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November 12, 2020

Mr. Patrick Wruck
Commission Secretary and Manager
Regulatory Support
British Columbia Utilities Commission
Suite 410, 900 Howe Street
Vancouver, BC V6Z 2N3

Dear Mr. Wruck:

**RE: British Columbia Utilities Commission (BCUC or Commission)
British Columbia Hydro and Power Authority (BC Hydro)
2020 Street Lighting Rate Application**

BC Hydro writes to submit its 2020 Street Lighting Rate Application (**Application**) in which it seeks approvals or consents pursuant to sections 58 to 61 of the *Utilities Commission Act (UCA)* as follows:

- (i) Approval of proposed amendments to Rate Schedule (**RS**) 1701 – Overhead Street Lighting rate to allow for the provision of this service by way of light emitting diode (**LED**) street lights on an interim and final basis. BC Hydro is preparing to completely replace its older technology street lights with LED street lights (**Replacement Program**) to meet a requirement to eliminate equipment that contains Poly-Chlorinated Biphenyls (**PCBs**) under the [Federal PCB Regulation \(PCB Regulation\)](#) by December 31, 2025;
- (ii) Consent to rescind RS 1755 – Private Outdoor Lighting (closed) and approval of amendments to RS 1755 to facilitate its rescindment. This rate schedule has been closed since 1975 and contains few remaining customers. As major investment would be required to meet the PCB Regulation in order for BC Hydro to continue to offer this service and the lighting equipment is generally available from other lighting suppliers, BC Hydro believes that rescindment is the preferred option;
- (iii) Approval to waive Service Connection Charges for RS 1755 customers who request a new service for their light; and
- (iv) Approval of amendments to BC Hydro's Electric Tariff Terms and Conditions (**Electric Tariff**), street lighting and small general service (**SGS**) rate schedules related to the under- and over-billing of unmetered accounts, mixed use loads, as well as housekeeping and other amendments.

November 12, 2020
Mr. Patrick Wruck
Commission Secretary and Manager
Regulatory Support
British Columbia Utilities Commission
2020 Street Lighting Rate Application

BC Hydro respectfully requests interim BCUC approval of the proposed amendments and LED rates in RS 1701, on an interim, refundable and collectible basis, effective December 1, 2020 to allow it to immediately begin installation of LED street lights for spot repairs and to commence implementation of the Replacement Program. BC Hydro has also proposed effective dates for final RS 1701 rates, as well as for other approvals or consents sought in the Application that it believes allow for fulsome regulatory review.

For further information, please contact Anthea Jubb at 604-623-3545 or by email at bchydroregulatorygroup@bchydro.com.

Yours sincerely,



(for) Fred James
Chief Regulatory Officer

ch/rh

Enclosure

BC Hydro 2020 Street Light Rates Application

November 12, 2020

Table of Contents

1	Introduction	1
1.1	Purpose and Need for Application.....	1
1.1.1	Rate Schedule 1701 – Overhead Street Lighting	1
1.1.2	Rate Schedule 1755 – Private Outdoor Lighting (Closed)	2
1.1.3	Electric Tariff Amendments for Back-Billing of Unmetered Services	2
1.1.4	Electric Tariff Amendments for Mixed Use Loads	3
1.2	Legal and Regulatory Context.....	4
1.2.1	Legal Context.....	4
1.3	Proposed Regulatory Review Process and Communications	6
1.4	Orders Sought.....	7
2	BC Hydro Street Light Services.....	11
3	Background and Need for RS 1701 Changes	12
3.1	Background.....	12
3.2	Federal PCB Regulation and Ongoing Technological Changes.....	13
3.3	Customer Feedback, Consultation and Engagement.....	14
3.4	Jurisdiction Review	15
3.5	LED Pilot Studies	16
4	RS 1701 LED Street Light Replacement Program	19
4.1	RS 1701 LED Installation Plan	20
5	BC Hydro's Proposed RS 1701 LED Rate	23
5.1	Rate Design Principles.....	23
5.2	Rate Design Approach	26
5.2.1	Calculation of the Street Light Charge	26
5.2.2	Calculation of the Temporary Supplemental Charge	28
5.3	Proposed Pricing.....	29
5.3.1	Bill Impacts	31
5.3.2	Customer Consultation and Influence on Rate Design	33
5.4	Rate Schedule Elements.....	35
5.4.1	Availability and Applicability	35
5.4.2	Rate	37
5.4.3	Special Conditions	37
5.4.4	Rate Rider	39
5.4.5	New RS 1701 Supplemental Charge Section	40

	5.4.6	Eventual Complete Replacement of Older Street Lighting Technologies	40
6		BC Hydro's Proposed Termination of RS 1755	40
	6.1	Background and Need for Termination of RS 1755.....	40
	6.2	RS 1755 Customer Segmentation and Consultation.....	44
	6.2.1	RS 1755 Customer Segmentation	44
	6.2.2	RS 1755 Customer Consultation	45
	6.3	BC Hydro's Proposed Approach to RS 1755	47
	6.3.1	Group 2 Lights	47
	6.3.2	Group 1 and Group 3 Lights	48
	6.3.3	Book Value of Assets Removed from Service	49
	6.4	Mitigating Customer Impacts.....	49
	6.4.1	Service to Group 1 and Group 3 Customers that Still Require Lighting.....	50
	6.4.2	Transition Assistance.....	51
	6.4.3	Summary of Transition Assistance	52
	6.5	Proposed RS 1755 Amendments.....	52
7		BC Hydro's Proposed Electric Tariff Amendment for Back-Billing of Unmetered Service.....	53
	7.1	Background and Need for Electric Tariff Amendments	53
	7.2	BC Hydro's Proposed Electric Tariff Amendments for Back-Billing of Unmetered Service	57
	7.2.1	Under-billing.....	58
	7.2.2	Over-billing	59
	7.3	Jurisdictional Review.....	60
	7.4	Consultation and Engagement.....	60
	7.4.1	Customer Feedback	60
	7.4.2	Influence of Customer Feedback on BC Hydro's Proposals	62
8		BC Hydro's Proposed Electric Tariff Amendment for Mixed Use Loads	63
	8.1	Background and Need for Electric Tariff Amendments	63
	8.2	BC Hydro Proposed Electric Tariff Amendments	67
	8.3	Consultation and Engagement.....	67
9		Other Related Housekeeping Amendments	68
	9.1.1	Consolidation of Special Conditions related to Unmetered Services.....	68
10		Conclusions.....	68

