

## Whistler Electric Vehicle charging Station User Fee Strategy

### Background

On December 15, 2020, the RMOW Council adopted Whistler's 2020 Climate Action Big Moves Strategy and new GHG emission reduction target of reducing Whistler's greenhouse gas emissions by 50 per cent below 2007 levels. The new strategy focuses on climate change mitigation priorities that will accelerate climate action in Whistler and achieve significant GHG emission reductions while recognizing the importance of equity and inclusion of all Whistler residents, commuter workforce and visitors.

Personal vehicle transport is Whistler's largest source of greenhouse gas (GHG) emissions, accounting for 70,827 tonnes of carbon dioxide equivalent (CO<sub>2</sub>e) in 2019 (54 per cent of Whistler's community wide emissions) and is the main reason the community is off-track to achieving its climate targets. Whistler's ability to meet its long-term GHG reduction targets is thus very much dependent meeting emissions targets from passenger vehicles. Previous Big Moves impact estimations show that a coordinated approach to putting more zero-emission vehicles on the road has the ability to reduce community-based emissions by more than any other single source.

The main barrier to broad EV adoption is reliable and convenient charging where people live, work, and visit. Many households do not have access to charging at home or at work. In addition, Whistler receives approximately three million overnight and non-overnight visitors each year and tourism related GHG emissions in the Sea to Sky corridor are estimated significantly higher than the total community emissions. Therefore, Whistler can have an outsized impact in reducing GHG emissions beyond municipal borders by enabling publicly available electric vehicle infrastructure.

Whistler has recently installed and commissioned 22 new Level 2 EV chargers in the Day Lots which were added to the previously existing four Level 2 chargers. On November 3<sup>rd</sup>, 2020, the RMOW Council directed staff to submit an application to the CleanBC Communities Fund to fund 73.3 per cent of the proposed Sea to Sky Electric Vehicle Network Expansion project. In addition, Council directed staff to evaluate options to implement EV charger user fees to recover the cost for EV charger operations as well as future replacement of equipment.

Currently, the Resort Municipality of Whistler (RMOW) provides use of all municipally operated public electric vehicle charging stations free of charge. This was an effective approach to encouraging early EV adoption in Whistler; however, free EV charging can lead to a situation where the stations are not being used efficiently due to a lack of turnover and can cause unfair distribution of access to charging services. Imposing a user fee for EV charging has been done by many nearby communities to ensure more efficient use of the stations in order to maximize the number of EV drivers accessing the stations. Therefore, we are proposing to implement a user fee that is fair and equitable for Whistler's residents, commuter workforce and visitors. The user fees are intended to recover the cost of energy, operating and maintenance costs, as well as future installations and replacement (e.g. charging units, electrical upgrades, permits etc.).

## Overview

### Strategic Rational

The goal of this strategy is to implement a user fee that is fair and equitable for the following three user groups: 1. Whistler residents, 2. Commuter workforce, 3. Visitors.

The following rationale has been applied when proposing user fee rates for RMOW EV chargers:

- **Support EV adoption:** The main goal of providing public EV charging is to encourage EV adoption and use. The public EV charging stations in Whistler are not intended to replace home charging, but instead to provide increased opportunities for residents, commuters, and visitors. To achieve this goal, fees for EV charging (not including the local parking rate) needs to be significantly lower than the equivalent fossil fuel costs for driving an average internal combustion engine (ICE) vehicle.
- **Increase turnover:** In order to support EV adoption as well as to encourage home charging, public EV charging needs to be more affordable than driving an internal combustion engine (ICE) vehicle but more expensive than residential electricity rates. Based on the current usage analysis of the RMOW public EV chargers, there is currently no evidence for a need to accelerate turnover beyond an hourly charge. This might change based on future EV adoption projections.
- **Simple and clear fee structure:** The price per hour will be continuous while vehicles are connected; For DC Fast Charge stations, this will be presented as a price-per-minute; The fees are structured as an 'add-on' to parking fees in a given lot
- **Flexibility to change the rates for future adjustments**

### Electric Vehicle Charging Stations owned and operated by the RMOW

The RMOW currently owns and operates nineteen Level 2 charging stations that can accommodate a total of 35 vehicles at the same time. In addition, a grant proposal was submitted for 16 new dual-port Level 2 chargers, accommodating a total of 28 additional vehicles, and 8 Direct Current Fast Chargers (DCFCs).

