RR-1(d)

CITY OF VANCOUVER

ADMINISTRATIVE REPORT

Report Date:	June 20, 2017
Contact:	Doug Smith
Contact No.:	604.829.4308
RTS No.:	12009
VanRIMS No.:	08-2000-20
Meeting Date:	June 27, 2017

TO: Vancouver City Council

FROM: General Manager of Planning, Urban Design and Sustainability

SUBJECT: User Fees for City Owned and Operated Public Electric Vehicle Charging Stations

RECOMMENDATION

A. THAT Council approve the charging of user fees at City owned and operated public Electric Vehicle (EV) charging stations as described herein.

B. THAT Council approve, in principle, changes to the Parking Meter By-law No. 2952, as generally outlined in this report and Appendix A, to effect the charging of user fees at City owned and operated public EV charging stations.

C. THAT Council authorize the Director of Legal Services to prepare and bring forward for enactment amendments to the Parking Meter By-law No. 2952 as generally outlined in Appendix B.

REPORT SUMMARY

The City committed to introducing user fees for public electric vehicle ("EV") charging stations as part of the 2016 EV Ecosystem Strategy. The intent of this report is to seek Council approval to charge user fees at City owned and operated public EV charging stations and to amend the Parking Meter By-law to allow implementation and enforcement of these fees.

User fees will be introduced with the intention of increasing turnover at EV charging stations, and encouraging EV drivers with access to home or workplace charging to use those preferentially.

The City consulted with stakeholders and thought leaders on EV infrastructure in early 2017 as part of the development of this program.

COUNCIL AUTHORITY/PREVIOUS DECISIONS

The City has the legal authority to own and operate EV charging stations in the City of Vancouver pursuant to section 145 of the *Vancouver Charter*. As part of the City's authority to operate EV charging stations, the City may charge user fees.

In November 2016, Council unanimously adopted the EV Ecosystem Strategy, providing a five-year strategy on the City's approach to home, workplace and public charging infrastructure; and, defined the City's role as a provider of and a market enabler for electric vehicle charging access as a community amenity to 2021. The introduction of user fees was the Fair Access Quick-Start committed to under the EV Ecosystem Strategy.

In November 2015, Council adopted the *Renewable City Strategy*, committing to derive 100 per cent of all energy used in Vancouver from renewable sources before 2050; and, to reduce greenhouse gas emissions by 80 per cent from 2005 levels before 2050.

In August 2013, Council adopted new minimum requirements for all parking stalls in new one- and two-family homes, 20 per cent of parking stalls in multi-unit residential buildings, and ten per cent of parking stalls in new commercial buildings, such that they be equipped with a "Level 2" charging circuit under the *Vancouver Building By-law*.

In October 2012, Council adopted *Transportation 2040*, which includes actions to support electric vehicle deployment and the provision of charging infrastructure.

In July 2011, Council adopted the *Greenest City Action Plan (GCAP)*. Goal 9 (Clean Air) of GCAP includes encouraging electric vehicle transport. Goal 2 of GCAP includes carbon reduction goals to reduce greenhouse gas emissions by 33 per cent by 2020 over 2007 levels. In 2009, Council adopted requirements in the *Vancouver Building By-law* for electric vehicle charging circuits in new homes and multi-unit residential buildings. These were the first such requirements in North America.

For many years preceding this, Council has directed staff to develop policy and plans that have been built upon in the current Greenest City work including *Clouds of Change*, the *Community Climate Change Action Plan*, EcoDensity and others.

CITY MANAGER'S/GENERAL MANAGER'S COMMENTS

The City Manager recommends approval of the foregoing.

REPORT

Background/Context

The 2016 EV Ecosystem Strategy describes how different approaches to deploying electric vehicle charging infrastructure in the home, workplace, and public settings can create an interdependent network that will support the electrification of light-duty vehicles in Vancouver. The different approaches build on an existing public network of charging stations (currently numbering approximately 250, of which approximately 75 are City owned)), and on a growing number of homes and commercial buildings that have been constructed with EV charging circuits since 2011.

A public survey of over 2,000 Vancouver residents in 2016 indicated that 85% of people planning to buy new cars in the next five years would or would consider buying an electric vehicle, a number greater than total EVs registered in Vancouver at the time.

Challenges

Presently, the City does not require payment for the use of City owned and operated public charging stations, although the standard parking rates for each block or parking lot apply. Use of City owned and operated EV charging stations has more than doubled in the past two years, with over 17,000 charging sessions averaging nearly five hours per day per station, but with some locations having up to approximately 13 hours of use per port, per day. Increasing congestion at many of the City owned and operated public access EV charging stations is reducing their utility to members of the public who rely on them. The significant growth in EV uptake (a 63% increase between 2015 and 2016) is likely to exacerbate this issue under current conditions.

In 2016, City owned and operated public access EV charging stations logged over 17,000 charging sessions. Data shows that approximately half of all time spent at City owned and operated EV charging stations occurs after the battery is full, suggesting a need for greater turnover.

Solutions

If approved, user fees will be introduced and phased in at City owned and operated EV charging stations with the intention of increasing turnover at such stations, and encouraging EV drivers with access to home or workplace charging to use those preferentially.

The City consulted with stakeholders and thought leaders, including BC Hydro, SFU Sustainable Transportation Action Research Team, Metro Vancouver, and the BC Institute of Technology, among others, on EV infrastructure in early 2017 as part of program development.