List of Tables

Table 1	Proposed Regulatory Review Process	7
Table 2	Summary of BC Hydro Street Lighting Services.....	11
Table 3	Summary of Canadian Utility Owned and Maintained Street Lighting Service Rates, as of Summer 2020 (\$/Month/Fixture)	16
Table 4	LED Street Lighting Installation Plan – number of street lights replaced per quarter	22
Table 5	Bonbright Assessment of RS 1701 Final Rate Proposal	25
Table 6	Proposed Final RS 1701 Street Light Charges (\$/Month/Light)	28
Table 7	BC Hydro's Proposed RS 1701 Final Rates.....	30
Table 8	Illustrative RS 1701 Final Pricing – Fiscal 2021	32
Table 9	Illustrative RS 1701 Customer Bill Impacts	32
Table 10	RS 1755 Light Counts by Group.....	42
Table 11	Initial Investment Required to Continue RS 1755 Service.....	43
Table 12	RS 1755 Customer Types by Group	45
Table 13	RS 1755 Summary of Recommendations	52

Appendices

Appendix A	Draft Orders
Appendix B	Tariff Sheets - Rate Schedule 1701 - Black-lined and Clean
Appendix C	Tariff Sheets - Rate Schedule 1755 - Black-lined and Clean
Appendix D	Tariff Sheets - Unmetered Services, Mixed Use Loads and other Amendments - Black-lined and Clean
Appendix E	Customer Engagement Materials
Appendix F	LED Street Lighting Pilot Program
Appendix G	BC Hydro's Proposed Final Rate Schedule 1701 Financial Analysis

1 Introduction

BC Hydro is filing this Street Lighting Rates Application (**Application**) with the British Columbia Utilities Commission (**BCUC** or **Commission**) to seek approval and/or consent, as the case may be, pursuant to subsections 58 to 61 of the *Utilities Commission Act* (**UCA**) and subsection 63 of the UCA as follows:

- (i) Approval of amendments to Rate Schedule (**RS**) 1701 – Overhead Street Lighting rate to allow for the provision of this service by way of light emitting diode (**LED**) street lights on an interim and final basis;
- (ii) Consent to rescind RS 1755 – Private Outdoor Lighting (closed) and approval of amendments to RS 1755 to facilitate its rescindment;
- (iii) Approval to waive Service Connection Charges for RS 1755 customers who request a new service for their street light; and
- (iv) Approval of amendments to BC Hydro's Electric Tariff Terms and Conditions (**Electric Tariff**), street lighting and small general service (**SGS**) rate schedules related to the under- and over-billing of unmetered accounts, mixed use loads, as well as housekeeping and other amendments.

1.1 Purpose and Need for Application

Below is a summary of the purpose and need for each item in this application.

1.1.1 Rate Schedule 1701 – Overhead Street Lighting

BC Hydro is preparing to completely replace all existing street lights used to serve customers under RS 1701 with street lights using LED technology as part of its Street Light Replacement Program (**Replacement Program**). BC Hydro is required to remove or replace all equipment, including street lights, that contain Poly-Chlorinated Biphenyls (**PCBs**) by December 31, 2025 pursuant to the Federal [PCB Regulation](#) (**PCB Regulation**). Changes to RS 1701 to allow BC Hydro to

charge for street lighting service provided using LED street lighting are required for BC Hydro to implement the Replacement Program as currently RS 1701 does not include rates applicable to LED lights.

1.1.2 Rate Schedule 1755 – Private Outdoor Lighting (Closed)

Under RS 1755, BC Hydro provides lighting service on private property. Unlike RS 1701, the lights under RS 1755 are generally not affixed to a BC Hydro power distribution pole. This rate schedule and service was introduced in the 1960s and has been closed to new premises since 1975. No changes have been allowed to service under RS 1755 since that time and there are few customers still on the rate schedule. Because of the PCB Regulation, a major capital investment would be required to continue to offer the service given that these lights would need to be replaced. Given this, BC Hydro seeks the BCUC's consent to rescind RS 1755, with removal of lights starting in 2022 and service terminated effective December 31, 2025. To support RS 1755 Customers BC Hydro proposes to waive Service Connection Charges for those who request a new service using a new light.

1.1.3 Electric Tariff Amendments for Back-Billing of Unmetered Services

Street lighting service is generally unmetered. For the most part, this is practical and cost effective because street lights follow a very predictable pattern of daily electricity usage. As a result, estimated electricity use is generally adequate for billing purposes.

For customer owned street light rate schedules, such as RS 1702, the lighting equipment is owned by the customers, and the customer must notify BC Hydro of any changes to the equipment or estimated consumption that could impact the bill. In some cases, customers are not notifying BC Hydro of relevant changes in a timely manner. This can result in the customer being under-billed. The current Electric Tariff terms and conditions are not clear on BC Hydro's ability to collect the full revenue that should be received from the customer if BC Hydro does not get timely

1 and accurate information on relevant equipment or consumption change. This
2 situation impacts rates for all other customers. We are therefore proposing a change
3 to the terms and conditions to require customers to accurately report changes to
4 their equipment or consumption in a timely manner, by clarifying BC Hydro's ability
5 to back-bill the customer to the date of the change. Changes are also proposed
6 regarding the treatment of over-billing that also could result from a customer not
7 notifying BC Hydro of changes in a timely manner.

8 In addition to street lighting services, these changes are also proposed to apply to
9 unmetered services billed under SGS rate schedules, such as those for
10 telecommunications equipment, display signs and signboard lighting.

11 **1.1.4 Electric Tariff Amendments for Mixed Use Loads**

12 With advancements to technology and evolving customer needs, some
13 municipalities are requesting service to mixed use loads that include one or
14 more customer owned street lights, along with other end uses such as public electric
15 vehicle charging, through the same electrical service. The applicable General
16 Service Rate would typically apply to mixed use loads. However, the current Electric
17 Tariff could be interpreted to require that customer owned street lights be separated
18 from the other loads at the same location and billed under RS 1702 or RS 1704 as
19 applicable. This imposes costs and practical challenges on customers and does not
20 align with BC Hydro's goals of encouraging electrification and supporting
21 evolving customer needs. We are therefore proposing a change to the Electric Tariff
22 so mixed use loads that include one or more customer owned street lights or traffic
23 control equipment on a metered basis will be served under the applicable General
24 Service Rate Schedule.

1.2 Legal and Regulatory Context

1.2.1 Legal Context

BC Hydro is seeking approval of a number of amendments to its Electric Tariff pursuant to sections 58 to 61 of the UCA. The rate setting function of the BCUC is governed by sections 58 to 61 of the UCA:

- Section 58 of the UCA addresses the process by which the BCUC is engaged to determine (on its own motion or on application by a public utility or interested person) that existing rates in effect or any rates charged or attempted to be charged for a service by a public utility are unjust, unreasonable, insufficient, unduly discriminatory or in contravention of the UCA, the regulations or any other law. The BCUC may, after a hearing, determine the just, reasonable and sufficient rates to be observed and in force. Pursuant to subsection 58(2), if the BCUC makes such a determination, the BCUC must, by order, set the rates;

- Section 58.1 of the UCA addresses rate rebalancing. Section 58.1(7) states that:

“The Commission may not set rates for a public utility for the purpose of changing the revenue-cost ratio for a class of customers except on application by the public utility.”

