



To: Public Works and Transportation Committee **Date:** May 18, 2018
From: Peter Russell **File:** 10-6125-07-02/2017-
Senior Manager, Sustainability & District Energy Vol 01
Re: **Public Electric Vehicle Charging Infrastructure Expansion**

Staff Recommendation

That, as described in the staff report titled, "Public Electric Vehicle Charging Infrastructure Expansion" dated May 18th 2018 from the Senior Manager, Sustainability & District Energy:

1. Publicly accessible electric vehicle charging infrastructure be installed at City Hall and Richmond Olympic Oval, with funding from the 2017 Capital Budget;
2. Pending the successful award of the City's application to Natural Resources Canada's Electric Vehicle and Alternative Fuel Infrastructure Deployment Initiative grant, staff be directed to report back with any additional capital budget approval for further expansion of charging infrastructure;
3. A cost recovery approach to impose user fees and time limits for publicly accessible electric vehicle charging stations be endorsed as outlined in the report, and that staff be directed to bring forward amendments to the Consolidated Fees Bylaw No. 8636, the Traffic Bylaw No. 5870, Parking (Off-Street) Regulation Bylaw No. 7403, and the Notice of Bylaw Violation Dispute Adjudication Bylaw No. 8122 to implement this cost recovery approach.

Peter Russell
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Att. 3

REPORT CONCURRENCE		
ROUTED TO:	CONCURRENCE	CONCURRENCE OF GENERAL MANAGER
Law	<input checked="" type="checkbox"/>	
Parks Services	<input checked="" type="checkbox"/>	
Recreation Services	<input checked="" type="checkbox"/>	
Transportation	<input checked="" type="checkbox"/>	
REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE	INITIALS: 	APPROVED BY CAO
PWT - 31		

Staff Report

Origin

In January 2014, Council adopted the Community Energy and Emissions Plan, which includes *Action 19: Continue expanding the City-owned network of EV charging stations.*

On November 28th 2016, Council directed “that staff report back regarding the potential installation of community Level 3 charge stations, including an energy cost recovery approach, as part of advancing greenhouse gas emissions under the City’s Community Energy and Emissions Plan.” To help gauge community support for the cost-recovery concept as well as consult on potential locations for additional charging stations, public consultation was undertaken during 2017. Community consultation was approved by Council at their January 23, 2017 meeting.

This report supports Council’s 2014-2018 Term Goal #4 Leadership in Sustainability:

Continue advancement of the City’s sustainability framework and initiatives to improve the short and long term livability of our City, and that maintain Richmond’s position as a leader in sustainable programs, practices and innovations.

This report presents an overview of the consultation feedback and proposes priority charging station locations to be considered. This report further discusses partnership and funding opportunities for electric vehicle (EV) charging expansion as well as outlines an approach for cost recovery.

Background

In 2010, Council adopted targets in Richmond’s Official Community Plan to reduce community greenhouse gas (GHG) emissions 33% below 2007 levels by 2020, and 80% below 2007 levels by 2050. Transportation accounts for more than half of Richmond’s GHG emissions recorded in BC’s Community Energy and Emissions Inventory, with emissions from personal transportation accounting for more than 40% of emissions.

Richmond’s 2014 Community Energy and Emissions Plan (CEEP) outlines strategies and actions for the City to take to reduce community energy use and GHG emissions, including:

- **Strategy 7: Promote Low Carbon Personal Vehicles**
 - **Action 19:** Continue expanding the City-owned network of electric vehicle (EV) charging stations.

Modeling undertaken as part of the CEEP indicates Richmond’s 2050 emissions reduction targets can only be achieved with the near-universal adoption of zero emissions personal vehicles by the 2040s, in addition to increasing transit ridership, walking, bicycling, car/ride sharing, and other transportation modes.

“Levels” of EV Charging

As the City moves to consider expanding infrastructure EV charging opportunities, it is helpful to understand the different levels of EV charging, per industry standards, noted below:

Table 1: Common EV service equipment charging levels.

