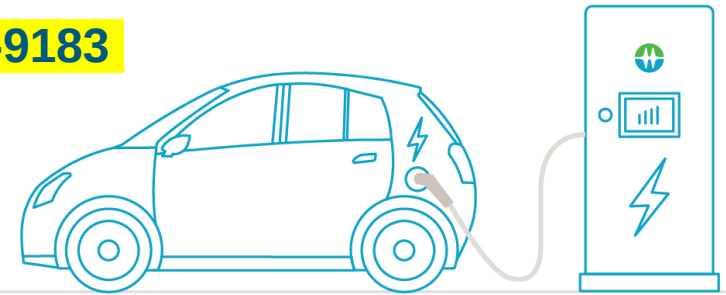
BC Hydro EV Public Charging

Fast charging program & preliminary rates

Note: Call In Number for Audio: 855-353-9183
Access Code: 9157613#
(we are using WebEx for Visual Only)



December 7, 2020

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Participation instructions – 1 of 3

1. **To Hear the presentation:**
   - Please use phone number **855-353-9183**
   - Access Code **9157613#**

2. **To View the presentation:**
   - Click the link that was provided in your invitation

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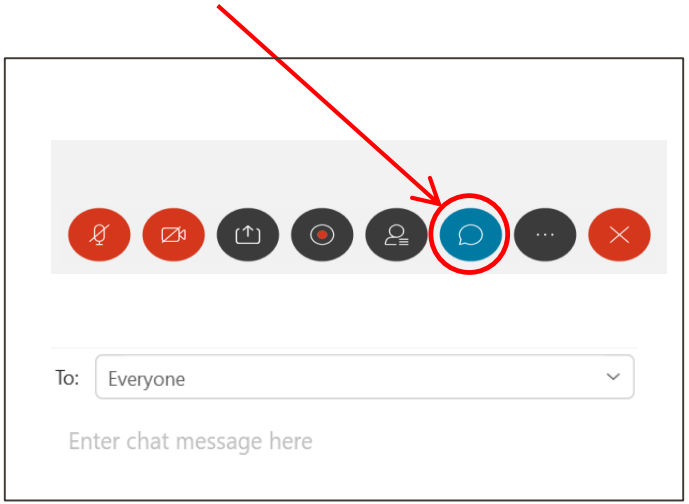
Participation instructions – 2 of 3

How to participate and ask questions in Webex

(Chat function icon)



With the large number of registrants we ask that you use the **chat function** to send us questions during the presentation. In the interest of time, please only send “questions” through the chat during this live presentation.

Thank you.

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Participation instructions – 3 of 3

How can you send us further questions and comments

We very much welcome additional questions or feedback via survey or email:

- We will be forwarding all participants a survey on December 8
- General comments, additional questions, or confidential questions can be sent to bchydroregulatorygroup@bchydro.com

Thank you.

Agenda

- **Opening Remarks**
  Keith Anderson, Vice President, Customer Service
- **BC Hydro EV Public Charging Program**
  Mike Wenzlaff, Senior Program Manager, EVs
- **Public Charging Rates**
  Anthea Jubb, Senior Regulatory Manager, Tariffs
- **Closing Remarks**
  Fred James, Chief Regulatory Officer

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Purpose of today's session

BC Hydro is requesting your feedback on proposed rates for BC Hydro's EV fast charging service

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Welcome

- BC Hydro is a Crown corporation. It's our mandate to safely provide our customers with reliable, affordable and clean electricity throughout the province.
- We're here to help:
  - Switch our customers to electric vehicles – both charging at home and on-the-go;
  - Build market confidence with a robust and reliable fast charging network across the province; and
  - Support reduction of Greenhouse Gas Emissions as envisioned under CleanBC.

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BC Hydro EV network history

We started to pilot stations in 2013

- **Commenced in 2013 –** Original demonstration project, a first in North America, to seed a network of fast charging stations from Vancouver Island to the Interior
- **Regional travel focus –** Based on consultation with stakeholders
- **Funding –** Majority of capital funding provided by Federal Natural Resources Canada and Province of B.C. EV infrastructure grant programs
- **We've been building EV driver confidence –** Equipment reliability and customer experience have greatly improved over last 7 years

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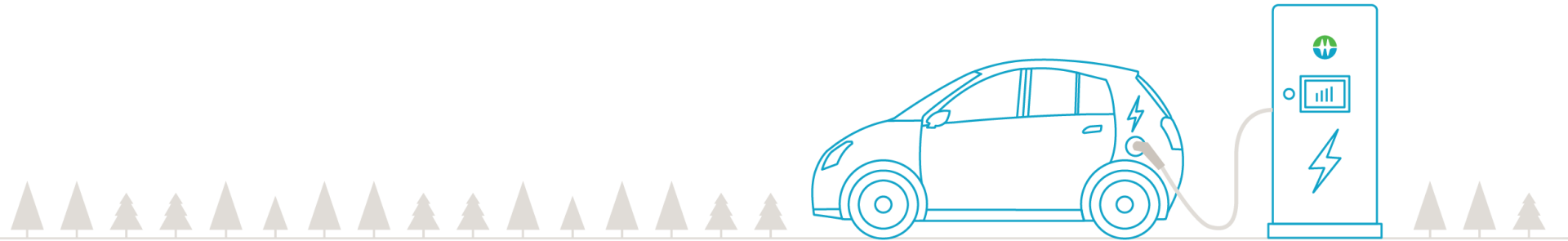
Current state