As BC Hydro is not applying for rate rebalancing as part of this application this section of the UCA is not applicable to this application;

- Subsections 59(1) to (4) and section 60 inform the BCUC’s decision making and specify the criteria the BCUC is to consider in setting rates. Section 60 also provides for a public utility to have different classes of service;
- Subsection 59(5) specifies the circumstances in which a rate is “unjust” or “unreasonable”;

-
- 1 • Section 61 speaks to the requirement to file rate schedules with the BCUC and
2 specifies that only those rate schedules that have been filed with the BCUC are
3 considered the lawful, enforceable and collectable rates of BC Hydro; and
 - 4 • Subsection 61(2) specifies that a rate schedule filed with the BCUC must not be
5 rescinded or amended without the BCUC's consent.

6 The BCUC has considerable discretion in designing rates under the UCA.

7 Subsection 60(1)(b) provides that in setting a rate under the UCA the BCUC “must
8 have due regard to the setting of a rate that: (i) is not unjust and unreasonable within
9 the meaning of section 59; (ii) provides the public utility for which the rate is set a fair
10 and reasonable return on any expenditure made by it to reduce energy demand; and
11 (iii) encourages public utilities to increase efficiency, reduce costs and enhance
12 performance”.

13 In addition to the Electric Tariff amendments, BC Hydro is seeking consent to waive
14 Service Connection charges set out in section 11.1 of BC Hydro’s Electric Tariff for
15 those RS 1755 customers who require a new Service to install their own outdoor
16 lighting upon the termination of the RS 1755 service. Section 63 of the UCA sets out
17 that a public utility must not, without the consent of the BCUC, charge an amount
18 other than as is set out in its approved tariff sheets, including by providing waivers of
19 charges.

20 For clarity, BC Hydro is not seeking approval of any capital expenditures or the
21 Replacement Program implementation plan as part of the Application or separately.
22 BC Hydro will not file a CPCN application because the Replacement Program is not
23 an “extension” as it is to replace existing street lighting. BC Hydro also will not file an
24 application under section 44.2 of the UCA as the authorized cost estimate for the
25 Program is \$83.3 million, inclusive of all contingencies and reserves, which is below
26 the threshold amount of \$100 million for power system projects established by
27 BC Hydro’s 2018 Capital Filing Guidelines.

1.3 Proposed Regulatory Review Process and Communications

BC Hydro requests BCUC approval of RS 1701, on an interim refundable and collectible basis, effective December 1, 2020. Approval by December 1, 2020 is required to immediately begin installation of LED street lights for spot repairs, commence implementation of the Replacement Program and to allow BC Hydro to bill for LED street lights that it installs. BC Hydro also requests BCUC approval of RS 1701 on a final basis effective May 1, 2021. This timeline will allow for a fulsome regulatory process, while also acknowledging feedback from RS 1701 customers that a decision on final RS 1701 rates as soon as practical is desirable for cost certainty and budgeting purposes.

BC Hydro's proposed RS 1701 includes a number of changes, however only one of these changes will have an immediate and material impact on customer bills; this is the proposed new supplemental charge. In response to customer feedback, BC Hydro proposes that the supplemental charge not take effect until May 1, 2021. This timing allows for examination of BC Hydro's proposal and better aligns with the typical budgeting timelines and processes of RS 1701 customers.

BC Hydro requests that in all cases, amendments to RS 1701 be effective the first day of the month for billing purposes. RS 1701 customers are billed on a monthly basis, and having changes take effect the first of the month minimizes the complexity of the first bill following BCUC approval of amendments.

In this application BC Hydro also requests approval of amendments to RS 1755, to reflect that the rate will be terminated in future and to reflect amendments required to facilitate that termination. BC Hydro will commence removing RS 1755 lights in 2022.

Finally, in this application BC Hydro also requests approval of Electric Tariff amendments for unmetered services and mixed-use loads. These amendments are

not contentious, and their approval will improve customer service and billing accuracy.

[Table 1](#) below outlines a proposed schedule for this process. BC Hydro believes that a written regulatory process with one round of IRs is sufficient for the BCUC to review the Application and make its determination and will provide interveners and interested parties sufficient opportunity to provide their input.

Table 1 Proposed Regulatory Review Process

Process	Date
Filing of Application	November 12, 2020
Effective Date of Rate Schedule 1701 Approved on an Interim Basis	December 1, 2020
BCUC and intervener information requests	December 23, 2020
BC Hydro responses to information requests	February 1, 2021
BC Hydro Final Argument	February 15, 2021
Intervener Final Argument	February 29, 2021
BC Hydro Reply Argument	March 15, 2021
BCUC Decision	April 26, 2021

All communications regarding this proceeding should be addressed to:

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1.4 Orders Sought

BC Hydro seeks orders from the BCUC as follows:

1. Approval of RS 1701 on an Interim Refundable and Collectible Basis:

BC Hydro seeks approval of RS 1701 LED rates, on an interim, refundable and collectible basis, effective December 1, 2020. RS 1701 is proposed to include

the following changes, all of which are proposed to take effect December 1, 2020 with the exception of the temporary supplemental charge to take effect May 1, 2021:

- ▶ Changes to the Street Lighting Service Rates to reflect the new LED lighting fixtures;
- ▶ A temporary supplemental charge to recover the undepreciated value of the existing lights that are being removed before the end of their useful life to take effect May 1, 2021;
- ▶ Housekeeping and other Amendments as follows and as further described in section [5.4](#):
 - To clarify that High Pressure Sodium (**HPS**) fixtures are no longer available for new installations;
 - To allow BC Hydro to recover the undepreciated value and removal costs of the LED fixtures if they are removed by BC Hydro because a customer has failed to comply with the Service Agreement, and if a customer requests the removal of the LED fixtures for any reason before they are fully depreciated;
 - To provide an exclusion for the recovery of the undepreciated value and removal costs for customers that request termination of lighting service following a change in account holder for the Premises;
 - To remove the reference to lamps since LED luminaires do not contain lamps;
 - To provide better clarity on BC Hydro's rights and obligations when it decides to terminate the service;
 - To allow for the availability of service to illuminate private property with certain limitations;

