

## Summary Notes

### BC Hydro Fleet Electrification Rate Design Workshop

May 28, 2019

Vancouver – BCUC Hearing Room

<b>Type of Meeting</b>	Fleet Electrification Rate Design Workshop – Customers and Interveners	
<b>Agenda</b>	<p>Welcome – Fred James, Chief Regulatory Officer</p> <ol style="list-style-type: none"> <li>Objective and Key Rate Drivers – Gord Doyle, Customer Service Operations</li> <li>Jurisdictional Review – Allan Chung, Regulatory and Rates Group</li> <li>Rate Design Criteria and Economic Assessment – Anthea Jubb, Regulatory and Rates Group</li> <li>Rate Options and Discussion – Allan Chung and Anthea Jubb, Regulatory and Rates Group</li> </ol> <p>Closing – Anthea Jubb, Regulatory and Rates Group</p>	
<b>Abbreviations</b>	<p>BCH BC Hydro</p> <p>BCIT BC Institute of Technology</p> <p>BCUC BC Utilities Commission</p> <p>DCFC DC Fast Charger/Charging</p> <p>FACOS Fully Allocated Cost of Service</p> <p>GHG Greenhouse Gas</p> <p>GWh Gigawatt Hour</p> <p>kW Kilowatt</p> <p>kWh Kilowatt Hour</p> <p>LGS Large General Service</p>	<p>LLH Low Load Hours</p> <p>Mid-C Mid-Columbia</p> <p>NRCan Natural Resources Canada</p> <p>NPV Net Present Value</p> <p>R/C Revenue to Cost</p> <p>RDA Rate Design Application</p> <p>RRA Revenue Requirements Application</p> <p>T&amp;D Transmission &amp; Distribution</p> <p>TOU Time of Use</p>

#### Welcome – Fred James

Fred provided a welcome to participants, both those attending in-person and via the webcast, and introduced the agenda and objectives for the workshop.

### 1. Objective and Key Rate Drivers – Gord Doyle

Gord provided an overview of the objective of the rate design and outlined the key drivers. He clarified that the rate options being considered are for fleet vehicles and not for public charging. Feedback is being requested on the proposed rate availability.

	Feedback	BC Hydro Response
	<b>David Austin, Clean Energy Association of BC</b>	
1.	<b>Question</b> – Slide 9 - Have you looked at substations where the charging will be in metro areas to see what they can accommodate?	They'll be considered as the customers interconnect.
2.	<b>Question</b> – Slide 9 - Is the existing trolley system DC? Can you piggyback on the existing infrastructure?	Not sure. Will take away and talk to TransLink.  <b>Updated Response:</b> <ul style="list-style-type: none"> <li>• The trolley overhead is 600 VDC</li> <li>• The wires and infrastructure cannot be “piggy backed” to a new system such as in route. .</li> </ul>

### 2. Jurisdictional Review – Allan Chung

Allan provided an overview of rates for commercial EV charging in other jurisdictions. The review determined that other utilities have rates that are designed to encourage EV adoption and meet other objectives such as load shifting.

	Feedback	BC Hydro Response
	<b>David Austin, Clean Energy Association of BC</b>	
3.	<b>Question</b> – Slide 14 -Please explain how BC Hydro sets its demand charge?	For BC Hydro's LGS customers the demand charge is set to recover a portion of BC Hydro's transmission, generation and distribution demand related costs.  <b>Note:</b> Slides 8 and 24 of the presentation have been revised to show the actual system peak rather than the average system load for the year. A revised presentation is attached.

	Feedback	BC Hydro Response
4.	<p><b>David Austin, Clean Energy Association of BC</b></p> <p><b>Question</b> – Slide 7 - Here it shows there is little energy required for charging during the peak. Has consideration been given to using battery storage at or near charging stations? If you could charge batteries in the evening for demand in the day, it might work. What is not considered are T&amp;D losses during the day and the need to expand substations.</p>	<p>BC Hydro will continue to examine battery storage as this emerging technology develops.</p>
5.	<p><b>Question</b> - For years you had a study with BCIT regarding a micro-grid. Presumably you were studying cost of batteries and battery performance. Is this still ongoing? What are the results?</p>	<p><b>Updated Response:</b></p> <p>BC Hydro partnered with BCIT in 2012 on the Energy OASIS (Open Access to Sustainable Intermittent Sources) demonstration project that was funded by NRCan's Clean Energy Fund. This project studied the use of a solar photovoltaic system and battery energy storage as parts of BCIT's smart microgrid system to mitigate the impact of a DCFC station on BC Hydro's grid. The study was concluded and a final report was submitted to NRCan in March 2015; which can be found here: <a href="#">BCIT Energy OASIS Final Project Report</a>.</p> <p>BC Hydro has not been engaged in further energy storage studies with BCIT since the completion of the Energy OASIS project but has provided letters of support to BCIT for their applications for further NRCan funding in 2016 and 2017 on their other microgrid studies.</p>
6.	<p><b>David Craig, Commercial Energy Consumers</b></p> <p><b>Comment</b> – It would be interesting to see the information about studies of the cost of batteries to serve this load.</p>	<p>Please see the response to question 5 above.</p>
7.	<p><b>Yolanda Domingo, BCUC Staff</b></p> <p><b>Question</b> - Slide 7 – 450 kW is a big draw on the system. Do you have concerns about the reliability and how that may impact the grid?</p>	<p>When a customer interconnects we do a study to consider impacts and what upgrades are required in accordance with our extension policy.</p>