The user fee program for City owned and operated EV charging stations will be guided by the following principles, in order of importance:

1. Increasing turnover
2. Ease of understanding
3. Encourage home use where possible and use of lowest power infrastructure
4. Eventual return on investment on infrastructure
5. Fairness
6. Rates that encourage the transition to electric vehicles

Roll-out of User Fees to initial City owned and operated EV Chargers

Initially, user fees will be introduced at City owned and operated EV charging stations located at 16 different locations – all of which are City or Park Board jurisdiction sites. For context, EV charging stations presently exist under four different operating models in Vancouver, as described in the table below. User fees proposed in this report will be applied to Groups 'A' and 'D' initially. The EV charging station in Group D is the only one that is not City owned and operated. That charger is owned by BC Hydro and operated by

the City. EV charging stations that fall within Groups B and C are not under consideration for user fees at this time.

Group	Owner	Operator	City to Apply User Fees	Example(s)
A	City	City	Yes	City Hall Main Library Branch Hillcrest Community Centre Curbside locations
B	City	Third Party Site Host	No	Oakridge Mall Bentall Centre
C	Third Party	Third Party	No	Fairmont Pacific Rim Vancity Credit Union
D	Third Party	City	Yes	Empire Fields (BC Hydro owns station, City operates).

A separate approval process for charging stations at Park Board jurisdiction sites is required by the Park Board and this may be scheduled in the fall of 2017.

Proposed Fees

Fees will be charged hourly instead of per unit of energy, to encourage turnover once batteries are fully charged. Charging hourly is also a more familiar and easily understood method of payment. For more details on the fee models considered please see Appendix A.

User fees are initially proposed as follows:

- Level 2[1]: $2.00/hour plus regular meter rate (as applicable)
- DC Fast Charge[2]: $16/hour plus regular meter rate (as applicable)

[1] Typically provides up to 30km of range per hour plugged in
[2] Typically provides up 200km of range per hour plugged in

The above pricing equates to about $0.46/L and $0.50/L of gasoline equivalent respectively[3]. The City's existing EV infrastructure on those City owned and operated EV chargers that are part of the initial rollout is capable of collecting user fees based on rates set by the City. With the exception of three charging stations at Hillcrest Community Centre, which are being upgraded, no additional changes or upgrades to City EV infrastructure is anticipated to implement the user fee system. The City will also ensure that, before applying a user fee at any particular City owned and operated EV charger, the party that has been hired by the City to electronically process payment at that EV charger complies with the standards established by the Payment Card Industry's PCI Security Standards Council.

For more detail on rates, please refer to Appendix A and page 41 in the EV Ecosystem Strategy.

Strategic Analysis

Pricing will be designed so that residential charging will cost less than public charging, and Level 2 to cost less than Fast Charging. The primary goal of this graded pricing model is to encourage drivers with home or workplace charging options to use them when possible. Because of the large price differential between electricity and liquid fuels in the region, it will be possible to implement charge station pricing that is effective in minimizing abuse while at the same time being far less expensive than gasoline or diesel. Also these rates will help ensure that other modes like walking, biking and transit will remain more attractive financially than driving an EV.

The pricing structure will be developed as an "add-on" to existing parking fees to optimize station utilization. In other words, the Level 2 and DCFC rates that are developed under the above criteria will be in addition to a given parking lot price or fee zone prices.

It should be noted that those City owned and operated EV charging stations that are part of the initial rollout and that are located in parking lots should not require a change in pricing policy by the parking management company. The City will set rates through the EV charging stations that will include the usual parking fee at a given lot and remit the parking fee to the lot operator. The City will agree upon the terms and conditions of such an arrangement with the parking lot operator before applying a user fee to such EV chargers.

Implications/Related Issues/Risk (if applicable)

Financial

Details of financial implications of introducing user fees are provided in Appendix A of this Council Report. The existing thirty (30) Level 2 stations and one (1) DC Fast Charging station will not incur any additional capital costs. Future installations, as approved under the 2016 EV Ecosystem Strategy, will have capital costs that will be funded within the approved 2015-2018 capital plan and expenditures will be managed with existing budget.

[3] Equivalency with gasoline is strictly an estimate, and can vary based on the energy efficiency of vehicles being compared. Typically, an EV can travel approximately nine to ten times further on a unit of energy than a similar internal combustion engine vehicle. Home charging would be closer to $0.20/litre equivalent.

It is estimated that annual revenues from all stations will be $23,500 with annual operating (excluding the investment for capital costs and installation) of approximately $14,500. It is anticipated that the currently proposed user fees will achieve a positive return-on-investment ("ROI") for Level 2 charging stations in approximately 1.25 years. It is anticipated that the currently proposed user fees for DC Fast Charge stations will not achieve a short-term ROI, however, revenues will increase significantly as electric vehicles become more common.
\
It is not presently known how sensitive EV drivers will be to user fees. As more market data is obtained and as the number of EVs on the road increases, it is expected that user fees will be adjusted and that positive ROIs will be achievable during the useful lifetime of the infrastructure.

The framework for rate-setting is described in detail in Appendix A.

Human Resources/Labour Relations

The introduction of user fees for City owned and operated public EV charging stations, and the concurrent inclusion of EV infrastructure within the Parking Meter By-law will generate the need for, and the ability of the City to, enforce the appropriate use of such public charging stations. This in turn will generate training needs for City Parking Enforcement staff and external partners, including parking management companies such as Easypark. Sustainability will support such training prior to the launch of user fees.