-
- 1 ▪ To provide that BC Hydro has sole discretion to determine what
2 constitutes a suitable overhead distribution line in the applicability
3 provision of RS 1701; and
- 4 ▪ To clarify that BC Hydro is not responsible for the customer's selection of
5 lighting technology and that BC Hydro is responsible for vegetation
6 maintenance only for the purpose of maintaining reliable electricity
7 service.
- 8 2. **Approval of RS 1701 on a Final Basis:** BC Hydro seeks approval from the
9 BCUC of RS 1701 on a Final Basis effective May 1, 2021.
- 10 3. **Amended RS 1755 and its Rescindment:** BC Hydro is seeking the following:
- 11 ▶ Consent from the BCUC to rescind RS 1755 as of December 31, 2025.
12 BC Hydro will remove all installed BC Hydro equipment, or transition
13 customers to ensure that no BC Hydro owned equipment remains installed
14 and no billing is required under this rate schedule by the termination date;
- 15 ▶ Consent to waive the Service Connection Charge for RS 1755 Group 1 and
16 Group 3 Customers who request a new Service for their light; and
- 17 ▶ Amendment to RS 1755 to specify the termination date of
18 December 31, 2025, and to specify migration of service to RS 1701
19 customers, if applicable, and removal of BC Hydro equipment.
- 20 4. **Electric Tariff Amendments for Back-Billing of Unmetered Services:**
21 BC Hydro seeks approval of the following amendments to section 5.7 of the
22 Electric Tariff in situations when under-billing or over-billing is caused by a
23 customer's delayed or inaccurate notification of the addition, removal or
24 alteration of unmetered street lights or equipment:
- 25 ▶ Clarify that under-billed amounts can be recovered to the date of an addition
26 or change to an unmetered service;

-
- ▶ Enable the application of interest to under-billed amounts resulting from a customer's delayed or incorrect notification of the addition or alteration of unmetered street lights or equipment, after a period of six months; and
 - ▶ Limit the application of credits to be applied to over-billed amounts to a period no longer than six months prior to the customer notifying BC Hydro of changes.

5. **Electric Tariff Amendments for Mixed Use Loads:** BC Hydro seeks approval of amendments to the Electric Tariff to implement General Service for mixed use loads:

- ▶ Amend section 1 Definition of General Service to remove the language that General Service is not available for use in circumstances where Street Lighting Service is available for use;
- ▶ Add new section 6.1.5 General Service for Street Lighting to indicate that General Service will be provided to mixed uses in cases where the customer chooses to connect other mixed uses through the same service connection as lighting use on a metered basis; and
- ▶ Amend RS 1702 and RS 1704 Special Conditions to clarify that these rate schedules do not apply in the case of mixed uses.

6. **General Housekeeping Items:** BC Hydro seeks approval of housekeeping amendments to section 5 of the Electric Tariff as well as SGS rate schedules 1234, 1300, 1301, 1310 and 1311; RS 1702 - Public Area Ornamental Street Lighting; and RS 1704 – Traffic Control Equipment to improve clarity and alignment with business practices.

Draft forms of the interim and final orders sought by BC Hydro are included in Appendix A. The draft orders reflect the proposed Electric Tariff amendments as described in the Application and as reflected in the revised Electric Tariff pages attached as follows:

-
- 1 • Appendix B Rate Schedule 1701 Black-lined and Clean;
 - 2 • Appendix C Tariff Sheets - Rate Schedule 1755 Black-lined and Clean, and
 - 3 • Appendix D Tariff Sheets - Unmetered Services, Mixed Use Loads and other
 - 4 Amendments Black-lined and Clean.

5 **2 BC Hydro Street Light Services**

6 BC Hydro supplies electricity to over 350,000 street lights across our service
 7 territory. Service is provided under the following rate schedules.

8 **Table 2 Summary of BC Hydro Street Lighting**
 9 **Services**

Service	Owned and Maintained by	Available for	Actual Revenue in F2020 (\$ million)
Rate Schedule 1701 – Overhead Street Lighting	BC Hydro owns lights and poles	Lighting of public highways, streets and lanes	20.84
Rate Schedule 1755 – Private Outdoor Lighting (Closed)	BC Hydro owns lights, in most cases customer owns poles	Outdoor lighting service to private property	1.26
Rate Schedule 1702 – Public Area Ornamental Street Lighting	Customer owns light and poles	Lighting public highways, streets and lanes and municipal pathways and for public area seasonal lighting displays	15.55
Rate Schedule 1703 – Street Light Service (Closed)	Customer owns lights, BC Hydro owns poles	Lighting of public highways, streets and lanes. Only available to selected customers.	1.05
Rate Schedule 1704 – Traffic Control Service	Customer owns lights and poles	Lighting of traffic signals, traffic signs and traffic warning devices, and other equipment for controlling or directing vehicular or pedestrian traffic	1.50

3 Background and Need for RS 1701 Changes

3.1 Background

BC Hydro owns and maintains approximately 90,000 street lights that illuminate roadways across the province; the majority of these are high-pressure sodium (**HPS**) while some are Mercury Vapour (**MV**). Service for this street lighting is provided under RS 1701. There are 373 customers served under RS 1701, located across our service territory including our Non-Integrated Areas. Customers are primarily comprised of municipalities, regional districts, government ministries and First Nation Communities. In some cases, municipalities also own and operate their own fleet of street lights under RS 1702 in addition to having BC Hydro's street lights.

For fiscal 2020, monthly RS 1701 customer bills ranged from approximately \$147,000 to \$20, with an average of ~\$4,700 and a median of ~\$800. Actual bill values are dependent upon the actual quantities of the various types and wattages of street lights associated with a customer. The median number of street lights for an RS 1701 customer is 41 street lights. Forty per cent of these customers have fewer than 25 and two-thirds have fewer than 100 RS 1701 street lights. Approximately 6 per cent or 22 municipalities have over 1,000 lights each.

BC Hydro leases these street lights to customers at an all-inclusive, unmetered monthly rate. The rate is applicable only in areas where there is suitable existing BC Hydro infrastructure. The street lights are installed on BC Hydro's existing power poles and, in most cases, connected directly to the existing secondary electrical service on the pole to which the street light is attached. The rate is a fixed monthly charge that varies by lighting technology and wattage. Street Lights are photocell controlled, turning on at dusk and off at dawn. Electricity consumption is not metered.

1 The total actual revenue from RS 1701 was \$20.84 million dollars in fiscal 2020.
2 BC Hydro does not expect a substantial change in the number of customers and
3 lights served under RS 1701 over the next 20 years.

4 BC Hydro has offered service under RS 1701 since 1964. In 1989 the availability of
5 MV fixtures under RS 1701 was closed when BC Hydro undertook a program to
6 replace MV fixtures with HPS lights. Rates were not adjusted at this time. These
7 changes were approved by the BCUC Order No. G-10-89.

8 As part of its 2015 Rate Design Application (**2015 RDA**), BC Hydro committed to
9 seeking approval of LED street lighting rates under RS 1701. In the 2015 RDA,
10 BC Hydro also committed to review the monthly contact charge under RS 1703;
11 Street Lighting Service under which the customer owns lights on BC Hydro owned
12 poles. BC Hydro believes that the contact charge remains sufficient to recover its
13 costs associated with this service and no amendments are proposed to the contact
14 charge under RS 1703 in the Application.