BC Hydro EV charging



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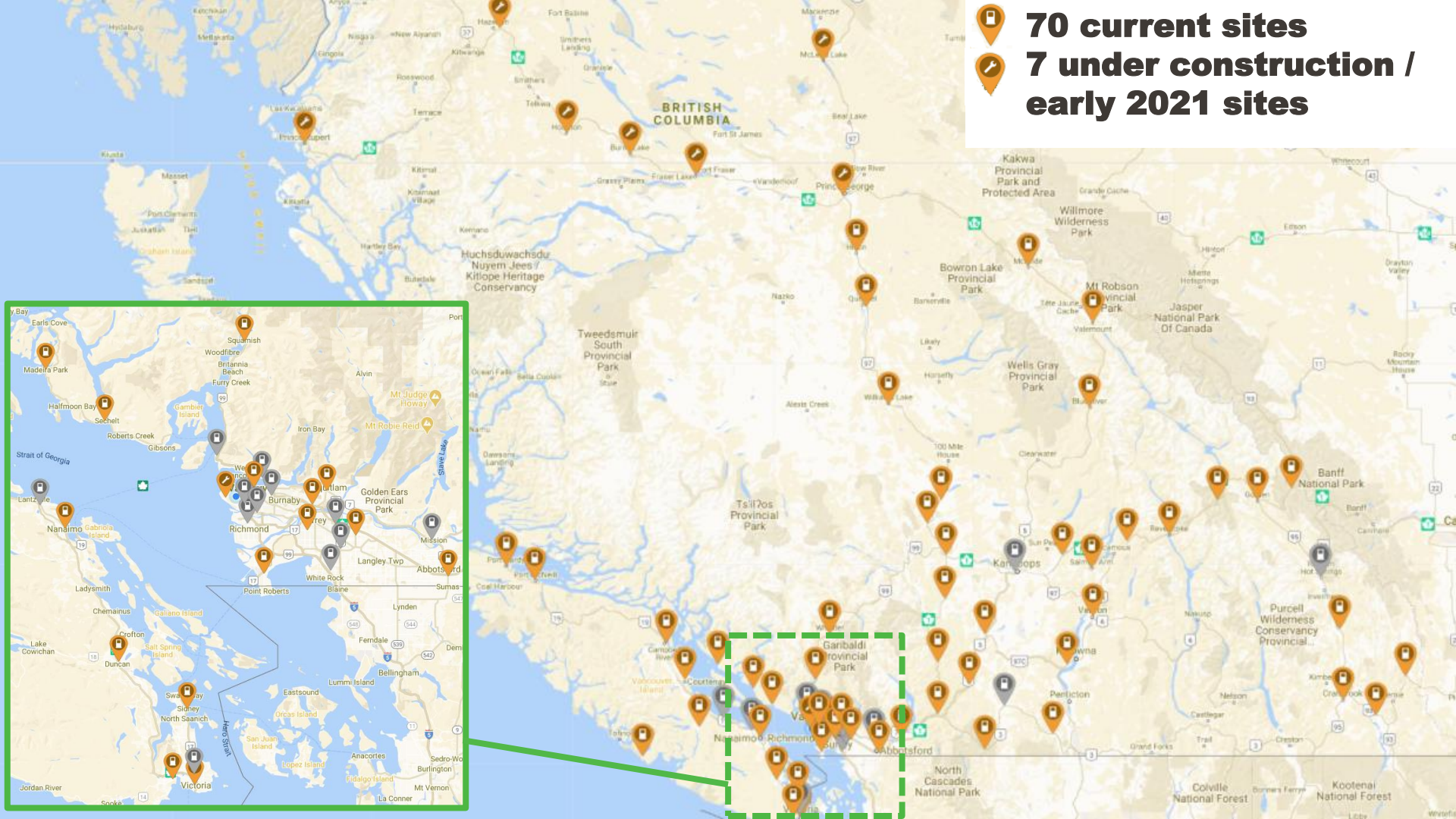
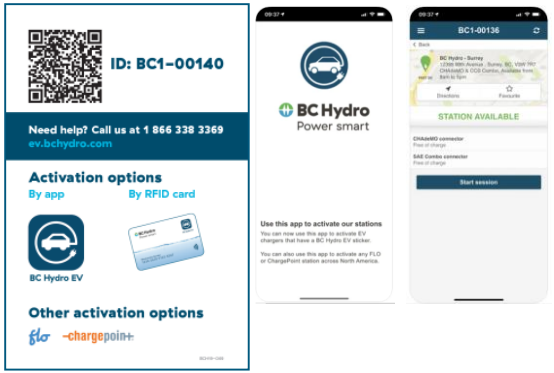