Charging Level	Voltage	Amperage	Apprx km of range per hour	Time to fully Recharge	Applications
AC Level 1	120 VAC	12-16 A	~ 7 km/hr	5 to 30 hours	At home, at work
AC Level 2	208 / 240 VAC	<=80A (30 A most common)	~ 45 km/hr (at 30A)	2 to 8 hours	At home, at work, public charging
DC Fast Charge (“Level 3”)	200–400 VAC	80–400 A	200-1000 km/hr	<10 min to 1 hour	Major public rapid-recharge locations

City Action on Electric Vehicles

As part of enhancing community EV adoption, multiple options need be available to EV users to avoid issues such as range anxiety (running out of charge). The importance of providing publicly accessible charging is outlined in Attachment 1.

To advance community uptake in EV adoption, the City has undertaken a mix of policy and infrastructure actions, including:

1. **Policy Action** – Supporting EV Charging in Private Developments

On December 18th, 2017, City Council adopted a requirement in the Parking and Loading section of the Richmond Zoning Bylaw that all residential parking spaces in new developments, excluding visitor parking, feature an energized electrical outlet capable of providing Level 2 charging. The City was the first jurisdiction in Canada to make such a requirement. Other jurisdictions are now building from Richmond’s leadership – the City of Vancouver adopted essentially the same requirement in March 2018, and a number of other local governments are considering such a requirement.

2. **Infrastructure Action** – Installed Public Charging Infrastructure

In March, 2013 the City also installed four public Level 2 charge stations (total of eight charging ports) at the following locations:

- Steveston Community Centre
- Thompson Community Centre
- Cambie Community Centre
- City Hall

Additionally, the Richmond Olympic Oval offers two Level 2 charging stations.

As summarized in Table 2 below, usage of the City's stations has grown, indicating growing demand for public charging. The hours of use experienced at some stations suggest that City-owned EV charging infrastructure is reaching capacity.

Table 2: Usage of City-owned EV charging infrastructure

	2013	2014	2015	2016	2017
Times used	776	1,974	4,597	7159	10924
Charging time	975 hours	2,609 hours	8,377 hours	11,995 hours	18,300 hours
Energy used	4,345 kWh	11,809 kWh	35,904 kWh	48,406 kWh	82,984 kWh
Energy cost	\$434	\$1,181	\$3,590	\$4,841	\$8,298

As outlined in the staff report presented at the November 28, 2016 Council meeting, there are also opportunities to install charging infrastructure as part of new or major facility/park upgrade projects. Since that date, Level 2 charging stations have been implemented, or are being planned, at the Minoru Civic Precinct, Firehall #1, and Firehall #3.

In addition to City-owned public EV charging infrastructure, there has also been an increase in the number of charging stations available for public use provided by other organizations. According to information from Plug-In BC's website, there were 43 other publicly accessible locations in Richmond where drivers can charge their EVs as of May 2018, including 39 offering Level 2 infrastructure and four offering DC Fast Charging.

Funding and Partnership Opportunities

Staff have submitted a grant application to Natural Resources Canada's (NRCan) Electric Vehicle and Alternative Fuel Infrastructure Deployment Initiative. This grant funds the expansion of publicly accessible DC Fast Charging infrastructure. Applicants located in the province of BC are automatically enrolled in the BC Clean Energy Vehicle Public Fast-Charging Program for additional funding. The City requested \$1.35 million in combined federal and provincial funding under this grant. A decision is expected by September 2018. A recommendation is included that directs staff to report to Council should the City's proposal be awarded the additional funding.

The City has also been approached by an automobile dealer interested in providing a financial contribution to the City's EV charging expansion. In exchange, they propose that charging stations would feature their logo, in addition to City of Richmond branding. Staff will further explore sponsorship opportunities, and will report back to Council with any recommendations with regards to sponsorship that can offset costs of expanding the City-owned network of EV charging stations.

Analysis

Public consultation was undertaken to gather feedback and as part of establishing the desired levels and locations for additional charging infrastructure. Consultation was approved by Council at their January 23, 2017 meeting.

Consultation

The City's EV consultation program consisted of:

1. **Digital engagement** – An online Let's Talk Richmond webpage and survey. The survey was open to the public from May 14th to June 26th, 2017. It was distributed via press release, social media, and notifications by the Richmond Chamber of Commerce and other organizations. 484 visits to the webpage occurred, with 168 visitors completing the survey. Of survey respondents, 34% currently drove an EV and 78% were considering an EV for their next vehicle purchase.
2. **A Public Open House** – The Open House was held June 15th, 2017, and included introductory information about EVs, their role in mitigating climate change, and the City's action to support EVs to date. Thirty-three people attended the Open House.