15 **3.2 Federal PCB Regulation and Ongoing Technological Changes**

16 BC Hydro is required to remove or replace all street lights that contain PCBs by the
17 Federal [PCB Regulation](#) (SOR/2008-273).¹ The PCB Regulation originally came into
18 effect on September 5, 2008 and the most recent amendments came into effect on
19 January 1, 2015. The stated purpose of the PCB Regulation is to protect the health
20 of Canadians and the environment by preventing the release of PCBs by
21 phasing-out the use of these substances in Canada. Included in the PCB Regulation
22 is a requirement to remove light ballasts that were in-use on September 5, 2008,
23 containing PCBs in a concentration of 50 mg/kg or more, by December 31, 2025.

24 BC Hydro does not have conclusive records that indicate which light ballasts that are
25 part of the street lights it provides to customers taking service under RS 1701 may

¹ <https://laws-lois.justice.gc.ca/eng/regulations/SOR-2008-273/index.html>.

1 contain PCBs at concentrations of 50 mg/kg or higher. Testing of all such street
2 lights would not be cost-effective. HPS technology is expected to become more
3 expensive as suppliers continue to shift production lines to LED technology. It is
4 expected that sourcing of replacement HPS street lights and lamps will become
5 difficult in the next five to 10 years. As part of the Replacement Program four
6 alternatives to meet the PCB Regulation were evaluated. The evaluation is
7 summarized in section 4 below and identifies that proactive replacement of
8 BC Hydro's street lights with LED technology is the most cost-effective option to be
9 compliant with the regulation and meet customer expectations. As a result, we will
10 be removing or replacing all BC Hydro owned street lights by December 31, 2025.
11 LED street lights do not have ballasts or contain any component that contains PCBs,
12 and LED street lights will be the only street lights offered under RS 1701 following
13 completion of the Replacement Program.

14 **3.3 Customer Feedback, Consultation and Engagement**

15 BC Hydro has been discussing LED street lighting with customers for many years. In
16 addition to individual customer meetings, municipal customers have requested
17 meetings with BC Hydro at the Union of BC Municipalities (**UBCM**) annual meetings
18 to discuss LED street lighting every year since 2014.

19 Municipal customers have expressed a high level of interest in the conversion of
20 BC Hydro owned street lights to LED technology for better lighting quality and
21 expected electricity bill savings.

22 At the 2019 UBCM annual meeting, municipalities passed resolution B33² urging the
23 provincial government "to require BC Hydro to expeditiously replace all street lights
24 within BC municipalities with LED technology, or provide municipalities with the

² UBCM 2019 Resolutions Book, available at:
<https://www.ubcm.ca/assets/Resolutions~and~Policy/Resolutions/2019%20UBCM%20Resolutions%20Book.pdf>, at page 122.

1 financial resources necessary to continue paying for the operation of its inefficient
2 street lights”.

3 BC Hydro hosted a virtual rate design engagement session on August 12, 2020.
4 Over 170 customers and other interested parties participated. Slides are included as
5 Appendix E. Customers raised questions around the themes of LED light
6 specifications, deployment logistics, Replacement Program costs and savings
7 calculations and the proposed supplemental charge. BC Hydro sought feedback on
8 aspects of the proposed RS 1701 rate design after the session. Twenty-six complete
9 feedback forms were received after the session. The feedback form and the
10 feedback summary report are included in Appendix E. Customer feedback was
11 incorporated into various elements of the RS 1701 rate design as well as the
12 Replacement Program deployment and customer communications plans.

13 **3.4 Jurisdiction Review**

14 Most Canadian electricity utilities, including Manitoba Hydro, Hydro Quebec,
15 SaskPower, and Nova Scotia Power are converting their street lights to LED. The
16 main learnings from a review of these utility programs are:

- 17 • For the most part, street light rates are similar before and after LED conversion.
18 For example, Hydro Quebec’s 100 watt HPS street light rate is
19 24.51 \$/month/light, and their equivalent LED light rate is 23.19 \$/month/light.
20 This outcome reflects the fact that generally, capital and installation cost are
21 offsetting the value of electricity and maintenance savings of LED;
- 22 • To manage deployment costs, SaskPower applies a uniform rate to all lamps
23 that have equivalent wattage, in other words, customers pay the same charge
24 for lumen equivalent HPS and LED street lights. This approach may reduce rate
25 and billing complexity, and improve the efficiency of the deployment by
26 reducing the potential for competition among customers for a spot in the
27 deployment schedule based on potential rate impacts; and

- Canadian utilities are generally retaining photocell control technology for street lights, while a few U.S. utilities (e.g., San Diego Gas and Electric) have installed advanced controllers. Advanced controllers offer functionality such as dimming, outage notifications, consumption measurement, location identifications and potentially a variety of sensor functionalities. The cost of advanced controllers is limiting their widespread adoption.

For comparison purposes, shown below are the rates in 2020 for a selection of electric utility owned street light services, for the 100 watt HPS and equivalent LED. In most cases, equivalent LED rates are slightly lower than HPS rates.

Table 3 Summary of Canadian Utility Owned and Maintained Street Lighting Service Rates, as of Summer 2020 (\$/Month/Fixture)

Luminaire Type	Manitoba Hydro	Hydro Quebec	Newfoundland Power	Newfoundland & Labrador Hydro	Sask Power	Nova Scotia Power	New Brunswick Power
HPS							
100W	11.58	24.51	17.89	17.89	13.75	15.45	14.92
LED (HPS Equivalent Wattages)							
100W	10.13	23.19	16.20	16.20	13.75	9.6 to 10.08	13.73

3.5 LED Pilot Studies

With approximately 90,000 street lights to replace, it is important that the appropriate street lighting components are selected and installed. BC Hydro needs to ensure the lights can last for the 20-year life expectancy to minimize the future costs associated with street light repair or replacement. Further, there has been media coverage about perceived inadequacies of LED street lighting. Given this context, BC Hydro undertook two pilot studies to better understand these issues, inform LED purchase specifications, and to help inform customers in their selection of appropriate street lights for each location

1 In 2016 and 2017, BC Hydro installed 195 LED street lights as part of its LED pilot
2 studies. These pilot studies were conducted in the municipality of Richmond and in
3 Haida Gwaii (Port Clements, Queen Charlotte City, Village of Masset, Skidegate).
4 The purpose of the pilots was to assess:

- 5 • Meeting the requirements of applicable standards;
- 6 • LED performance compared to HPS luminaires;
- 7 • Performance compared to other LED products;
- 8 • Field measurements to evaluate light quality of HPS and LED luminaires,
9 specifically: illumination level, light uniformity, colour temperature, flicker, glare,
10 and light trespass;
- 11 • Laboratory measurements, specifically: power quality including harmonics, and
12 power consumption of LEDs;
- 13 • Crew feedback regarding ease of installation, ease of cleaning the luminaire
14 and replacing the components, build-up of dirt/ debris in the luminaire; and
- 15 • The number of luminaires that break, burn out or fail.