70 current sites
7 under construction / early 2021 sites
BRITISH COLUMBIA
Huchsduwachsdu Nuyem Jees / Kitlope Heritage Conservancy
Tweedsmuir South Provincial Park
Tsilʔos Provincial Park
Wells Gray Provincial Park
Bowron Lake Provincial Park
Kakwa Provincial Park and Protected Area
Willmore Wilderness Park
Mt Robson Provincial Park
Jasper National Park Of Canada
Banff National Park
Garibaldi Provincial Park
Purcell Wilderness Conservancy Provincial...
North Cascades National Park
Colville National Forest
Kootenai National Forest
Golden Ears Provincial Park
Strait of Georgia
Victoria
Nanaimo
Richmond
Burnaby
Surrey
Abbotsford
Kamloops
Penticton
Prince George
Prince Rupert

BC Hydro EV network evolution

Made many improvements with others to come

- Stations open 24/7 and capable of charging all EV's that support Combined Charging System (CCS) or CHAdeMO DC connectors
- Recently improved station customer experience including more reliable chargers, lighting, accessibility and signage at many sites
- BC Hydro EV become an official EV network in 2019 – driver tools including mobile app, web portal and RFID cards, allowing both flexibility and privacy compliance
- Added roaming with FLO and ChargePoint for additional options
- Enhanced phone support from British Columbians who know B.C. roads and towns
- Installing two or more chargers at all new sites going forward
- Adding 25kW and 100kW chargers in addition to 50kW chargers at some sites



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Enabling EV travel across B.C. ...

McBride

Valemount

70 Mile House

Cache Creek

Surrey

Cloverdale

Saanich

Questions

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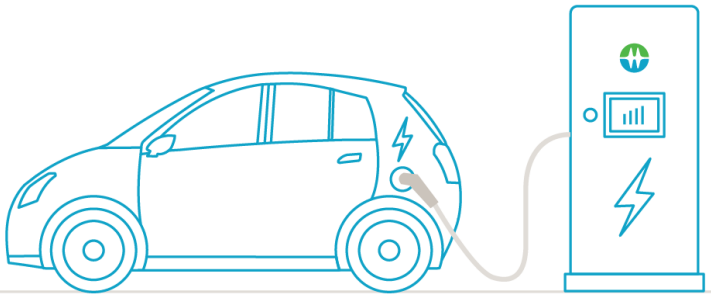
Customer research & insights

BC Hydro EV charging



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EV charging rate research summary

1. BC Hydro EV Network survey, sent to members – Leger
    - Section A Satisfaction with EV customer support (Fall 2019 & Summer 2020)
    - Section B Feedback on rates and the fast charging experience (Summer 2020)
2. In-depth individual phone interviews – BC Hydro (Summer 2020)
3. Other customer sentiment – PlugShare

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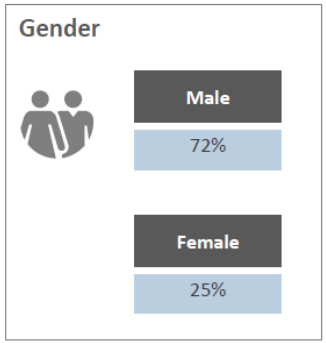
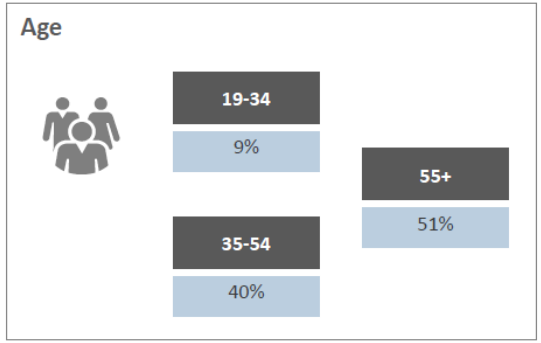
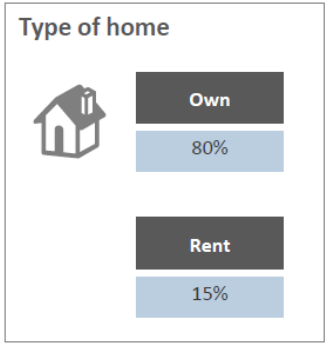
Satisfaction with EV customer support