The collection of user fees will be via electronic means through existing data network providers that support the City owned and operated public EV charging stations. Human resources implications for this are therefore expected to be minimal and no new resources will be required.

Legal

The City may sell electricity through City owned and operated EV charging stations for a user fee without attracting public utility regulation under the British Columbia *Utilities Commission Act*. The definition of "public utility" under the *Utilities Commission Act* excludes municipalities.

Notwithstanding the above, the sale of electricity by the City through a City owned and operated EV charging station would trigger certain filing requirements under "energy supply contract" section (s. 71) of the *Utilities Commission Act*. This includes the need to file a generic sales contract as well as quarterly and annual sales information.

Public Notifications

City staff will provide public notifications for at least one month prior to implementing new user fees. Notifications will be provided through four modes simultaneously:

1. Messages displayed on EV charging station displays at affected sites.
2. Messages posted online at Vancouver.ca and to EV infrastructure mapping sites like Chargehub.com and plugshare.com outlining new pricing and implementation
3. Signage posted adjacent to EV charging stations at affected locations.

4. Regular social media reminders leading up to implementation.

The City will continue to gather input via 311 and social media to monitor implementation and may convene future user workshops to get input on evolving the program to best suit user's needs.

CONCLUSION

As directed by Council via the EV Ecosystem Strategy, the introduction of user fees at City owned and operated public access EV charging stations will increase turnover and ensure that the infrastructure is used more optimally and make owning an EV easier and more attractive. To implement a user fee system, Sustainability staff will work with Easypark, EV charging station data network providers, and City staff in affected departments and the Park Board. Public notifications will be provided approximately one month before the initiation of user fees, expected during summer 2017.

* * * * *

Financial Plan for COV Owned and Operated Public Electric Vehicle Charging Station Rates

1. Summary

The City committed to introducing user fees for public electric vehicle ("EV") charging stations as part of the 2016 EV Ecosystem Strategy. Sustainability will present an update to City Council on June 27, 2017 that will include proposed rates and changes to the *Parking Meter Bylaw*.

Presently, the City does not charge any fees at any of its public charging stations. Increasing congestion at many of the City's public access EV charging stations is reducing their utility to members of the public who rely on them. The significant growth in EV uptake (a 63% increase between 2015 and 2016) is likely to exacerbate this issue under current policy.

In 2016, City public access EV charging stations logged over 17,000 charging sessions. Data shows that approximately half of all time spent at City-owned EV charging stations occurs after the battery is full, suggesting a need for greater turnover.

The City consulted with stakeholders and thought leaders on EV infrastructure in early 2017 as part of program development.

2. Guiding Principles

User fees will be introduced with the intention of increasing turnover at City owned and operated EV charging stations, and encouraging EV drivers with access to home or workplace charging to use those preferentially.

The user fee program for City owned and operated EV charging stations will be guided by the following principles, in order of importance:

1. Turnover
2. Ease of Understanding
3. Encourage home use, lowest power use infrastructure
4. Return on investment on infrastructure
5. Public perception of fairness
6. Inexpensive compared to fossil fuels (maintain attractiveness of EVs over ICEs)

3. Consultation & Fee Models

Three potential models for fees were considered as part of the program design and consultation. The City plans to implement a time-based ($/hour) model as described below due to its alignment with the program principles as described above. A brief description of the three fee options is below.

Time-based ($ / hour)

Charging fees based on the length of time a station is occupied, and will encourage turnover so that charging stations are used by those who need them for EV charging and not simply as parking spaces, and optimize access through improved availability. Hourly fees are simple to understand, and would mirror existing rate structures for parking meters.

Energy-based ($/ kWh)

An alternate argument suggests that a fee based on energy (per kWh) would be more equitable between different models of vehicles with different on-board charging speeds, since users would only pay for energy received regardless of the length of time to charge. This, however, may hamper the ability for users who may be queuing to use station to determine wait times, and the ability for enforcement staff to manage these systems becomes increasingly complex.

Hybrid rate ($/kWh until battery full, then $/hour)

The third, hybrid option, would ensure equity in terms of pricing of energy delivered, while at the same time ensuring that users continue to pay a rate for staying at a charging station. Some jurisdictions have examined using relatively high hourly rates once a battery is fully charged to more strongly disincentivize “squatting”. However, a hybrid rate is also more difficult for users to understand, and may possibly lead to a less positive user experience. Some jurisdictions have introduced a ‘punitive’ hybrid rate such that the price is dramatically higher after a given time. However, more conventional parking enforcement measures can be employed by the City to prevent drivers staying beyond time limits at a given location.

It should be noted that upper limits on parking / charging times will be imposed, in line with the lot or city block that the charger is located on.

4. Station Usage

The City will only be bringing in user fees at locations where the City owns and operates the EV charging stations. The only exception is the DC Fast Charge Station located at Empire Fields, where BC Hydro owns the charge station and the City operates it. At these locations, the City owns the electrical supply, which is limited to City/Park Board buildings, City parking lots and stations on City ROW.

Such stations are present at 16 locations, as follows:

Level 2 Stations (7kW)

1. Arbutus St. adjacent to Kits Beach tennis courts
2. Britannia Community Centre
3. City Hall
4. Pacific National Exhibition

5. Mainland St. at Nelson
6. 180 Keefer St.
7. Mt. Pleasant Community Centre
8. Laneways at Oak & 49th Ave.
9. Coal Harbour Community Centre
10. Vancouver Aquarium
11. Vancouver Public Library Main Branch
12. Hillcrest Community Centre
13. Beach Ave. at Cardero St.
14. Beach Ave. at Bute St.
15. Beach Ave. at Bidwell St.