16 Based on the lighting measurements, the LED luminaires exceeded the performance
17 of the HPS luminaires by reducing the maximum illuminance while still meeting
18 average illuminance requirements and improving uniformity. However, LED
19 luminaires have a stark light cut off between illuminated and non-illuminated areas,
20 whereas HPS luminaires have a fading light cut off, and this can create a noticeable
21 pattern of light and dark where the pole spacing is not optimal for LED luminaires.

22 LED luminaires demonstrated improved power quality characteristics. LED
23 luminaires greatly exceed minimum power factor requirements (above 99 per cent)
24 and were below maximum harmonic current emission limits. The 100W HPS
25 luminaire was below the minimum power factor of 90 per cent during start up but

1 eventually leveled off above 99 per cent. HPS luminaires were within maximum
2 harmonic current emission limits, however HPS luminaires produce significantly
3 higher third harmonic currents than LED luminaires.

4 LED luminaires used 29 per cent to 65 per cent less energy than HPS luminaires,
5 based on the power specified by the manufacturer.

6 The field trials recommended that BC Hydro proceed with replacing existing street
7 lights with LED luminaires, and recommended a number of requirements to include
8 in the specifications for the LED luminaires, such as:

- 9 • Provide options for different colour temperature 3000k and 4000k luminaires -
10 3000 kelvin (warmer) and 4000 kelvin (cooler);
- 11 • Include electromagnetic compatibility requirements as per CSA 61000³;
- 12 • Require a minimum 10-year warranty on the LED luminaire; and
- 13 • Require luminaires to be within 5 per cent of the specified wattage

14 The pilot also included analysis and testing of adaptive controls. Adaptive controls
15 allow for centralized energy management (e.g., remotely turning on, off, and
16 dimming individual lights), data collection (e.g., logging of power and energy
17 consumption), and communication data. Various adaptive control technologies were
18 tested and while the potential for energy savings were verified a number of technical
19 and practical limitations for the application to the BC Hydro owned street light
20 network were noted. BC Hydro decided not to include adaptive controls in the
21 Replacement Program due to the findings of the pilot and due to their costs.

22 The LED pilot street lighting plans and the full Engineering Technical Reports are
23 included in Appendix F.

³ <https://www.scc.ca/en/standardsdb/standards/29287>.

4 RS 1701 LED Street Light Replacement Program

In order to ensure compliance with the Federal PCB regulation BC Hydro considered four alternatives and evaluated them using a structured decision-making process.

The four alternatives included:

- Status quo –replacement of failed street lights with new HPS lights as failure occurs;
- Reactive replacement of failed street lights or street lights that may contain PCBs with new HPS street lights;
- Reactive replacement of failed street lights with LED lights; and
- Proactive replacement of the existing fleet of street lights with new LED lights.

The proactive model of converting BC Hydro's existing fleet of street lights was identified as the best alternative based upon regulatory compliance, financial, and reputational considerations.

Current industry trends are expected to result in a complete replacement of older technology street lights such as HPS with LEDs throughout much of the world within the next few years. As demonstrated by the pilot studies describe in section [3.5](#), BC Hydro has been examining LED street light technologies for the past few years. The LED street lights to be installed are expected to use less energy than is consumed in an HPS light for the same light output and properly selected LED street lights can provide better colour rendering with better light control so that the light is concentrated on the area where it is needed. In addition, LED maintenance costs are lower than conventional lighting since there is no bulb or lamp to be replaced on a regular basis, which requires regular attendance at the street light. Where failure of the LED street light occurs, the entire luminaire must be replaced. While this has a higher cost than re-lamping the street light, failures are expected to be much less frequent thus requires less labour costs.

1 However, replacing BC Hydro's existing HPS and MV street lights with LED
2 technology under the Replacement Program will be capital intensive because:

- 3 (i) The LED street lights have high up-front costs associated with their
4 procurement and installation by workers who are qualified to work on
5 equipment that is connected to BC Hydro's distribution system at live secondary
6 voltage and following rigorous safety protocols;
- 7 (ii) BC Hydro owned street lights are located throughout the province in diverse
8 and often remote locations where qualified crews or contractors are not based;
9 and
- 10 (iii) There are costs associated with coordinating with hundreds of customers to
11 confirm LED light selections and the installation logistics.

12 The Program conducted a multi-phased procurement process to identify the
13 luminaires and photocell supplier. To support the installation of LED street lights
14 across the province, BC Hydro also conducted multiple procurement events to
15 obtain regional installation services contractors.

16 **4.1 RS 1701 LED Installation Plan**

17 BC Hydro plans to convert the street lights to LEDs using several installation
18 contractors plus internal field crews who will be working in parallel in multiple regions
19 across the province. BC Hydro's street lighting customers are responsible for their
20 lighting design and ensuring adequate lighting levels. Therefore, a process was
21 developed whereby BC Hydro's customers will select the type of LED to be installed
22 in each location and will also identify any lights that should be removed or modified
23 (e.g., change in light wattage, arm length or orientation) as well as locations where
24 new lights should be added. Customers will have the ability to select from a number
25 of lights, with the initial offering of four wattages and two colour temperature options.
26 The Program will use customer selection information about each street light location,

received in advance to refine the installation schedule, forecast material orders as well as scheduling installation crews. The field work consists of:

- Converting approximately 90,000 street lights allocated under Schedule 1701 that are split into five regions and 65 districts including 11 non-integrated areas; and
- Converting approximately 370 lights under RS 1755 Group 2, as further described in section [6.3.1](#)

[Table 4](#) below shows the preliminary installation schedule and provides information about the number of street lights planned for conversion in each region by fiscal quarter. BC Hydro plans to start the deployment in December 2020 and will ramp up the monthly conversion volumes over the following quarters. The peak program installation volumes are planned for around fiscal 2022, quarter 1 to fiscal 2023, quarter 3, with a ramp-down period from fiscal 2023, quarter 4 to fiscal 2024, quarter 1.