Fifteen of the nineteen currently operated EV charging stations are used to analyze the current demand, charging session length, and number of sessions. These chargers were chosen because their locations are representative of the planned EV chargers network expansion and they are operated by ChargePoint, a third party vendor that provides user fee collection services and user data collection to the RMOW. Three month of usage data has been collected as shown in the table below. Note that the EV charger user data below is the only data available at this point. The data might not be representative of future projected EV charger usage due to the Covid 19 restrictions during that time and the chargers being newly implemented.

Table 1: EV charger usage data from October to December 2020, of newly installed chargers

Station Name	# of stations	Average session length (h:mm)	Total sessions Oct – Dec 2020	Average sessions per station per month	Total energy usage Oct – Dec 2020 (kWh)	Average energy per session in kWh
<b>Municipal Hall</b>	1	2:29	284	95	2,709	9.5
<b>Lot A</b>	2	1:00	290	48	1,401	4.8
<b>Lot 1</b>	4	3:22	719	60	7,282	10.1
<b>Lot 2</b>	4	3:30	276	23	3,351	12.1
<b>Lot 4</b>	4	3:48	685	57	9,784	14.3
<b>Total/Average</b>	<b>15</b>	<b>3:06</b>	<b>2,254</b>	<b>57</b>	<b>24,527</b>	<b>10.9</b>

## Possible Fee structures approaches

Two general fee structures for EV charger user fees have been considered, i.e. time based fees and energy based fees. Their respective advantages and challenges are outlined below:

### Time-based (\$ / hour)

Charging fees based on the length of time a station is occupied. The advantage is that time based fees encourage turnover and optimize access through improved availability so that charging stations are used by those who need them for EV charging and not simply as parking spaces. Hourly fees are simple to understand, and would mirror existing rate structures for parking meters. In addition, hourly rates can be easily adjusted based on demand and maintenance and operations cost can be factored into developing the hourly fee. The challenge of time based fees is that they have no relation to the amount of electricity received, which some users have objected to.

### Energy-based (\$/ kWh)

Charging fees based on the energy (per kWh) received. An argument could be made that this 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 they charge. The challenge however is that this rate structure does not encourage turnover, may hamper the ability for users to determine wait times, and the ability for enforcement staff to manage these systems becomes increasingly complex.

The RMOW would be permitted to sell electricity through RMOW 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. However, operating fees under a kWh pricing model are not currently permitted under the *Electricity and Gas Inspection Act*<sup>1</sup>, which is federal legislation that ensures accuracy in the trade of electricity and gas bought and sold on the basis of measurement. Before the RMOW would be permitted to operate a utility meter that involves the re-selling of electricity on units of energy, *Measurement Canada* must receive an application for certification from manufacturers of these meters; undertake a “type approval” assessment; develop regulations for the device; verify and certify each meter through on-site installation to

<sup>1</sup> Electricity and Gas Inspection Act: <https://laws-lois.justice.gc.ca/eng/acts/e-4/index.htm>

ensure that the meter used on site is the same as the type approved meter; ensure each meter is calibrated to standards; and obtain evidence from the site owner that there are measures in place to protect the meter against tampering.

Installing an approved meter is anticipated to require additional staff time and cost.

In addition to the time and energy based fee structure, a monthly membership fee for unlimited charging at certain EV charging stations would be possible. This would support mainly the EV adoption of Whistler's commuting workforce. No regional examples for this pricing structure could be found and practical details of this pricing structure would need to be analyzed in a next phase.

## Regional Best Practice Examples

During staff's research and analysis of fees, closer attention was paid to fees imposed by municipalities rather than private station owners for consistency and clarity. City of Vancouver and City of North Vancouver's pricing models are considered by staff to be best practice due to having fees implemented for a longer period of time. Most municipalities have implemented similar fees. Below is a list of best practice examples that have been used to inform this analysis.