	Feedback	BC Hydro Response
8.	<p><b>David Austin, Clean Energy Association of BC</b></p> <p><b>Question</b> - You said there are applications before California regulators. Can you see if they are considering battery storage at point of use to determine demand charges?</p>	<p>BC Hydro is not aware of any utilities that determine demand charges based on utility scale, utility owned batteries at the point of use or elsewhere.</p> <p>In US states such as California and Arizona, some utility customers are purchasing and installing battery storage on their premises in conjunction with customer owned behind the meter solar photovoltaic generation. Utilities in these states are examining rate designs to address cost recovery and fairness as this new technology develops. In some cases this examination includes an assessment of demand charges.</p>
9.	<p><b>Penny Cochrane, Cochrane Energy Consulting</b></p> <p><b>Comment</b> - I want to note that California has a capacity market which affords things like battery storage.</p>	<p>Acknowledged.</p>

### 3. Rate Design Criteria and Economic Assessment – Anthea Jubb

Anthea provided a review of the rate design criteria and the economic assessment framework being considered. Feedback is being requested on the metrics and outcomes to be monitored and evaluated.

	Feedback	BC Hydro Response
10.	<p><b>Penny Cochrane, Cochrane Energy Consulting</b></p> <p><b>Question</b> – Slide 18 - In considering an existing LGS customer, such as large retail outlets, which, based on retail hours and land space, there would be a good opportunity for after-hours charging. Is this not the entry point for service?</p>	<p>This type of arrangement would be an agreement between a fleet operator and the third party such as the retail outlet.</p>
11.	<p><b>David Craig, Commercial Energy Consumers</b></p> <p><b>Question</b> – Slide 19 - The BCUC will be looking at all of the benefits, beyond economic benefits, correct?</p>	<p>Slide 20 speaks to the metrics and outcomes we plan to monitor and evaluate. We are seeking feedback on whether there are other benefits that we are missing.</p>

	Feedback	BC Hydro Response
12.	<p><b>David Craig, Commercial Energy Consumers</b></p> <p><b>Comment</b> – No other benefits; just want to make sure they were being covered. The primary assessment will be related to economic impacts though</p>	Acknowledged.
13.	<p><b>David Austin, Clean Energy Association of BC</b></p> <p><b>Question</b> – Slide 19 - Is the marginal cost of energy, the marginal cost of a yet-to-be built greenfield project?</p>	<p>The marginal cost of energy is estimated based on the mid-C market pricing.</p> <p><b>Note:</b> Due to an error, Slide 19 of the presentation omitted marginal distribution costs, although these costs were included in the analysis that is presented in the slides on the preliminary economic assessment results. These costs have been added. A revised presentation was distributed to participants on June 4, 2019.</p>
14.	<p><b>Question</b> - How can you use mid-C when the Clean Energy Act requires BC Hydro to be self-sufficient?</p>	As BC Hydro is in an energy surplus on a planning basis, the mid-C market price provides a reasonable estimate of our marginal cost of energy.
15.	<p><b>Comment</b> – It's hard to believe you are in surplus when you imported 2500 GWh of energy – save it for RRA.</p>	We acknowledge that there is uncertainty with regards to our marginal costs. Therefore we are analyzing a range of scenarios and conducting sensitivity analysis to test whether or not ratepayer economics remain positive, given the range of potential outcomes.
16.	<p><b>Yolanda Domingo, BCUC Staff</b></p> <p><b>Question</b> – Slide 20 - This is monitoring and evaluation for this rate design. How would you measure GHG reduction as part of your rate design analysis?</p>	We would work with our customers to estimate the GHG reductions based on the fuel type from which the customer was converting (e.g., diesel, gasoline).
17.	<p><b>Linda Dong, Zone II Ratepayers Group</b></p> <p><b>Question</b> – If you are doing a three year evaluation, is this permanent rate or a pilot?</p>	Two rate design options could be offered on an ongoing basis and one option would be time bound.