Table 4 LED Street Lighting Installation Plan – number of street lights replaced per quarter

Region	Q3F21	Q4F21	Q1F22	Q2F22	Q3F22	Q4F22	Q1F23	Q2F23	Q3F23	Q4F23	Q1F24
Lower Mainland North	-	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	750	-
Lower Mainland South	-	1,600	2,400	2,400	2,400	2,400	4,800	4,600	3,300	750	-
Vancouver Island	1,250	2,800	5,000	4,800	3,200	3,200	1,500	-	-	-	-
North Interior	400	550	-	-	-	-	2,900	4,400	3,000	3,200	3,150
South Interior	800	3,200	3,700	4,300	2,300	2,200	-	-	-	-	-
Total	2,450	9,350	12,300	12,700	9,100	9,000	10,400	10,200	7,500	4,700	3,150

5 BC Hydro's Proposed RS 1701 LED Rate

BC Hydro requests that its proposed RS 1701, as set out in [Table 6](#) below and provided in Appendix B be approved on an interim refundable and collectible basis effective December 1, 2020, and that it be approved on a final basis effective May 1, 2021.

5.1 Rate Design Principles

The intent of the proposed RS 1701 rates is to update RS 1701 pricing to reflect the expected costs and benefits of the Replacement Program. The proposed RS 1701 rates are not designed with the intention of developing a new class of service, undertaking rate rebalancing, or changing the extent to which RS 1701 revenues recover BC Hydro costs that are unrelated to the Replacement Program.

Electric utility rate design is guided by a well-established set of principles referred to as the Bonbright criteria. In its decision concerning BC Hydro's 2008 Residential Inclining Block Rate Application, the BCUC found Bonbright's eight rate design criteria to be consistent with the UCA test of 'fair, just and not unduly discriminatory' and that they form an appropriate foundation for evaluating rate designs.

Consistent with the approach taken in the 2015 RDA, BC Hydro has assessed all eight Bonbright Criteria in the development of the RS 1701 rate. These eight criteria can be broadly grouped in four groupings as follows:

1. Economic Efficiency – price signals that encourage efficient use and discourage inefficient use;
2. Fairness – fair apportionment of costs among customers, no undue discrimination;
3. Practicality – customer understanding and acceptance, practical and cost effective to implement; and

4. Stability – revenue and rate stability.

The first Bonbright grouping is economic efficiency. Economic efficiency is commonly interpreted as a measure of how well the rate design reflects marginal costs. As further discussed in section [5.2](#), the proposed new rate was calculated in consideration of the marginal value of energy and the peak demand savings associated with the conversion to LED technology. BC Hydro therefore considers the new rate to perform well on the economic efficiency criteria.

The second Bonbright grouping is Fairness. Fairness, in the regulatory context, refers to how closely costs are recovered from those customers that cause the cost to arise. In the context of this rate application the Bonbright fairness criteria are illustrated by noting that the capital costs for the LED technology are for service only to BC Hydro owned street light customers under RS 1701. This is different from most other BC Hydro costs, such as transmission line investments which are for service to multiple different types of customers. As the LED investment is for service to RS 1701 customers only, the Bonbright fairness principle implies that the costs associated with it should be recovered from RS 1701 customers. Similarly, to the extent that the LED program results in savings, due for example to reduced maintenance and energy use, the Bonbright fairness criteria implies that RS 1701 rates should be reduced by the amount of those savings. As further described in section [5.2](#), we have applied the Bonbright fairness criteria in our rate design, and as such we view the new rates as performing very well on this Bonbright criteria.

The third Bonbright grouping is practicality. This criterion refers to how easy the rate is for customer to understand, and for the utility to implement. As the street light rate will be a simple fixed monthly charge, we view it performing well on practicality.

The fourth Bonbright criteria is stability. This criterion refers to how volatile or stable customer bills and BC Hydro's revenues are under the rate. The new rate we are proposing uses average annual costs and savings and is stable, changing only

by the amount of any approved general rate increases or decreases. In that regards stability is very good. However, as further described in section [5.2.2](#), a temporary supplemental charge will apply during the Replacement Program installation period, and when that charge ends there will be a change in the rate and revenue, so on an overall basis we assess the rate as good on stability.

**Table 5 Bonbright Assessment of RS 1701
Final Rate Proposal**

Bonbright Criteria	Grouping	Performance	Remarks
1. Price signals to encourage efficient use and discourage inefficient use	Economic Efficiency	Good	The marginal value of electric energy and capacity related savings are reflected in the RS 1701 rate
2. Fair apportionment of costs among customers	Fairness	Very Good	Savings, and costs associated with the LED conversion are reflected in the proposed new rate
3. Avoid undue discrimination			
4. Customer understanding and acceptance; practical and cost effective to implement	Practicality	Good/Fair	The proposed rate is easy to understand and practical to administer. The proposed rate results in a temporary bill increase which may not align with customer expectations
5. Freedom from controversies as to proper interpretation			
6. Recovery of the revenue requirement	Stability	Good	The only element of the rate that changes is the supplemental charge – this temporary charge ends when deployment completes. Otherwise the rate will be stable over time, changing only with general rate increases or decreases
7. Revenue stability			
8. Rate stability			

5.2 Rate Design Approach

There are two main components to the proposed pricing: the street light charge and the supplemental charge. To calculate the street light charge, BC Hydro used marginal cost analysis, adjusting the total revenue from RS 1701 by the amount of any increases or decreases in costs due to the Replacement Program. Cost increases arise from the amortization of one-time Replacement Program capital and installation costs. Savings arise from reduced maintenance and electricity savings. This approach applies the Bonbright fairness criteria by ensuring that the costs and benefits of the Replacement Program are contained to RS 1701 customers, without changing the extent to which RS 1701 revenues recover BC Hydro costs that are unrelated to Replacement Program. The outcome of the marginal cost analysis is an updated revenue estimate for RS 1701. Rates and pricing were then calculated by allocating the updated revenue estimate to the different LED wattage group based on their different capital costs and electricity usage.

In addition, a supplemental charge also applies during the Replacement Program installation period. The supplemental charge is a temporary charge intended to recover the undepreciated value of HPS lights that are being removed before their end of life. The total value of the undepreciated lights was allocated to street lights based on the count of luminaires, and a simple fixed monthly charge per light was estimated. This temporary supplemental charge ends when costs are fully recovered.

5.2.1 Calculation of the Street Light Charge

The revenue required from RS 1701 customers was calculated by adjusting the revenue in the absence of the Replacement Program for the financial benefits (annual electricity and maintenance cost savings) and direct related costs (capital related amortization cost of LEDs and unrecovered depreciation cost of HPS) to BC Hydro as a result of the Replacement Program. The financial benefits and costs

to BC Hydro of the Replacement Program are summarized below and additional details are included in Appendix G.

1. Electricity Savings:

As described in section [3.5](#), LED street lights use less energy than the existing HPS street lights. BC Hydro estimates that the energy savings resulting from the Replacement Program will be approximately 28 GWh/year after it is fully implemented. These savings are valued at BC Hydro's marginal cost of energy, which is approximated by the wholesale market price, at an average \$1.1 million per year.