Municipality	Fee
City of Vancouver <sup>2</sup>	Level 2 – \$2/hour
	DC Fast Charger – \$16/hour
City of North Vancouver <sup>3</sup>	Level 2 – \$2/hour
	Level 2 Power sharing – \$1/hour
	DC Fast Charger – \$16/hour
City of Burnaby <sup>4</sup>	Level 2 – \$2/hour 6am-10pm
	\$1/hour 10pm-6am
City of Coquitlam <sup>5</sup>	Level 2 – \$1/hour for the first 2 hours
	\$5/hour thereafter
City of Richmond <sup>6</sup>	Level 2 – \$2/hour for the first 2 hours
	\$5/hour thereafter
	DC Fast Charger – \$8/hour (25kW) \$16/hour (50kW)
City or Port Moody <sup>7</sup>	Level 2 – \$0.5 - \$2/hour for the first 2 hours (depending on location)
	\$5/hour thereafter
	DC Fast Charger – \$12/hour

Best practice research indicates that time-based fees have been effective in ensuring that stations are used fairly and efficiently, and that fees are clear. Typical Level 2 charging rates vary from \$1-\$2 per hour. As an example, if an EV is plugged in to a Level 2 station for the average term of four hours, as seen in most Municipally-owned parking lots, the maximum a user would be charged is \$8 based on the current

<sup>2</sup> City of Vancouver EV Charging Fees: <https://vancouver.ca/streets-transportation/electric-vehicles.aspx>

<sup>3</sup> City of North Vancouver EV Charging Fees: <https://www.cnv.org/city-services/streets-and-transportation/sustainable-transportation/electric-vehicles/where-to-charge-your-electric-vehicle>

<sup>4</sup> City of Burnaby EV Charging Fees: <https://www.burnaby.ca/City-Services/Policies--Projects---Initiatives/Environment/Environmental-Sustainability-Strategy/ESS-and-CEEP-In-Action/Electric-Vehicles-in-Burnaby.html>

<sup>5</sup> 4 City of Coquitlam EV Charging Fees: [https://coquitlam.ca.granicus.com/MetaViewer.php?view\\_id=2&clip\\_id=1420&meta\\_id=28515](https://coquitlam.ca.granicus.com/MetaViewer.php?view_id=2&clip_id=1420&meta_id=28515)

<sup>6</sup> City of Richmond EV Charging Fees: <https://www.richmond.ca/sustainability/energysrvs/electricvehiclecharge.htm>

<sup>7</sup> City of Port Moody EV Charging Fees: <https://www.portmoody.ca/en/recreation-parks-and-environment/electric-vehicle-charging-stations.aspx>

rate. The average electricity cost per session is estimated to be around \$1.09 per session (see Table 2) which would be the cost for charging at home. To encourage turnover and maintain a consistent simple user experience, industry experts recommend an hourly usage charge for all public charging stations, resulting in public charging fees being higher than the cost of charging at home. This ensures better access to the infrastructure so that it can be used by more people and those who need a battery charge the most, while still providing EV drivers with the opportunity to receive a sufficient top-up charge when needed.

Due to the novelty of EV charging fees, the lack of long-term data, and the quickly changing market, it is expected that regular fee adjustments will take place until an equilibrium of fees and usage is reached. As such, it is important that the RMOW establish indicators to ensure that station data is being monitored consistently over time to inform data-driven decisions.

## Financials

All public charging stations have fixed and variable operating costs as well as the anticipated cost of unit replacement. The fixed operating costs include scheduled maintenance, repairs, and manual snow shoveling around the stations. In addition, a fixed network connection fee is charged by a third-party operator, currently ChargePoint, in order to collect data, remotely monitor the stations, and collect payments. Variable operations costs include costs for electricity and a transaction fee per session which is 10% of the revenue collected. BC Hydro electricity rates of 10 cents per kWh were assumed. This is a simplified assumption as BC Hydro rates usually include not only the cost of electricity but also transaction charges from network providers, and demand charges.

A preliminary cost-revenue analysis was conducted for Level 2 and DC Fast chargers for the following rates (see Appendix A for full analysis):

- Level 2 Charging: \$1.00/hr
- Level 2 Charging: \$2.00/hr
- DC Fast Charging: \$16/hr

The analysis shows that operational costs for Level 2 chargers are recovered through all evaluated user fees. The payback time for a Level 2 charger unit replacement is assumed to be 5 years at \$2/hr. For a DCFC unit replacement the payback time is estimated to be 10 years.

It is important to note that the cost revenue analyses in Appendix A are all based on EV charger user data from the last 3 months which is the only data available this point. This data might not be representative of future projected EV charger usage due to Covid 19 restrictions and the chargers being new.