Demographics of network members who responded to 2020 survey

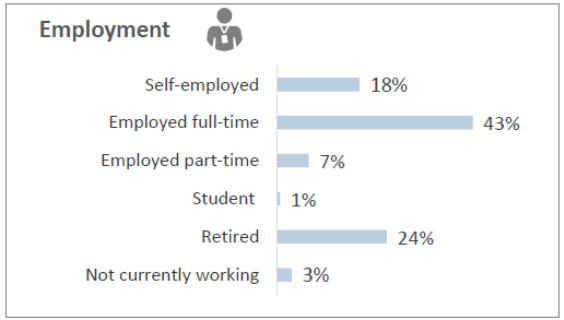


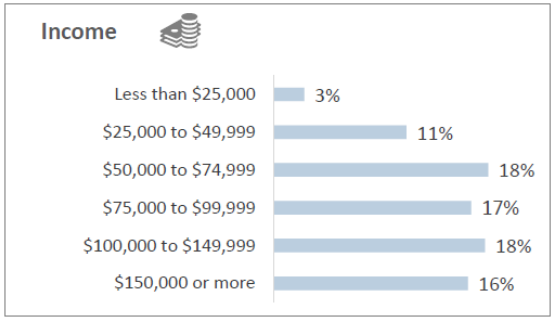


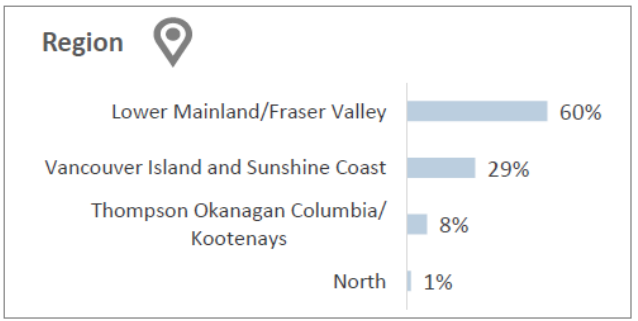


Key observations

- Most are male
- Most are 35+
- Most own their home
- Two-thirds are employed
- Most earn $50K/year +
- Almost two-thirds live in LM/FV







Source: Electric Vehicle Charging Stations Survey Section A, n=346 (Leger)

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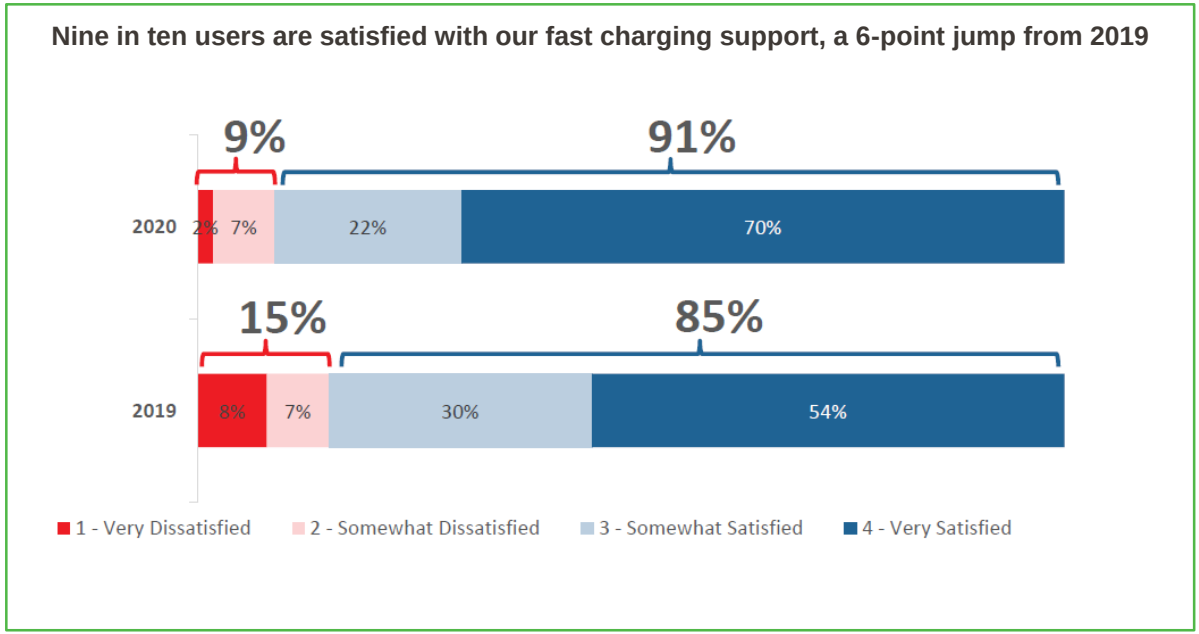
Satisfaction with EV customer support

Satisfaction has improved over last year



Source: Electric Vehicle Charging Stations Survey Section A (Leger)

Total 2020, n=269; Total 2019, n=112.