DC Fast Charge Station (50kW)

16. Empire Fields

Analysis of usage at 15 Level 2 locations was conducted for the period from January 10, 2016 to January 9, 2017 to determine the variations in usage at each location, and the typical session length and power obtained by users. It should be noted that usage at all locations has been increasing since 2013 when analysis began.

Usage of the Empire Fields location is not presently monitored, but is anecdotally reported to be high.

Analysis determined that the public Level 2 stations are used quite frequently, but not necessarily in a way that provides maximum public benefit. In the period mentioned above, a total of 17,016 charging sessions were recorded across the network.

The Level 2 stations were used on average for approximately three hours per session, consuming an average of approximately 8.2kWh. This suggests that the users of these stations are remaining longer than is necessary: a Level 2 charging station dispenses between 6.7kWh and 7.7kWh, indicating that on average, stations stop dispensing power less than halfway through a session.

The table below provides the breakdown, for illustration purposes, of the usage at Level 2 charging stations on City property.

Table 1 - EV Infrastructure Usage at City Properties

Station Name	Average Session Length	Avg. Energy (kWh/ session)	Total Sessions	Avg. Sessions / Month	Avg Session / per port	Avg Sessions (port/mo)	Average Usage per Day (hh:mm/port/d)
Kits Beach	2:40:18	8.76	1668	139.0	834	70	6:06
Britannia Community Centre	2:31:43	7.58	1910	159.2	955	80	6:36
City Hall	4:01:17	5.65	3035	252.9	759	63	8:21
Hastings Park	3:23:05	10.8	619	51.6	310	26	2:52
Mainland St.	2:53:41	10.8	3253	271.1	1627	136	12:53
Mt. Pleasant Community Centre	2:10:09	7.25	418	34.8	139	12	0:49
Oak St. / W.49th Ave.	1:30:10	5.03	177	14.8	177	15	0:43
Coal Harbour Community Centre	7:50:24	15.3	746	62.2	373	31	8:00
Vancouver Aquarium	1:38:31	5.33	965	80.4	483	40	2:10
VPL Main Branch	5:22:46	9.78	746	62.2	249	21	3:39
Hillcrest Community Centre	1:47:47	6.54	2475	206.3	825	69	4:03
Beach Ave (all)	1:25:19	5.47	1004	83.7	167	14	0:39
180 Keefer St.	1:40:10	5.143	471	39.3	236	20	1:04
Overall Average	**3:06:16**	**8.19**	**1418**	**118.17**	**575**	**48**	**4:44**
Overall Total			**17,016**				

5. Framework for Rate-Setting

The introduction of user fees will follow the City's model set out in the December 2016 *Parking Meter Bylaw* update. This framework is data-driven, and allows for adjustments to pricing based on a pre-determined objective for occupancy / availability. With respect to charging infrastructure, little is known on consumers' sensitivity to pricing, as few jurisdictions have introduced user fees to-date. Vancouver has significantly higher rates of use (and therefore of congestion) compared to many jurisdictions.

Generally, public understanding of energy consumption is quite low. Based on consultation with other local governments and thought leaders in this field, it was determined that a time-based system of user fees was simpler to integrate into existing parking regimes; and, was more likely to be understood by users. Further, pricing by time ensures an incentive for turnover, as public charging stations will continue to accumulate costs to a user's account; an energy-based system would cease to charge fees once a battery became completely charged.

Due to variations between vehicles, some EVs will obtain less energy over a given charging time than others, giving rise to concerns about equity between users. However, this disparity is not dissimilar from conventional fossil-fueled vehicles, whereby vehicles with poorer fuel economy derive less range per dollar spent compared with more fuel efficient models. Access to the infrastructure is arguably the value proposition behind introducing user fees. Therefore, that access, measured over time, appears the simplest method to ensure fairness.

Rates will be set as follows:

- Price per hour continuously while vehicles are connected
    - In some locations, this will likely be accompanied by an enforced upper limit on parking time.
    - For DC Fast Charge stations, this will be presented as a price-per-minute
- Structured as an 'add-on' to parking fees in a given lot or zone
- Correlated roughly to the power provided
- Tiered such that the charging stations providing the most range per hour will be the most expensive, and all public charging locations will be more expensive than residential electricity rates
- Fees for charging (not including the local parking rate) will be significantly lower than the equivalent fossil fuel costs.

6. Introductory Rates

The City will introduce the following rates, with adjustments expected as user sensitivity to pricing is better understood. The following introductory rates are additional to the parking rate at a given location, although the two fees will likely be collected at the charging station.

- AC Level 2: $2.00/hr
- DC Fast Charging (50kW): $16/hr.

7. Profit-Loss Expectations / Cost-Revenue

All public charging stations have both fixed and variable operating costs, as follows:

Fixed costs:

- Equipment lease or interest on capital investment
- Network services

- Utility basic charges
- Rate rider

Variable costs:

- Utility charges (electricity usage)
- Demand charges
- Transaction fees (network charge)

In order to be remotely monitored and collect payments, a fixed network fee is charged by a third-party operator that provides a cellular data connection to the charger. In addition, BC Hydro rates include a fixed daily charge. Operating costs include the cost of electricity, transaction charges from network providers, and demand charges[1]. It is expected that the introduction of user fees will cover the operating costs of EV charging infrastructure. It is also expected that a 5 year return-on-investment is possible even with a modest decrease in utilization. Because few jurisdictions in North America have implemented pricing for the purposes of easing congestion, projections will be challenging prior to implementing the program.