Both the survey and the Open House solicited participants' feedback on where in the City public EV charging infrastructure is desired, and on key questions related to the provision of public charging services. The map in Attachment 2 illustrates the public's responses regarding where in Richmond additional public EV charging infrastructure is desired. The findings included that both DC Fast Charging and Level 2 charging infrastructure is desired across the community, especially at City Hall, in the City Centre area, and proximate to Steveston Hwy and Hwy 99. Attachment 3 summarizes further feedback received during stakeholder consultations relating to public charging. As shown, there is strong community interest for the City to add Level 3 Fast Charging infrastructure for improved convenience.

Public Charging Infrastructure Expansion

Council approved \$300,000 in the 2017 Capital Budget to support the next phase of investment in public EV charging network. The consultation process noted above was used to identify appropriate locations to expand the City-owned EV charging network. Based on stakeholder feedback regarding preferred sites for expansion of the City's public charging network, costing information, and known gaps exist in the public charging network, a range of City facilities have been identified as appropriate locations for expanded publicly accessible EV charging infrastructure. These are listed in order of priority, from highest to lowest:

1. City Hall
2. Richmond Olympic Oval
3. Richmond Ice Centre (current lease permits implementation of EV charging infrastructure)
4. Hamilton Community Centre (located on Richmond School District property)
5. Garry Point Park
6. Hugh Boyd Soccer Fields
7. Minoru Centre for Active Living (Minoru Civic Precinct)
8. Cambie Community Centre

9. Garden City Lands (subject to ALC approval)

It is recommended that the \$300,000 in the 2017 Capital Budget be used to support implementation of charging infrastructure at City Hall and the Richmond Olympic Oval. These sites were selected because they are proximate to areas of high demand indicated during consultation, and because they are relatively cost-effective to implement due to existing electrical capacity. The City Hall infrastructure will be located adjacent to current charging infrastructure. The Oval charging infrastructure is proposed to be located within the enclosed parking area. Each site will feature one 50kW dual-headed DC Fast Charging (“Level 3”) and a Level 2 charging station, with three parking stalls dedicated to EV charging.

As noted in the Background section above, the City has applied to NRCan’s Electric Vehicle and Alternative Fuel Infrastructure Deployment Initiative. If the City is successful in its grant application, additional City funds may be necessary to meet leverage requirements of the grant. If the grant application is successful, staff will report back with recommendations to implement EV charging infrastructure at the sites noted above, subject to final negotiation of sites between the City and its funding partners. If the City is unsuccessful in this grant application, staff will explore other funding opportunities and report back to Council with options to continue to expand EV charging infrastructure in priority locations.

Cost Recovery

To date, the City has offered access to its public EV charging infrastructure free of charge. This incentivized adoption of EVs during the early years of their availability. As EVs become more mainstream and gain an increasing share of vehicle sales and the vehicle fleet, the need for electricity cost incentives lessens. Benefits of user fees include:

- **Help to ensure availability of chargers and efficient use of infrastructure.** By charging a time-based fee, users are encouraged to charge only for as long as they need to receive sufficient charge, and then leave the charging station. This has the effect of increasing the likelihood that the charging station will be available for other users, increasing convenience and making more efficient use of the charging station asset. Current City-owned charging stations are often in use by individual vehicles for multiple hours even when not charging, and the City has begun to receive more frequent feedback from users that they frequently cannot access charging stations.
- **Support cost recovery of implementing charging stations.** User fees can be set to cover the operating costs of charging stations. With sufficiently frequent use, the capital cost of implementing the stations may also be covered. Introducing user fees can allow the City and other entities to implement a greater amount of public charging than might otherwise be possible, improving services for EV drivers.
- **Differentiate between different levels of service** – The qualities of different levels of EV charging differ. Level 2 is lower cost to provide, but requires a longer period to recharge (up to 6 hours or more to fully recharge a long range vehicles). Level 3 DC Fast Charging can recharge vehicles much more quickly; moreover, varying levels of power can be delivered through DC Fast Charging systems, resulting in different recharge times (from 10 minutes or less, to an hour) and costs. Differentiating user fees based on the nature of the service offered allows drivers use charging infrastructure that is most

appropriate for their needs – Level 2 for a longer stay or a “top up”, faster charging for a rapid refill.