## Proposed 3 phase fee implementation for RMOW EV chargers

The introduction of EV charger user fees in Whistler will follow the strategic rationale outlined above and is guided by the examples of other municipalities. A phased approach to the user fee implementation was chosen to ensure the long-term success and to help to overcome potential resistance to change by EV drivers. A phased approach will allow staff to gather more data on EV charger usage and lessons learned in phase 1 to inform decisions in phase 2 and 3.

### **Phase 1 – EV chargers outside of day lots:**

Guided by the main goal to reduce GHG emissions and support EV adoption, Phase 1 will focus on implementing a user fee at RMOW EV chargers outside of the day lots. EV chargers outside of day-lots serve a user who is primarily needing a top-up and will do so while running errands, getting a coffee or going to a restaurant. Charging while grocery shopping or other short-term opportunities is unlikely to be changed as a result of a charging fee. This is applicable to both local use and visitor use. A low user fee in phase 1 will still encourage turnover and encouraging home charging whenever possible. An introductory fee is being proposed as follows:

- Level 2 Charging: \$1.00/hr.
- No DC Fast Charging is currently owned and operated by the RMOW

This hourly fee is slightly higher than the electricity cost for EV charging at home but low enough to support EV adoption for residents, commuters, or visitors that have no home charging option or are in need of a top up. In addition, this fee will still cover the electricity cost and additional service fees that incur for the RMOW. More information on cost and revenue analysis in Appendix A.

### **Phase 2 – Mirroring fees from other communities and implementing fees in day lots:**

In a second phase, the goal is to increase turn over at all public EV charging stations and to further incentivize home charging when possible. With the projected growth in EV adoption in Vancouver and the Sea to Sky region, it is anticipated that the demand for charging will increase. Regional visitors will be seeking charging options for return trips and more commuters will charge during their workday. Therefore, home charging and turnover will likely need to be encouraged in the day lots as well while still ensuring that EV usage remains a cost effective and viable option for both commuters and visitors.

The implementation and amount of the EV charger user fee at the day lots will depend on more reliable long-term EV charger usage data. As a starting point, a fee of \$1.00/hr is being considered with a cost ceiling of \$5.00 per day to make the use of the day lot chargers economic even when parking for a full day. The EV charger user fees outside of the day lots are anticipated to increase to mirror the user fee structure of nearby communities. As a starting point, a fee of \$2.00/hr will be implemented.

The preliminary cost-revenue analysis in Appendix A for a Level 2 EV fee of \$2/hr and a DC Fast charger fee of \$16/hr shows that mirroring the user fee structure from nearby communities will cover all operating costs of existing and planned EV charging infrastructure. It is also expected that a 5 or 10 year return-on-investment is possible for the replacement cost of each Level 2 or DC Fast charger, respectively. Note that significant grant funding has already been received for the currently installed EV charger and further grant opportunities are being expected to help meet the Federal and Provincial Government's climate and zero-emissions vehicle targets. This grant funding is expected to significantly help the cost recovery and shorten the payback time of equipment replacement.

### **Phase 3 – long-term strategy with sensitivity around commuter workforce and evolving EV use uptake:**

In a third phase, a long term strategy for Whistler's commuting workforce and passenger vehicle visitors will be developed. Sensitivity around the charging behaviour and requirements for commuters will be the focus of this phase with the goal to keep EV commuting a more cost effective option than commuting with an internal combustion engine vehicle, even when there is no home charging option available. This final long-term strategy will be based on EV charger usage data from phase 1 and 2 and EV adoption projections in the region.

To facilitate informed and data-driven decisions about hourly fee adjustments at each station, it is important that the RMOW establishes indicators that help monitor station data consistently over time.

The City of Vancouver recommends to track the *Average Daily Utilization* at the electric vehicle charging stations as indicator for price adjustments. The *Average Daily Utilization* is the percentage of time that the EV charging station is occupied on daily basis averaged over three month. If it drops under 40%, the user fee can be reduced; if it goes over 75%, the user fee can be increased. Long term solutions for commuters could include unlimited charging based on a monthly fee in combination with the monthly parking pass.