[1] As of April 1, 2017, BC Hydro now includes a demand charge for all medium and large site accounts (previously, only peak consumption over a specific threshold triggered demand charges).

Typical Cost-Revenue for a Level 2 (~7kW) charging station is provided in the table below.

Table 2 – Proposed Initial Profit-Loss Calculations for a Level 2 EVSE

Item	Unit Qty.	Per Session	Monthly
Typical Session Energy (kWh)		**8**	
Installed Capacity (kW)	**6.65**		
# Sessions	-	**1**	**125**
Usage Length (regardless of energy consumption) (hours)	**3**	**3**	**375**
Fixed			
Capital cost	**$4,500**		
Labour & Installation	**$2,500**		
Annual Network Fee	**$225**		**$18.75**
Basic Daily Utility Charge	**$0.2429**		**$7.39**
Annual Maintenance	**$200.00**		**$16.67**
Variable			
Electricity Cost ($/kWh)	**0.0880**	**$0.70**	**$88.00**
Demand Charge ($/kW)	**4.92**		**$32.72**
Rate Rider	**5%**		**$6.41**
Swipe Transaction Fee ($/txn)	**0.91**	**0.91**	**$113.75**
Total Variable Costs		**$1.61**	**$240.87**
Total Operating Costs			**$283.68**
User Fees Revenue	**$2.00**	**$6.00**	**$750.00**
Net Revenue over operating			**$466.32**
Annual Revenue over operating			**$5,595.86**
Simple Payback (yrs)			1.251

Overall, revenues for a Level 2 station could be as high as $750 per month, based on current usage rates. However, it is expected that this will be lower in practice. From a consumer perspective, $2.00/hour translates into about $0.30 per kWh, or the approximate equivalent energy as $0.46 per L of gasoline[2].

[2] Estimates of electricity vs. gasoline fuels' price equivalency are highly imprecise due to broad differences in vehicle efficiency between EVs and fossil-fueled vehicles. An EV can go approximately nine times further per unit of energy compared with a similar fossil fueled vehicle. As the two fuels themselves cannot be easily compared (electricity does not have a physical volume to be priced by), comparisons rely on estimated range per dollar of fuel purchased.

Table 3 - Proposed Initial Profit-Loss Calculations for a DC Fast Charging Station

Item	Unit Qty.	Per Session	Monthly
Typical Session Energy (kWh)		**25**	
Installed Capacity (kW)	**50**		
# Sessions	**-**	**1**	**125**
Usage Length (regardless of energy consumption) (hours)	**0.5**	**0.5**	**62.5**
Fixed Costs			
Capital cost	**$40,000**		
Labour & Installation	**$50,000**		
Annual Network Fee	**$225**		**$18.75**
Basic Daily Utility Charge	**$0.2429**		**$7.39**
Annual Maintenance	**$200.00**		**$16.67**
Variable			
Electricity Cost ($/kWh)	**0.0880**	**$2.20**	**$275.00**
Demand Charge ($/kW)	**4.92**		**$246.00**
Rate Rider	**5%**		**$26.42**
Swipe Transaction Fee ($/txn)	**0.91**	**0.91**	**$113.75**
Total Variable Costs		**$3.11**	**$661.17**
Total Operating Costs			**$703.97**
User Fees Revenue	**$16.00**	**$8.00**	**$1,000.00**
Net Revenue over operating			**$296.03**
Annual Revenue over operating			**$3,552.31**
Simple Payback (yrs)			25.336

The above table provides a sample calculation of the costs and revenues from a DC Fast Charging Station. Note that the simple payback period is significant. However, this assumes an initial usage of approximately 125 sessions per month. As EV adoption grows, it is likely that more than 300 sessions per month would occur, significantly reducing the payback period.

As the primary goal of the User Fees program is to create turnover, but also to ensure that electricity remains a significantly less expensive option, an hourly rate of $16.00 is proposed. From a consumer perspective, this translates into an approximately $0.50/L gasoline price.

8. Adjustments

Rate adjustments will be controlled through a similar methodology to the supply and demand based system applied to parking meters under the *Parking Meter Bylaw*. This is a data-driven system that sets rates to maintain a target occupancy/vacancy in a given area. When the number of vacant parking stalls is too low, parking rates are increased to create turnover and availability; when the number of vacant parking stalls is higher than targeted, parking rates are

reduced to increase demand for those stalls. A similar approach can easily be taken with EV charging, since networked stations are able to track their own availability and use.

Parking meter rates are adjusted based on the Peak Daytime Curbside Occupancy Rate over a calendar year, with adjustments occurring in the following calendar year. The Peak Daytime Curbside Occupancy Rate is defined as "the ratio of the number of occupied spaces on a block during the hours of 9:00 am to 6:00 pm to the total number of spaces on a block, expressed as a percentage that is calculated based on all data collected by the City throughout the calendar year."

In the case of EV charging infrastructure, different target occupancies and availabilities are proposed initially because the sensitivity of consumers to price changes is unknown, and the relative availability of public infrastructure is quite low compared to that of metered parking stalls. Additionally, rate adjustments are recommended on a semi-annual basis for the first two years following the introduction of user fees.