#### 4. Rate Options and Discussion – Anthea Jubb and Allan Chung

Anthea provided an overview of Option 1 – the Overnight Rate with Demand TOU. Allan provided an overview of Option 2 – the Overnight Rate with Energy and Demand TOU and Option 3 – the Demand Transition Rate.

	Feedback	BC Hydro Response
18.	<p><b>Penny Cochrane, Cochrane Energy Consulting</b></p> <p><b>Comment</b> - Slide 25 - There is a benefit to the shareholder because we are increasing rate base.</p>	<p>For the next two years our net income is set so this will increase revenues, but not net income. BC Hydro does not earn our net income off of rate base, so an increase in the rate base is not relevant.</p>
19.	<p><b>David Austin, Clean Energy Association of BC</b></p> <p><b>Question</b> – Why would anyone invest in the interconnection costs if it was a three year rate?</p>	<p>We are not contemplating terminating any of the potential rates in three years. Rather, we are contemplating an evaluation and review of outcomes, pricing and availability in three years.</p>
20.	<p><b>Aaron Lamb, BC Transit</b></p> <p><b>Question</b> – Slide 29 - Why does the off peak energy charge not commence until 11 – why is demand starting at 10?</p>	<p>It's the same as Option 1 – the energy charge is a little later based on the system load curve.</p>
21.	<p><b>Comment</b> – This would make billing more complex.</p>	<p>The implication of aligning the off peak charge with the demand charge is that the unit price may go up. We will examine aligning the timing.</p>
22.	<p><b>Sarah Khan, BCUC Staff</b></p> <p><b>Question</b> – Slide 30 - How did you come up with the numbers at the bottom of the chart?</p>	<p>Values are illustrative. For the bill saving we compared the NPV of the customer bill under this option versus the LGS rate, over a 5 year period. So a comparison of what a customer paid under LGS versus this proposed rate expressed as a percentage of bill savings for the customer. For the ratepayer benefit cost ratio, we estimated the NPV of the incremental revenue from the proposed rate divided by the NPV of the marginal cost to serve the incremental load.</p>

	Feedback	BC Hydro Response
23.	<p><b>Thomas Hackney, BC Sustainable Energy Association</b></p> <p><b>Webcast Question</b> – Could the proposed overnight rate Options 1 and 2 be seen as a subsidy of customers on that rate class to other ratepayers?</p>	<p>Option 1 and Option 2 do not result in a subsidy to participants under that rate. We analyzed the apportionment of costs and Options 1 and 2 result in a similar recovery of costs as is currently the case for LGS customers. The rate designs reflect costs of service and customers pay their share of costs – i.e., there is no shifting of costs.</p>
24.	<p><b>Shannon Craig, Ministry of Energy, Mines and Petroleum Resources</b></p> <p><b>Webcast Question</b> – Are any revenues to BCH from the sale of credits under the Low Carbon Fuel Standard included in the “revenues” for the various rate options?</p>	<p>No.</p>
25.	<p><b>Penny Cochrane, Cochrane Energy Consulting</b></p> <p><b>Question</b> – Slide 36 - Can you run us through a bill calculation for demand for one month? I am not clear how you would do the calculation.</p>	<p>For LGS, we have a billing determinant for example for a depot load that has a demand and energy component. We apply the demand charge to the monthly peak kW and energy charge to the monthly energy kWh usage.</p>
26.	<p><b>Question</b> – What if the peak is in a LLH? How do you determine the peak?</p>	<p>For the Demand Transition Rate, there would be no demand charge during the first 5 year period. After that you would pay for demand based on your monthly peak demand.</p>
27.	<p><b>Question</b> – So one reading per month, peak regardless of when it happened?</p>	<p>The maximum demand for that month, multiplied by the demand charge.</p>
28.	<p><b>Janet Rhodes, Commercial Energy Consumers</b></p> <p><b>Question</b> – Have you considered seasonal rates?</p>	<p>We did consider seasonal rates but we wanted to have a consistent charging message year round. The rate gets complex if it is seasonal.</p>
29.	<p><b>Yolanda Domingo, BCUC Staff</b></p> <p><b>Question</b> – This is an optional rate and it has linkages to the LGS rate. Is this an optional rate to the LGS rate class or is it completely separate?</p>	<p>BC Hydro is contemplating that these would be optional general service rates, available to fleet charging customers within the LGS rate class. Option 1 and 2 are estimated to have the same revenue to cost ratio as does the LGS rate class overall. We have an estimated load profile and considered costs based on that profile and the revenue is based on the rates.</p>