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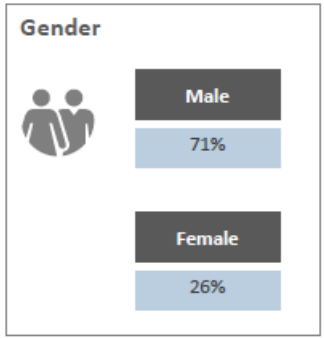
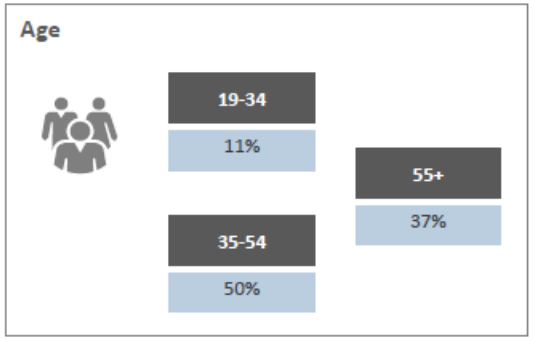
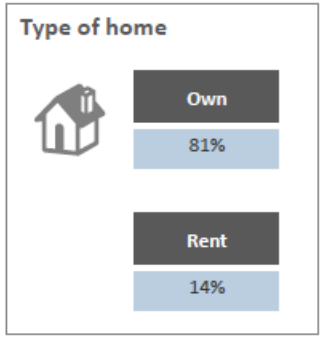
Feedback on rates and the fast charging experience

Demographics of network members who responded to this section







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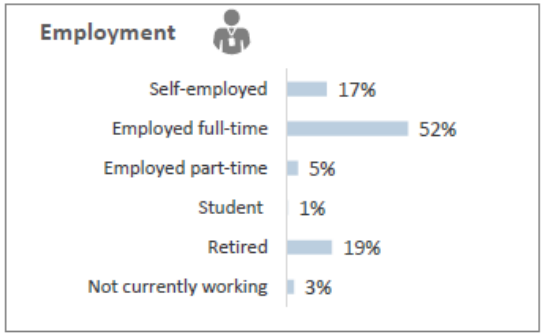

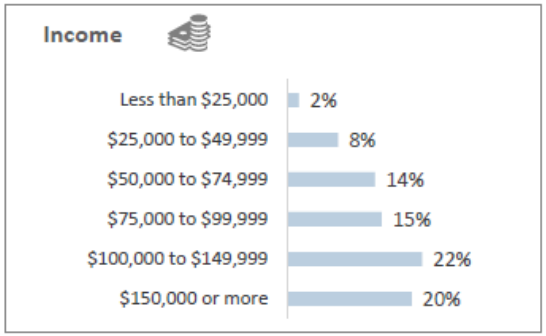

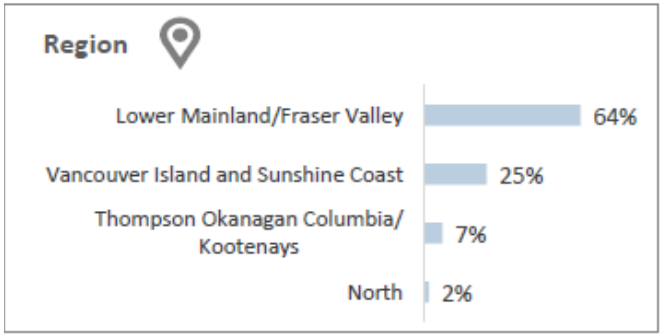

Source: Electric Vehicle Charging Stations Survey Section B, n= 4,196 (Leger)

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Feedback on rates and the fast charging experience

Almost two-thirds of respondents think it is reasonable to charge a fee

Main reasons for using BC Hydro fast charging stations

- Fast to charge
- Free service
- Convenient location

Most important elements in station experience

- Multiple chargers per site
- Easy to find / convenient locations
- Safe locations
- Nearby amenities

Support for a fee

- **Almost two-thirds think it is reasonable to charge a fee**

Time-based pricing

- Half would like to pay less than $5 for 30-min charge
- 20% would pay between $6 and $9 for 30-min charge
- Half would pay more for a faster charger

If we charge a fee

- **Half said they'd stop using the stations**
- **One-third said they have nowhere else to charge**

Support for other models

- Half would like kWh-based pricing
- One-quarter would support a discount for off-peak charging
- The rest are fine with time spent at charger

Source: Electric Vehicle Charging Stations Survey Section B, n= 4,196 (Leger)

Feedback on rates and the fast charging experience

Summary of written comments on rates

I support a fee but …

- Should be less expensive than gas
- Should be more expensive than charging at home
- Should be less expensive than Tesla, PetroCanada, etc.
- Should be low enough to keep encouraging people to buy EVs
- You should be expanding the network and improving station reliability first

Time- vs. kWh-based pricing

- Time-based is a good idea because it encourages drivers to move along
- Time-based is very unfair – due to variability in charging output, vehicle battery, outside temperature, etc.
- “Charge us the way drivers are charged at gas stations” was the most frequently referred to analogy (by “fuel amount” versus “time spent plugged in”)

I have some other ideas

- Hybrid model: charge drivers for kWh, plus time based for extended session length
- Base rate of $X to 80% charge, then increase fee
- Graduated time-based charging
- Have time-varying rates
- Free, or discount for BC Hydro customers
- Monthly subscriptions
- Location-based pricing
- Find another way to subsidize

Keep it free

- I justified the expense of buying an EV because of the free charging
- You should be rewarding EV owners; we are doing our part for the environment
- Free charging encourages EV adoption
- I will stop using your stations if you start charging a fee
- Keep it free for another year or two, or until the number of EVs reaches some critical mass