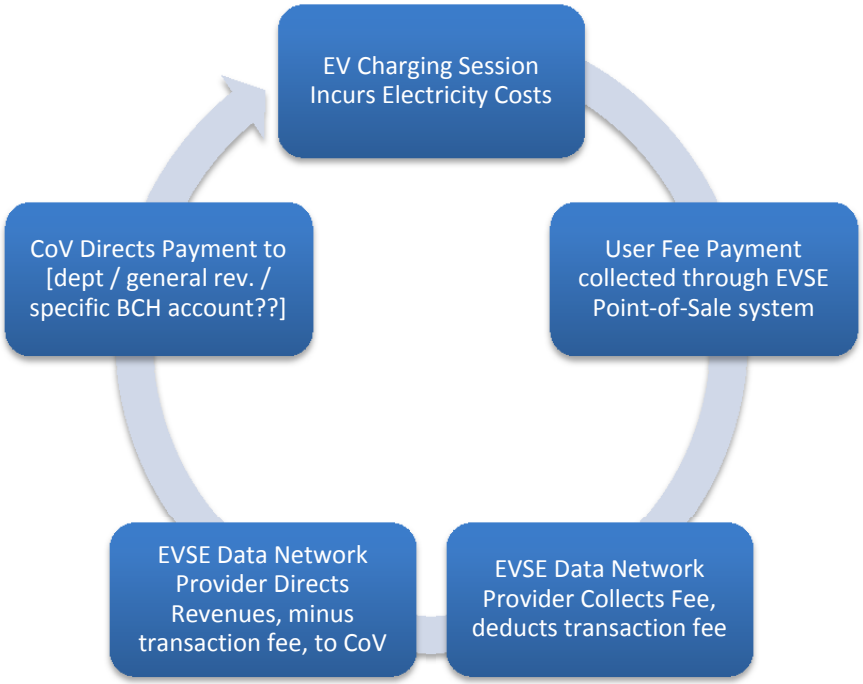
9. Use of Revenues

Two separate arrangements currently exist for electricity costs associated with EV charging stations on City properties.

1. EV infrastructure connected to an electrical panel that supports other loads and is not metered separately from other loads.
2. EV infrastructure is on a separate electrical panel that has a dedicated BC Hydro meter that bills only for EV charging loads.

A project to retrofit all locations captured under 1., above, is presently underway. However, it is anticipated that at some locations, installation of a separate BC Hydro meter may not be possible. In such scenarios, a revenue-grade submeter, as specified by Real Estate and Facilities Management, will be installed to determine the EV infrastructure-specific loads.

Under any of the above scenarios, the intended use of EV infrastructure revenues will be first to ensure cost recovery to the sites or departments responsible for them.



In the case of pay parking lots (i.e. – off-street parking), parking fees will be rolled into fees charged at the charging station, to avoid users needing to pay at multiple locations (i.e. – once at the charger, again at a payment kiosk). In such situations, the portion of revenues from EV charging stations equivalent to the parking rate will be directed back to the parking management company by the City.

10. User Fee Program Responsibilities

Department	Role
Sustainability	• Develop policy for User Fees and Oversee Implementation
Engineering	• Integrate EV Infrastructure User Fees Into Parking Management Policies, Consult with Sustainability on fee adjustments for two years following implementation • Quarterly and annual reporting to BCUC under S.71 of the Utilities Commission Act, supported by SUS • Direct payments to Easypark for portion of revenues equivalent to parking rates.
REFM Energy Management	• Manage Utility bills associated with EV charging
Finance	• Ensure flow of revenues to appropriate departments / accounts
EVSE Network Provider	• Provide monitoring data and remit revenues to CoV
Parking Enforcement (Internal to CoV or Easypark)	• Ensure that time limits at all EV infrastructure are enforced, and the any parking stalls associated with EV infrastructure are used only for that purpose.

A By-Law to amend

Parking Meter By-law No. 2952

regarding electric vehicle charging stations

THE COUNCIL OF THE CITY OF VANCOUVER, in public meeting, enacts as follows:

1. This by-law amends the indicated provisions of the Parking Meter By-law No.2952

2. In Section 2, Council inserts the following definitions in correct alphabetical order:

"Direct Current Fast Charging Station" or "DCFC" is a battery charging station equipment that transfers electric energy (by conductive or inductive means) to a battery or other energy storage device in an electric vehicle, is publicly available and that has a nominal power output of at least 24kW.

"Electric Vehicle" means any vehicle that operates, either partially or exclusively, on electrical energy from an off-board source, that is stored on-board for motive purpose; but, for the purposes of this by-law, does not include vehicles that cannot be licensed by the Insurance Corporation of British Columbia.

"Electric Vehicle Charging Station" means a Direct Current Fast Charging Station or a Level 2 Charging Station.

"Electric Vehicle Parking Space" means any marked parking space that identifies the use to be exclusively for the parking of an electric vehicle. Electric vehicle parking spaces may or may not be situated adjacent to an Electric Vehicle Charging Station.

"Interim Maximum Daytime Charging Station Occupancy" is the ratio of occupied Electric Vehicle Charging Stations during the hours of 9:00am and 6:00pm to the total number of Electric Vehicle Charging Stations on a block, expressed as a percentage that is calculated based on all data collected by the City over a 30 day period.

