similar document for BC. It would be helpful for FortisBC to either adopt or amend a section of this document for installation of DCFC charging stations in its service area assuming that competition may be permitted. [Reference 3, section 5.4]**

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<https://www.fortisbc.com/About/RegulatoryAffairs/ElecUtility/ElectricBCUCsubmissions/Rates/Pages/default.aspx>

1.8. References:

1. <https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/regulatory-planning-documents/regulatory-matters/VEVA-20170919-DCFC-Stations.pdf>
2. <https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/transportation-energies/clean-transportation-policies-programs/clean-energy-vehicle-program/charging-infrastructure/dcfc-program>
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