## Schedule

Milestone	Date Completed
Finalizing user fee planning	Feb 2021
Collect feedback from TAG and Day Lot Operating Committee	February 2021
Presentation to Council	March 2, 2021
Phase 1 fee implementation	April/May 2021
Community engagement or survey	Summer 2021
Phase 2 fee implementation	December 2021/January 2022
Community engagement or survey	Summer 2022
Phase 3	Summer 2022 – depending on charger demand and usage data

## Appendix

### Appendix A – Cost revenue analysis

Table 2: Estimated monthly operational cost and revenues per Level 2 EV charger for a user fee of \$1/hour

**Level 2 chargers – Fees of \$1/hr**

Item	per station*	per session	per station per month
# of sessions			57
changing time (h)		3	171
Average energy usage (kWh)		10.9	621.3
<b>Capital cost for charger replacement</b>			
charger unit	\$ 9,000		
installation	\$ 2,000		
<b>Fixed operational costs</b>			
Data acquisition to monitor usage			\$ 25
Maintenance and repairs			\$ 25
snow hand shovelling			\$ 17
<b>Variable operational costs</b>	per hour	per session	per station per month
Electricity cost (0.1\$/kWh)	\$ 0.36	\$ 1.09	\$ 62
<b>Total operating cost per station per month</b>			\$ 129
<b>User fee revenue per station per month</b>	\$ 1	\$ 3	\$ 171
Transaction fees (10% of revenue )	\$ 0.10	\$ 0.30	\$ 17.10
<b>Net revenue RMOW</b>	\$ 0.90	\$ 2.70	\$ 153.90
<b>Net revenue over operating per month</b>			\$ 25
<b>Annual revenue over operating</b>			\$ 301

\*One station includes 2 ports and 2 parking stalls

Table 3: Estimated monthly operational cost and revenues per Level 2 EV charger for a user fee of \$2/hour

**Level 2 chargers – Fee of \$2/hr**

Item	per station*	per session	per station per month
# of sessions			57
changing time (h)		3	171
Average energy usage (kWh)		10.9	621.3
<b>Capital cost for charger replacement</b>			
charger unit	\$ 9,000		
installation	\$ 2,000		
<b>Fixed operational costs</b>			
Data acquisition to monitor usage			\$ 25
Maintenance and repairs			\$ 25
snow hand shovelling			\$ 17



<b>Variable operational costs</b>	<b>per hour</b>	<b>per session</b>	<b>per station per month</b>
<i>Electricity cost (0.1\$/kWh)</i>	\$ 0.36	\$ 1.09	\$ 62
<b>Total operating cost per station per month</b>			\$ 129
<b>User fee revenue per station per month</b>	\$ 2	\$ 6	\$ 342
<i>Transaction fees (10% of revenue )</i>	\$ 0.20	\$ 0.60	\$ 34.20
<b>Net revenue RMOW</b>	\$ 1.80	\$ 5.40	\$ 307.80
<b>Net revenue over operating per month</b>			\$ 179
<b>Annual revenue over operating</b>			\$ 2,148
<i>simple payback years for Level 2 charger replacement</i>			5

\*One station includes 2 ports and 2 parking stalls

Table 4: Estimated monthly operational cost and revenues per DC Fast Charger for a user fee of \$16/hour

**DC Fast Charger**

<b>Item</b>	<b>per station*</b>	<b>per session</b>	<b>per station per month</b>
<i># of sessions</i>			125
<i>charging time (h)</i>		0.5	62.5
<i>Average energy usage (kWh)</i>		25	3,125
<b>Capital cost for charger replacement</b>			
<i>charger unit</i>	\$ 55,000		
<i>installation</i>	\$ 10,000		
<b>Fixed operational costs</b>			
<i>Data acquisition to monitor usage</i>			\$ 25
<i>Maintenance and repairs</i>			\$ 25
<i>snow hand shovelling</i>			\$ 17
<b>Variable operational costs</b>			
<i>Electricity cost (0.1\$/kWh)</i>		\$ 2.50	\$ 313
<i>Transaction fee (\$0.5/session)</i>		\$ 0.50	\$ 62.50
<b>Total operating cost per station per month</b>			\$ 442
<b>User fee revenue</b>	\$ 16/hr	\$ 8/session	\$ 1000
<b>Net revenue over operating per month</b>			\$ 558
<b>Annual revenue over operating per station</b>			\$ 6,700
<i>Simple payback years per DC Fast Charger replacement</i>			10

\*One station includes 1 ports and 1 parking stall