In relation to user fees for cost recovery, the majority of consultation participants suggested that public charging be free until there is further adoption of EV’s. A minority supported user fees, with the concern expressed that taxpayer funded free energy for EV owners is not equitable.

User fees are in place for EV charging infrastructure on some other local government locations in BC. Table 3 below summarizes pricing models in place for charging infrastructure on local government sites.

Table 3: EV charging infrastructure user fees

Jurisdiction	DC Fast Charge (50kw)	Level 2 (9.6kW)
City of Vancouver	\$16.00 per hour	\$2.00 per hour
Fortis BC operated (various local govt. sites)	\$18.00 per hour	N/A
BC Hydro operated (various local govt. sites)	\$0.35 per kWh	N/A
Township of Esquimalt	N/A	\$1.00

It is proposed to adopt the following pricing model for its EV charging infrastructure:

- \$2.00 per hour for access to 9.6 kW Level 2 Charging.
- \$16.00 per hour for access to 50kW DC Fast Charging.
- \$8.00 per hour for access to 25kW DC Fast Charging.

This approach aligns with other comparable user fees regionally. This proposed rate equates to roughly \$0.50 per litre of gasoline. While this is a higher cost than drivers can expect to pay to charge EVs at home (estimated at roughly the equivalent of \$0.20 per litre of gasoline), it still equates to much less on a dollar per distance basis than drivers would have to pay for travel in a gasoline or diesel vehicle.

Bylaw amendments will be required to give effect to this change. As part of this, it is important that other applicable bylaws be amended to ensure that only EVs connected to the EV charging infrastructure be parked in EV parking stalls. Amendments to the Consolidated Fees Bylaw No. 8636, the Traffic Bylaw No. 5870, Parking (Off-Street) Regulation Bylaw No. 7403, and the Notice of Bylaw Violation Dispute Adjudication Bylaw No. 8122 would be required. Staff will bring forward proposed amendments if the energy recovery fee concept is supported by Council.

All revenues from user fees are recommended to be directed to support ongoing operations, maintenance and costs associated with network expansion. The operating costs and revenue from the proposed energy recovery fee cannot be determined at this time, as it is dependent on the degree and rate of expansion; variability in use; and opportunity to access different revenue streams, such as credits for providing low carbon fuel.

Should Council choose not to implement user fees, staff will bring forward other strategies, such as signage or fees for remaining in EV parking spaces for longer than required to charge, in order to ensure efficient use of the infrastructure.

Resource Implications

As the City expands its public charging infrastructure, there are expected resource implications associated with installation, maintenance, repairs, complaint management, data analytics and administration that will exceed current capacity. An additional maintenance technician position is expected to be required for this purpose. This requirement and associated costs will be included in a future report presented to Council, once NRCan funding amounts are known.

Financial Impact

Council approved \$300,000 in the 2017 Capital Budget to support the next phase of City capital investment in its public EV charging network. These funds will support implementation of EV charging infrastructure at City Hall and the Richmond Olympic Oval. Staff will report back with any additional expansion to priority locations, pending award of the grant from Natural Resources Canada.

Conclusion

Expansion of City-provided electric vehicle charging infrastructure is a tool to advance community electric vehicle adoption. Community consultation was undertaken to identify priority locations for electric vehicle charging infrastructure expansion. This report recommends implementing additional charging infrastructure at City Hall and the Richmond Olympic Oval. It is also noted that staff have applied for additional funding to enable implementation of EV charging infrastructure at other priority locations. Partnership opportunities are also explored as part of this report, with further information to be reported back to Council once funding application decisions are known.

Community feedback on implementation of an energy recovery fee for charging station use was also sought. Staff are suggesting appropriate steps be taken to bring forward user fees and establish time limits to help make charging infrastructure more broadly accessible.