Other feedback …

- I want to see where the fees are going
- I want the fees to go into building new stations
- Provide more than one way to pay (not just credit card)
- Do more to enforce limits & etiquette
- Free up public charging stations by incentivizing at-home charging
- Improve the user experience
- Add the charging fees to my residential bill

Source: Electric Vehicle Charging Stations Survey Section B, n= 2,149 (Leger)

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In-depth individual interviews – key findings

1. Feedback on proposed fees @ 50kW

Source: Phone interviews conducted August to September, 2020

Per minute fee $0.20 ($12 / hour)	Per minute fee $0.25 ($15 / hour)	Per minute fee $0.30 ($18 / hour)
Some thought that this was the best option as drivers want the best price. Others thought this was too low as the perceived value of the service exceeds the price.	Some thought this was a reasonable fee as drivers will start to do the math and realize it's cheaper to charge at home. But there was an issue about costs to charge during the winter, which wouldn't help affordability.	Most thought this fee was too high. Would change their decision to use the station, especially if they had to pay parking on top of the charging fee.

Customer feedback on other power levels: 25kW charger: Less than half the cost of 50kW charger. 100kW: Less than double the cost of a 50kW charger.

2. Feedback on other fee structures

Subscription	Min. fee + rate	Time-varying rate	kWh-based rate	Seasonal	Urban vs rural
Most thought this wasn't a good option as drivers would overstay and abuse the system, and wouldn't benefit those who use the stations on an ad-hoc basis.	Almost no support for minimum fee. Would encourage people to stay as long as possible, would punish drivers who need a quick charge, and is problematic when stations aren't reliable.	Great option for garage orphans and people who have different shifts, smooths demand, increases utilization. Would require a different time limit overnight.	Overwhelmingly the favoured option. Seen as most fair because "in every other scenario drivers are being overcharged". One caution is it might create less urgency for a driver to vacate their spot.	Mixed reaction to this. Cheaper in winter would favour those who live in colder areas of BC. But more expensive in the summer would punish those who travel during the summer.	Good support for this. Rural stations are used by travelers and a valuable resource. Land value is less in rural areas, should be reflected in price. Gas in cheaper in rural areas too. Promotes social equity.

Summary of key insights

There is general support for a fee, with some cautionary advice

Charging a fee will improve behaviour at stations – it will push those with other options to charge elsewhere (home, work, other charging infrastructure, etc.)

Charging a fee means higher expectations of service – in return, drivers are expecting better reliability, more stations, and an improved app & station experience

Incentivize at-home charging to reduce demand at public charging stations

When people first bought EVs, they were thinking about the environment, now they are thinking about the cost of ownership, a charging fee is an extra expense

When compared to time-based charging, kWh-based charging was seen as the fairest approach – pay for electricity delivered not for the time spent at station

The price of gas is the barometer by which drivers judge a price as being “fair”

A fee punishes drivers who bought EVs to do their part for the environment and reduce their carbon footprint

Drivers also support a hybrid price structure; for example, where drivers are charged by kWh and penalized for idling time

Questions

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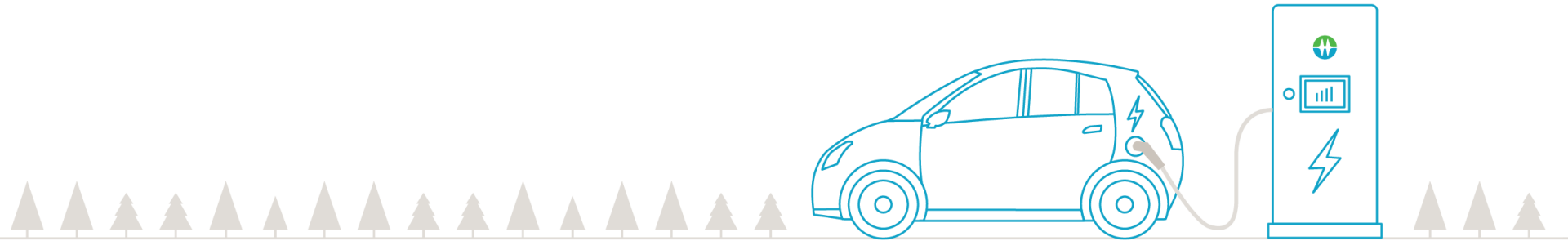
Jurisdictional scan

Public EV fast charging



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Jurisdictional scan – pricing