"Interim Maximum Evening Charging Station Occupancy" is the ratio of occupied Electric Vehicle Charging Stations during the hours of 6:00pm and 10:00pm to the total number of Electric Vehicle Charging Stations on a block, expressed as a percentage that is calculated based on all data collected by the City over a 30 day period.

"Interim Maximum Overnight Charging Station Occupancy" is the ratio of occupied Electric Vehicle Charging Stations during the hours of 10:00pm and 9:00am to the total number of Electric Vehicle Charging Stations on a block, expressed as a percentage that is calculated based on all data collected by the City over a 30 day period.

"Level 2 Charging Station" is a battery charging station equipment that has as its primary purpose the transfer of electric energy (by conductive or inductive means) to a battery or other energy storage device in an electric vehicle, is publicly owned and publicly available or privately owned and publicly available and that has a nominal power output between 4kW and 15kW.

"Maximum Daytime Charging Station Occupancy" is the ratio of occupied Electric Vehicle Charging Stations on a block during the hours of 9:00am and 6:00pm to the total number of Electric Vehicle Charging Stations on a block, expressed as a percentage that is calculated based on all data collected by the City throughout the calendar year.

"Maximum Evening Charging Station Occupancy" is the ratio of occupied Electric Vehicle Charging Stations on a block during the hours of 6:00pm and 10:00pm to the total number of Electric Vehicle Charging Stations on a block, expressed as a percentage that is calculated based on all data collected by the City throughout the calendar year.

"Maximum Overnight Charging Station Occupancy" is the ratio of occupied Electric Vehicle Charging Stations on a block during the hours of 10:00pm and 9:00am to the total number of Electric Vehicle Charging Stations on a block, expressed as a percentage that is calculated based on all data collected by the City throughout the calendar year.

"RFID EV network card" is a card provided by a data network operator of Electric Vehicle Charging Stations on a block that activates an Electric Vehicle Charging station through radio frequency identification technology for the purposes of providing electricity to an electric vehicle and collecting payments.

3. In Section 2, Council strikes the definition of "Parking Meter" and replaces it with:

   "Parking Meter" means a parking meter stand and the single or double parking meter head that it supports or an Electric Vehicle Charging Station.

4. In Section 2, Council adds a new subsection (8) to the definition of a "Metered Space" as follows:

   (8) in the case of an Electric Vehicle Charging Station any lawful parking space on a street between the curb adjacent to the roadway and an imaginary line on the roadway parallel to and 2.5 meters from the curb in an area marked as an Electric Vehicle Parking Space.

5. In Section 5 (1), Council adds the following new subsections:

   (g) in the case of an Electric Vehicle Charging Station designed to accept payments via a network subscription, tap the appropriate RFID EV network card on the appropriate part of the Electric Vehicle Charging Station and connect the electric vehicle to the Electric Vehicle Charging Station via conductive or inductive means to initiate a charging session;

   (h) in the case of an Electric Vehicle Charging Station designed to accept payments via a smartphone application, use the smartphone application appropriate to the Electric Vehicle Charging Station and connect the electric vehicle to the Electric Vehicle Charging Station via conductive or inductive means to initiate a charging session;

   (i) in the case of an Electric Vehicle Charging Station designed to accept payments via an RFID-enabled credit card, tap the credit card on the appropriate part of the Electric Vehicle Charging Station and connect the

electric vehicle to the Electric Vehicle Charging Station via conductive or inductive means to initiate a charging session; or

(j) in the case of an Electric Vehicle Charging Station designed to accept credit card payments by phone, call the phone number printed on the Electric Vehicle Charging Station and provide the appropriate details to initiate a session, and connect the electric vehicle to the Electric Vehicle Charging Station via conductive or inductive means to initiate a charging session.

6. In Section 5(2), Council adds the following new subsection:

(d) the time recorded on the Electric Vehicle Charging Station

7. In Section 5A, Council adds the following new subsections

(13) The initial metered rates for all Level 2 Charging Stations in an existing meter zone shall, prior to adjustment in accordance with this section 5A, be the metered rate for that block plus an additional $2.00 per hour.

(14) The initial metered rates for all Level 2 Charging Stations not in an existing meter zone shall, prior to adjustment in accordance with this section 5A, be $2.00 per hour.

(15) The initial metered rates for all Direct Current Fast Charging Stations in an existing meter zone shall, prior to adjustment in accordance with this Section 5A, be the metered rate for that block plus an additional $16.00 per hour.

(16) The initial metered rates for all Direct Current Fast Charging Stations not in an existing meter zone shall, prior to adjustment in accordance with this Section 5A, be $16.00 per hour.

(17) The initial metered rates for Direct Current Fast Charging Stations with nominal power outputs greater or less than 50kW in an existing meter zone shall, prior to adjustment in accordance with this Section 5A, be the metered rate for that block plus an amount calculated proportionally to the hourly rate of the nearest existing Direct Current Fast Charging Station as follows:

$$(R_{Near}) \times \left(\frac{P_{New}}{P_{Near}}\right) = R_{New}$$

Where

R_{Near} = Hourly Meter Rate of Nearest DCFC ($)

P_{New}= Power Output of New DCFC (kW)

P_{Near} = Power Output of Nearest DCFC (kW)

R_{New} = Hourly Meter Rate of New DCFC ($)

(18) The initial metered rates for Direct Current Fast Charging Stations with nominal power outputs greater or less than 50kW not in an existing meter zone shall, prior to adjustment in accordance with this Section 5A, be an amount calculated in accordance with the formula set out in subsection 5A(17) above without the metered rate.