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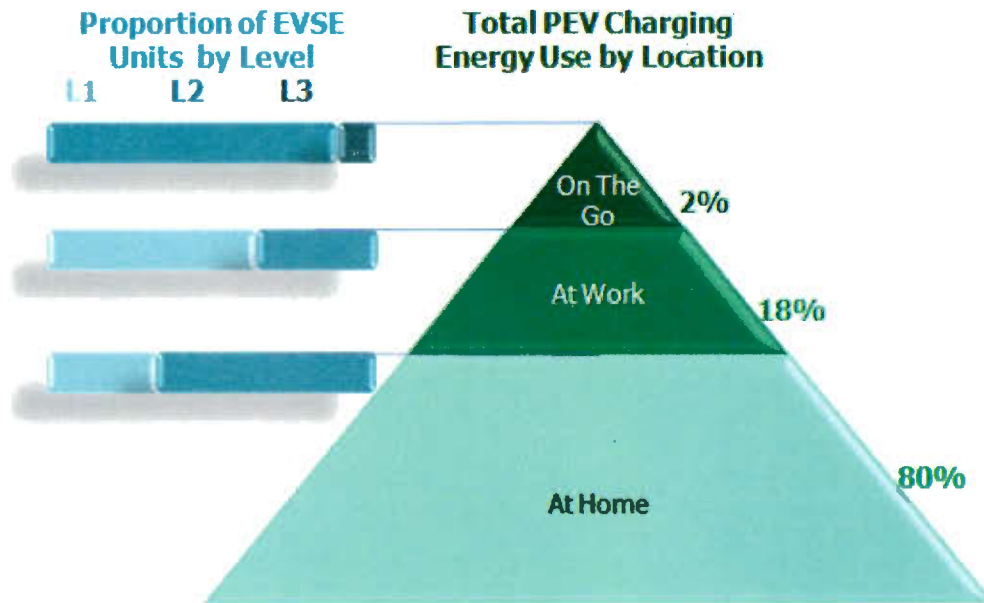
- Att. 1: The Importance of Public Charging
- 2: Public Responses Regarding Preferred Locations for City-Owned EV Charging Infrastructure
- 3: Summary of feedback during public consultations

Attachment 1: The Importance of Public Charging

Despite the relative infrequency of “on the go” charging, a network of publicly accessible charging stations is recognized as critical to facilitate EV adoption. Public charging:

- **Helps eliminate “range anxiety”.** A barrier to adoption of EVs is concern that on longer trips, drivers may be stranded without ability to recharge. Public charging locations provide for charging mid-trip.
- **Serves drivers on longer trips.** Drivers on longer trips between regions need access to fast recharging.
- **Provides for households without adequate access to “at home” or “at work” charging.** Many households, such as those living in multifamily buildings or those that park on street, do not have ready access to either charging at home or at work. Providing public charging can serve these households.
- **Creates greater visibility of EVs.** Public EV charging infrastructure can be an important reminder of the increasing availability of EVs. Implementation of EV charging is an important opportunity to showcase a community’s support of EVs.