Source: PlugShare, Nov. 2020

Provider	Description of service & any additional amenities	Rate (cents/min) @ power level	Number of sites and chargers in B.C.
City of North Vancouver	• Single 50kW charger	20¢ 50kW	• 1 site
City of Vancouver *	• Single or 2x 50kW chargers	21¢ 50kW	• 5 sites • 9 chargers
Electrify Canada	• 4x chargers up to 350kW • Ample lighting, major retail parking lots	27¢ <90kW* 57¢ >90kW* *member discount program available	• 3 sites (additional 5 sites under construction) • 12 chargers
FortisBC *	• Single or 2x 50kW chargers	Current: 30¢ 50kW Proposed: 27¢ 50kW 54¢ 100kW	• 15 sites • 20 chargers
Hydro Quebec * Electric Circuit Network	• Basic to high quality stations • Single, 2x, 4x, 6x – 50kW, and some 100kW	19.6¢ 50kW 19.6¢ 100kW* *interim rate	• ~250 sites in Quebec
Petro-Canada	• 2x chargers up to 350kW • Ample lighting, on-site amenities/staff	27¢ up to 350kW	• 11 sites • 22 chargers
Tesla	• Proprietary stations (Tesla only) • 4 to 22 chargers per site up to 150kW	22¢ <60kW 44¢ >60kW	• 16 sites • 172 chargers

* Most comparable to BC Hydro deployments

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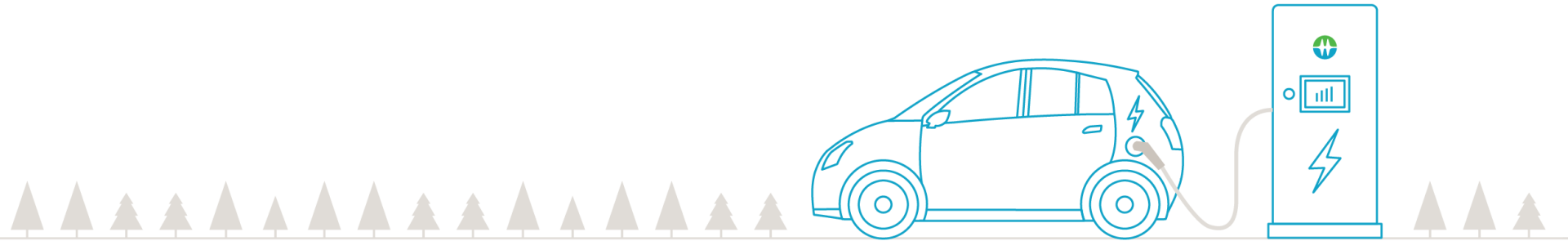
Preliminary rates

Public EV fast charging



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Regulation & regulatory context

Background

- Greenhouse Gas Reduction (Clean Energy) Regulation: Amended Jun 22, 2020
- BCUC Regulation of Electric Vehicle Charging Service Inquiry: 2018-2019
- FortisBC Rate Design and Rates for EV DCFC Service: Fall 2020
- BC Hydro Fiscal 2022 Revenue Requirements Application: Dec 2020

Rate application process

Overview

BC Hydro requires a new rate schedule to charge public EV charging stations

- Early 2021 we will apply to the BC Utilities Commission (BCUC) for approval of proposed EV Fast Charging rates
- BCUC will administer an open and transparent process to examine and decide on our rate design proposal
- All interested and affected parties may participate in the BCUC process by registering as Interested Party, sending a Letter of Comment or becoming an Intervener. More information on ways to get involved can be found at https://www.bcuc.com/get-involved/get-involved-proceeding.html.

BC Hydro rate design objectives

Rate design objectives	How they apply to a public fast charging rate
Economic Efficiency	• Set pricing to achieve full cost recovery over the longer term, starting with recovery of electricity supply costs in the near term
Low Carbon Electrification	• Support low carbon electrification through transportation electrification
Flexibility	• Build in flexibility through repricing in three years and future redesigns such as kWh-based and time-varying-based pricing

Rate design approach

- Energy based rate not currently feasible – lack of Measurement Canada approved DC metering
- Charge will be in cents/min - Metering/billing limitations
- Set pricing to recover electricity supply costs in the near-term
- Set pricing to achieve full cost recovery over the longer-term
- Convert Medium General Service (MGS) rate to a time-based rate ($/minute)
- Recover station capital and operating costs from all ratepayers, if meeting requirements of government regulation
- Propose evaluation and potential re-pricing in three years, which will be informed by utilization and price response data

Illustrative Rate model outcomes at 50kW

	Scenario 1	Scenario 2	Scenario 3
	Electricity supply costs	**Electricity supply + station operating costs**	**Electricity supply + station operating + capital costs**
Utilization rate	*($/min)*	*($/min)*	*($/min)*
3%	$0.25	$0.90	$1.30
5%	**$0.17**	**$0.57**	**$0.81**
10%	$0.11	$0.31	$0.43
15%	$0.09	$0.23	$0.31
20%	$0.07	$0.18	$0.24

Comments

- A 3 to 5% utilization rate aligns with published market studies
- Comparable service providers charge 20 to 30 cents/minute
- BC Hydro customers reported a willingness to pay 17-20 cents/minute

Assumptions

- Electricity supply costs valued at Fiscal 2021 Medium General Service rate (MGS), Rate Schedule 1500).
- Electric Vehicle charging information such as average charging length and average consumption per session are based on BC Hydro's 50kW station data from 2019
- Illustrative utilization rate