(19) If the Maximum Daytime Charging Station Occupancy on a block exceeds 75% in a calendar year, then the metered rate for Electric Vehicle Charging Stations on that block between 9am and 6pm for the subsequent calendar year shall be increased by $1.00 per hour no later than March 1 of that year.

(20) If the Maximum Daytime Charging Station Occupancy on a block is less than 40% in a calendar year, and that block is an existing meter zone, then the metered rate for Electric Vehicle Charging Stations on that block between 9am and 6pm for the subsequent calendar year shall be decreased by $1.00 per hour by no later than March 1 of that year provided that the rate shall not be less than the metered rate for that block.

(21) If the Maximum Daytime Charging Station Occupancy on a block is less than 40% in a calendar year, and that block is not an existing meter zone, then the metered rate for Electric Vehicle Charging Stations on that block between 9am and 6pm for the subsequent calendar year shall be decreased by $1.00 per hour by no later than March 1 of that year provided that the rate shall not be less than $1.00 per hour.

(22) If the Maximum Evening Charging Station Occupancy on a block exceeds 75% in a calendar year, then the metered rate for Electric Vehicle Charging Stations on that block between 6pm and 10pm for the subsequent calendar year shall be increased by $1.00 per hour no later than March 1 of that year.

(23) If the Maximum Evening Charging Station Occupancy on a block is less than 40% in a calendar year, and that block is an existing meter zone, then the metered rate for Electric Vehicle Charging Stations on that block between 6pm and 10pm for the subsequent calendar year shall be decreased by $1.00 per hour no later than March 1 of that year provided that the rate shall not be less than the metered rate for that block.

(24) If the Maximum Evening Charging Station Occupancy on a block is less than 40% in a calendar year, and that block is not an existing meter zone, then the metered rate for Electric Vehicle Charging Stations on that block between 6pm and 10pm for the subsequent calendar year shall be decreased by $1.00 per hour no later than March 1 of that year provided that the rate shall not be less than $1.00 per hour.

(25) If the Maximum Overnight Charging Station Occupancy on a block exceeds 75% in a calendar year, then the metered rate for Electric Vehicle Charging Stations on that block between 10pm and 9am for the subsequent calendar year shall be increased by $1.00 per hour no later than March 1 of that year.

(26) If the Maximum Overnight Charging Station Occupancy on a block is less than 40% in a calendar year, and that block is an existing meter zone, then the metered rate for Electric Vehicle Charging Stations on that block between 10pm and 9am for the subsequent calendar year shall be decreased by $1.00 per hour no later than March 1 of that year provided that the rate shall not be less than the metered rate for that block.

(27) If the Maximum Overnight Charging Station Occupancy on a block is less than 40% in a calendar year, and that block is not an existing meter zone, then the metered rate for Electric Vehicle Charging Stations on that block between 10pm and 9am for the subsequent calendar year shall be decreased by $1.00 per hour no later than March 1 of that year provided that the rate shall not be less than $1.00 per hour.

(28) If the Interim Maximum Daytime Charging Station Occupancy is more than 75%, then the metered rate for Electric Vehicle Charging Stations on that block between 9am and 6pm shall be increased by $1.00 per hour.

(29) If the Interim Maximum Daytime Charging Station Occupancy is less than 40%, and that block is an existing meter zone, then the metered rate for Electric Vehicle Charging Stations on that block between 9am and 6pm shall be decreased by $1.00 per hour provided that the rate shall not be less than the metered rate for that block.

(30) If the Interim Maximum Daytime Charging Station Occupancy is less than 40%, and that block is not an existing meter zone, then the metered rate for Electric Vehicle Charging Stations on that block between 9am and 6pm shall be decreased by $1.00 per hour provided that the rate shall not be less than $1.00 per hour.

(31) If the Interim Maximum Evening Charging Station Occupancy is greater than 75% then the metered rate for Electric Vehicle Charging Stations on that block between 6pm and 10pm shall be increased by $1.00 per hour.

(32) If the Interim Maximum Evening Charging Station Occupancy is less than 40%, and that block is an existing meter zone, then the metered rate for Electric Vehicle Charging Stations on that block between 6pm and 10pm shall be decreased by $1.00 per hour provided that the rate shall not be less than the metered rate for that block.

(33) If the Interim Maximum Evening Charging Station Occupancy is less than 40%, and that block is not an existing meter zone, then the metered rate for Electric Vehicle Charging Stations on that block between 6pm and 10pm shall be decreased by $1.00 per hour provided that the rate shall not be less than $1.00 per hour.

(34) If the Interim Maximum Overnight Charging Station Occupancy is greater than 75% then the metered rate for Electric Vehicle Charging Stations on that block between 10pm and 9am shall be increased by $1.00 per hour.

(35) If the Interim Maximum Overnight Charging Station Occupancy is less than 40%, and that block is an existing meter zone, then the metered rate for Electric Vehicle Charging Stations on that block between 10pm and 9am shall be decreased by $1.00 per hour provided that the rate shall not be less than the metered rate for that block.

(36) If the Interim Maximum Overnight Charging Station Occupancy is less than 40%, and that block is not an existing meter zone, then the metered rate for Electric Vehicle Charging Stations on that block between 10pm and 9am shall be decreased by $1.00 per hour provided that the rate shall not be less than $1.00 per hour.