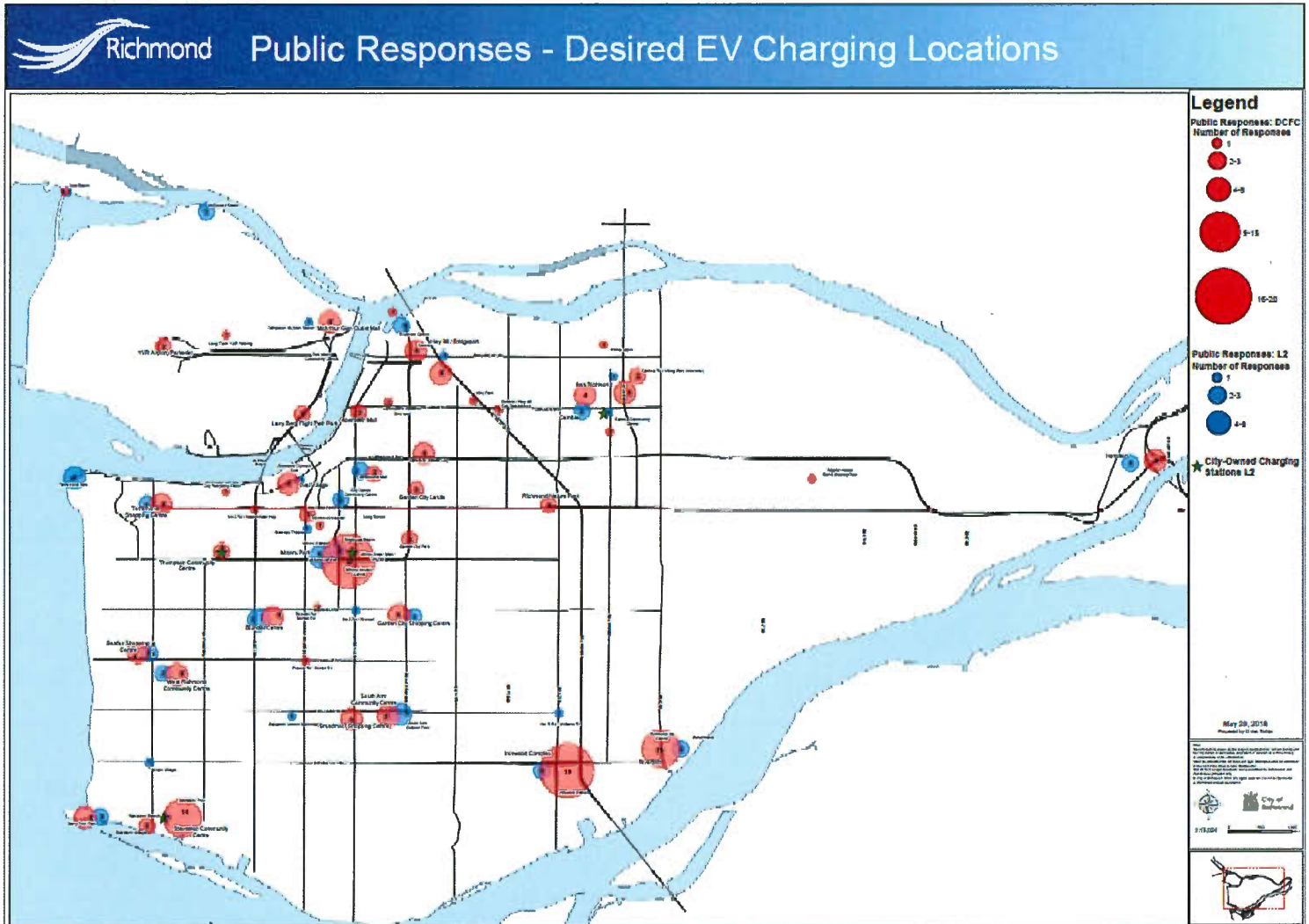
Public charging stations largely consists of “AC Level 2”, with a growing number of “DC Fast Charging” (or “Level 3”) stations that provide a much faster rate of charge being implemented in strategic locations.



Attachment 2: Public Responses Regarding Preferred Locations for Additional City-Owned EV Charging Infrastructure

Notes:

- Circle size indicates number of respondents who selected a site.
- Red circles represent DC Fast Charge infrastructure.
- Blue circles represent Level 2 charging infrastructure.
- Green stars represent existing City-owned Level 2 charging infrastructure.



Attachment 3: Summary of feedback during public consultations

What we heard...	City response
<p><i>Different perspectives on user fees</i></p> <ul style="list-style-type: none"> • A majority expressed desire to keep public chargers free until adoption increases, and EVs become more popular. • Some supported user fees, and expressed concerns that the City is providing free energy for EV owners using tax payer’s money. 	<ul style="list-style-type: none"> • The proposed user fees for public charging still represent costs for fuel well below that for gasoline or diesel vehicles • User fees will likely allow more efficient use of infrastructure, and control/recovery of costs as use increases
<p><i>Support for workplace charging at City Hall</i></p> <ul style="list-style-type: none"> • Some City employees noted the value of providing workplace charging, either on a fee for service basis or as a perk of employment. 	<p>Staff are exploring workplace charging options.</p>
<p><i>Perception of Public Charging</i></p> <p>Concern that there are not enough publicly accessible chargers available to service the growing EV community in Richmond.</p> <ul style="list-style-type: none"> • 58% of respondents would be more likely to consider switching to an EV if a DCFC was located within 5 min from their home or nearby shopping district. • 	<p>City developing options for DCFC and expanded L2 network for Council’s consideration.</p>
<p><i>Desire for charging at multiple facility types</i></p> <ul style="list-style-type: none"> • Respondents indicated their desire to have public charging infrastructure available at a variety of locations across the City. • The most common responses for charging locations were shopping centres and retail areas, Highway access points, and Community Centres. 	<ul style="list-style-type: none"> • A diverse range of geographic locales of charging infrastructure implementation are proposed. • The City will explore private sector interest and opportunities to support greater charging infrastructure in retail centres