Key finding

- Station utilization must reach sustained average levels of 20% for the rate to be attractive and to achieve full cost recovery

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Bonbright rate design criteria

Bonbright Criteria	Grouping	Performance	Remarks
1. Price signals to encourage efficient use and discourage inefficient use	Economic efficiency	Fair	• Price level is intended to encourage efficient use of stations by encouraging usage relative to higher price levels • Per minute charge discourages inefficient use of stations by reducing wait times • However, rate does not fully reflect BC Hydro's marginal cost (rate covers MGS rate which should cover marginal energy cost and portion of marginal capacity cost)
2. Fair apportionment of costs among customers	Fairness	Fair	• Per minute charge benefits customers with larger battery size and is a disadvantage to customers with smaller battery size relative to per kWh charge • Stations are available to the public and same rate applies to all users • Over the near term, EV Public Fast Charging station revenue will not recover all costs of providing the service including capital costs (which will be covered by other ratepayers)
3. Avoid undue discrimination			
4. Customer understanding and acceptance; practical and cost-effective to implement	Practicality	Good	• The proposed rate is easy for customers to understand and practical to administer
5. Freedom from controversies as to proper interpretation			
6. Recovery of the revenue requirement	Stability	Good/Fair	• Provides stable recovery of electricity supply cost • Improve revenue recovery and revenue stability over long term by encouraging electric vehicle usage • Does not fully recover revenue requirement
7. Revenue stability			
8. Rate stability			

Illustrative Pricing for different power level chargers

More than 95% of BC Hydro's fast chargers are 50kW

- BC Hydro will soon deploy more 25kW and 100kW chargers at some locations depending on power availability.
- These power levels will also require a reasonable rate per minute

Illustrative rates			
Max power level	**Per minute rate**	**Cost for 30 mins**	**Comments**
50kW	$0.20	$6.00	• Energy supply recovery based on MGS rate
100kW	$0.31	$9.30	• Energy supply recovery based on MGS rate
25kW	$0.12	$3.60	• Will be deployed at sites where 3-phase power is limited • Energy supply recovery based on Small rate • Includes some operation and maintenance recovery

Monitoring and evaluation

How we will be monitoring and evaluating the new rate

Annual monitoring

- New load (energy, demand, load shape and load factor)
- Revenues
- Incremental costs

Three year evaluation

- Utilization
- Potential Repricing
- GHG reduction
- Customer feedback
- Availability and evolution of a Measurement Canada DC metering standard

Question

Are there additional metrics and outcomes we should monitor and evaluate?

Question 1

What is the appropriate rate for a 50kW charger?

- Target range is between $0.20/minute and $0.25/minute
- Bottom end of the range would encourage greater utilization
- Top end of the rate would provide higher cost recovery

Question 2

Should it be the same rate for chargers with different power levels?

- BC Hydro has acquired and will soon deploy additional DC fast chargers with other power levels (25kW and 100kW)
- Simplicity for near term or variation in pricing?

Question 3

How might we increase utilization or improve experience?

- Sites / locations
- Support / communications
- Accessibility / usability
- Lighting / safety / signage
- Number of chargers per site
- Power level of chargers

Question 4

What terms and conditions are appropriate for both station users and to protect all BC Hydro customers? How do we strike the right balance?

Comparison to Current Electric Tariff Terms and Conditions	
Similar	Customers are responsible for the safety of their own property (extend to vehicle)
	BC Hydro can't guarantee service level
Unlike	BC Hydro is seeking ability to temporarily waive fee for specific charger / site for operational reasons
	BC Hydro will require collection of data specific to activation/payment
	BC Hydro can't guarantee connectivity for charger activation including mobile apps, cellular network or 3rd party roaming partners

Questions

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Closing Remarks: Rate Application Milestones

2020

• December 07	Public engagement via webinar
• December 11	Deadline for feedback on webinar

2021

• Late January	BC Hydro will file rate application with BCUC
• Early February	Likely date of intervener and interested party registration
• End of February	Interim rate approval
• Spring 2021	Rate proceeding underway
• April 2021	Interim Rate effective date
• Summary 2021	Rate proceeding underway

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Closing Remarks

Key contacts and process

- BC Hydro and the BCUC values your participation in the regulatory process
- Participation can be low involvement (e.g. letter of comment) or high involvement (e.g. interrogatories, legal submissions)
- Please contact BC Hydro Regulatory Group with any questions about the regulatory process: bchydroregulatorygroup@bchydro.com
- Submit your feedback form by December 11, 2020

Contact information

BC Hydro Regulatory

- BCHydroRegulatoryGroup@bchydro.com
- For this presentation and the feedback form of the session https://www.bchydro.com/toolbar/about/planning_regulatory/regulatory.html

EV Program Support

- http://electricvehicles.bchydro.com – all EV programs
- BC Hydro EV public network information and support:
    - ev.bchydro.com
    - evsupport@bchydro.com
    - 1 866 338 3369


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