	Feedback	BC Hydro Response
	<p><b>Yolanda Domingo, BCUC Staff</b></p>	
30.	<b>Question</b> – So because the rates are optional, are you making an assumption on uptake?	We do make load assumptions (magnitude and shape). We have modelled this and found that costs and revenues are sensitive to this load. This is why we are contemplating evaluating and potentially re-pricing the rates after three years.
31.	<b>Question</b> – Would you include the revenue and cost in the evaluation?	Yes we would include revenues and costs, because this is one way to assess fairness.
	<p><b>Thomas Hackney, BC Sustainable Energy Association</b></p>	
32.	<b>Webcast Question</b> – Does Option 3 represent costing that better reflects FACOS for BCH’s modeling of fleet charging than Options 1 and 2?	<p>Option 1 and 2 are better reflective of BCH’s cost of service; Option 3 is a little further from that. Please see Slide 24 – many of our costs are driven by our peak times. Overnight rates allow for lower rates because an overnight profile is not driving our costs.</p> <p>While Option 3 is less reflective of BC Hydro’s costs of service our modelling indicates that it will still provide benefits to all ratepayers.</p>
	<p><b>Dorota Kwasnik, Vancouver Fraser Port Authority</b></p>	
33.	<b>Question</b> – Is it possible to have more than one option available? We may have different needs for our fleets.	We may apply for more than one rate. We want to encourage overnight use but there may be customers that this does not work for.
34.	<b>Question</b> – Option 3 – Is this identical to the shore power rate? If yes, is the energy cost the Transmission rate?	No. Shore power is interruptible and was priced on that basis.
35.	<b>Question</b> – Wouldn’t it make sense to match it to shore power?	The fleet electrification rate designs are not interruptible. The pricing was based on the average LGS customer at a 55% load factor.
36.	<b>Comment</b> - No, interruptible does not work.	Please see the responses to question 34 above and question 37 below.
37.	<b>Comment</b> - This rate is higher than shore power so it almost looks like a penalty	We could consider the impacts of aligning the energy price between the shore power rate and the illustrative demand transition rate.
38.	<b>Comment</b> - This would apply to port customers – so a few rates could be helpful and if they can be aligned.	

	Feedback	BC Hydro Response
	<b>Penny Cochrane, Cochrane Energy Consulting</b>	
39.	<b>Question</b> – You mentioned two rates. Does a customer need two services to take advantage of both rates?	Yes, each would be its own interconnection.
40.	<b>Comment</b> - This may be too ambitious in light of billing changes.	Implementing the Overnight Rate design concepts would result in some changes to how we use meter information.
	<b>Dorota Kwasnik, Vancouver Fraser Port Authority</b>	
41.	<b>Question</b> – These would be separate meters for fleet?	Yes.
	<b>Bill Andrews, BC Sustainable Energy Association</b>	
42.	<b>Webcast Question</b> – Option 3. Does the five year transition begin when each new meter is introduced? Or does the five year transition begin in 2020 regardless of when the customer and/or meter first receives service under the rate?	The starting time is proposed to be fixed, starting in 2020 but it would be upon approval and implementation. We are not contemplating that that the start date would be customer specific – it starts in year 1. Customer bill savings are based on when you sign up.
	<b>Dorota Kwasnik, Vancouver Fraser Port Authority</b>	
43.	<b>Comment</b> - Electrification is expensive and takes time. One vehicle costs \$500k and we need many. So we need full five year period to bring on load. We will not be ready in 2020. It would only benefit those customers who accidentally align with the 2020 date.	We understand that for customers, a custom start date per account may be preferable. We can examine this recognizing that there may be practical barriers to introducing it, such as metering and billing system complexity and increasing risk to all ratepayers resulting for future uncertainty regarding marginal costs.
	<b>James Weimer, Clean Energy Association of BC</b>	
44.	<b>Question</b> – Slide 36 - Referring to Allan's benefit cost analysis, I am looking at the chart for Option 3 and the ratios in the coloured lines look different than the chart. Why? Is there an error?	<b>Note:</b> the graph on Slide 36 of the presentation has been corrected. A revised presentation was distributed to participants on June 4, 2019.
	<b>David Austin, Clean Energy Association of BC</b>	
45.	<b>Comment</b> - In relation to a comment from the Port – you need to consider how long the interconnection process takes.	Fair comment. It was an illustrative date but we will consider the interconnection process and whether we should make changes the Demand Transition Rate to provide more flexibility.

	Feedback	BC Hydro Response
46.	<b>Mike Grist, Seaspan Ferries</b> <b>Webcast Comment</b> - Re the comment that BC Hydro indicated that they have not considered that there may be interest in an interruptible rate for fleets because they did not anticipate that this would be of interest to customers. Given that some customers will have hybrid energy systems, there may be some interest in an interruptible design depending on how it is priced opposite the firm service options. Can BC Hydro include such an alternative for customers that have this flexibility?	We can consider the option but we would need to get a better idea of what the customer needs may be so we could model and design this.

#### 5. Closing – Anthea Jubb

Anthea thanked everyone for their participation and requested that feedback forms be provided back to BCH by June 5, 2019.