As street lights are on during BC Hydro's system peak period, there will also be capacity savings associated with the Replacement Program. BC Hydro estimates the capacity savings to be 6.7 MW once the program is fully implemented. These savings are valued at BC Hydro's long run marginal cost of generation capacity and bulk transmission, and our marginal costs for non-bulk transmission and for distribution, also totaling \$1.1 million per year.

2. Maintenance savings:

Relative to HPS light bulbs, a longer lifespan and lower failure rate of LEDs result in the reduction of operation and maintenance cost. The average value of these savings is estimated to be \$1.2 million per year.

3. Replacement Program Capital Costs:

The total one-time investment costs of the Replacement Program are expected to be \$3 million per year after the Replacement Program is fully implemented, including capital cost amortization (installation labour, assets and costs to facilitate the roll-out) over 20 years and dismantling.

The net sum of the benefits and costs is then calculated for each year of the 20-year expected life period for the LED luminaires. This net sum of Replacement Program

benefits and costs are added to RS 1701 revenues to develop a new RS 1701 revenue estimate for each year, under an assumption that approved annual rate increases will approximately match expected inflation over this period. The total revenue over this period is then equated to a billing revenue stream such that the average RS 1701 rate recovers the new RS 1701 revenue estimate. Total costs were allocated to the four wattage categories of lights based on the differences in costs between the luminaires and differences in the amount of electricity consumed as discussed in Appendix G. The resulting street light rate charge by wattage category is shown below for fiscal 2021.

Table 6 Proposed Final RS 1701 Street Light Charges (\$/Month/Light)

	Average	< 51 Watts	51-80 Watts	81-120 Watts	> 120 Watts
Street Light Charge	20.66	15.08	18.77	23.50	27.57

5.2.2 Calculation of the Temporary Supplemental Charge

The early retirement of existing street lights results in unrecovered depreciation for those assets that are removed before the end of their service life; specifically, the light fixtures. As these street lights are replaced by LEDs, the remaining Net Book Value of the replaced street light needs to be written off. In order to contain this write-off within RS 1701 (i.e., and not paid for by other ratepayers), BC Hydro is proposing that a temporary supplemental charge be included in the rate schedule. Based on the Net Book Value of existing street lights to be replaced with LED lights as of November 1, 2020 and considering on-going depreciation from then until the Replacement Program is complete, it is estimated that a total \$6.55 million unrecovered depreciation of existing street lights needs to be recovered through the supplemental charge.

Under International Financial Reporting Standards (**IFRS**; the accounting rules followed by BC Hydro), the undepreciated value of the existing street lights that are removed before end-of-life must be recorded as an expense on BC Hydro's income

statement in the year the street light is replaced. BC Hydro is proposing that a monthly supplemental charge be applied in the fiscal years in which the Replacement Program is undertaken, to approximately align the recovery of the supplemental charge with the removal of the undepreciated assets from service.

The proposed supplemental charge is in accordance with the Bonbright fairness criteria because BC Hydro's proposal would recover these costs only from RS 1701 customers through a supplemental charge that applies during the period in which these costs are incurred. BC Hydro calculated the supplemental charge as a fixed charge per month per light (see section [5.3.2](#)).

The supplemental charge is calculated as \$2.06 /month/street light and is proposed to be in effect from May 1, 2021 to March 31, 2024 (35 months).

5.3 Proposed Pricing

Shown below is BC Hydro's proposed Final RS 1701 LED pricing, for F2021 as compared to approved pricing for HPS and MV street lights. Further information regarding how the pricing was developed is included in Appendix G. The fiscal 2021 rates shown in Table 7 exclude any impact from the Fiscal 2020 to Fiscal 2021 Revenue Requirements Application compliance filing, which will set the final fiscal 2021 rates. In addition, the supplemental charge is not proposed to be initiated until fiscal 2022 hence the effective rates shown on line 11 will be affected by approval of general rate changes related to BC Hydro's revenue requirements applications. The average LED rate shown on line 9 is slightly lower than the equivalent approved HPS rate shown on line 2.

1

Table 7 BC Hydro's Proposed RS 1701 Final Rates

		1	2	3	4	5
1	HP Sodium (HPS) Unit	Weighted Average		100 W	150 W	200 W
2	F2021 Approved HPS Rate (\$/month)	21.08 \$/month		19.40 \$/month	23.14 \$/month	26.72 \$/month
3	Mercury Vapour (MV) Unit			175 W	250 W	400 W
4	F2021 Approved MV Rate (\$/month)	22.88 \$/month		21.32 \$/month	24.57 \$/month	31.67 \$/month
8	LED Unit		< 51 W	51 - 80 W	81 - 120 W	> 120 W
9	F2021 LED Rate (\$/month)	20.66 \$/month	15.08 \$/month	18.77 \$/month	23.50 \$/month	27.57 \$/month
10	LED Supplemental Charge (\$/month)	2.06 \$/month	2.06 \$/month	2.06 \$/month	2.06 \$/month	2.06 \$/month
11	F2021 LED Rate plus Supplemental Charge (\$/month)	22.72 \$/month	17.14 \$/month	20.83 \$/month	25.56 \$/month	29.63 \$/month

2 BC Hydro proposes four wattage groups for the new LED street light rates: 50 watts
 3 or less, 51 to 80 watt, 81 to 120 watt and greater than 120 watts. HPS and MV street
 4 lights have fixed industry standard wattages that are available in the market. LED
 5 street lights, however, do not have industry standard wattages and vendors continue
 6 to improve the efficiency of LED products. Equivalent lighting output products could
 7 require less energy in the future. To avoid constant updates to the RS 1701 rate, we
 8 propose wattage ranges for four-level lighting outputs for regulatory efficiency. The
 9 proposed rates for each of the wattage groups of LED street lights for fiscal 2021 are
 10 shown on line 9.

11 The proposed supplemental charge for RS 1701 is shown on line 10 and increases
 12 the effective rate as shown on line 11.

The rates are designed as postage stamp, so that the same rates apply to all RS 1701 customers in all areas of BC Hydro's service area including the non-integrated area.

5.3.1 Bill Impacts

[Table 8](#) shows illustrative pricing for a RS 1701 for a customer that currently has HPS street lights. The table shows pricing by wattage group. Column 1 shows the wattage groups. Currently there are three wattage groups – 100 watts, 150 watts, and 200 watts. Upon converting to LED technology there will be four wattage groups:

- 50 watts or less (which is equivalent to the current 100-watt (flat-lens) HPS light);
- 51 to 80 watts (which is equivalent to the current 100-watt (drop-lens) HPS light);
- 81 to 120 watts (which is equivalent to the current 150-watt HPS light), and
- Greater than 120 watts (which is equivalent to the current 200-watt HPS light).

Column 2 shows the current pricing. Following that is the illustrative new pricing, based on the results presented in section [5.3](#). The effective rate the customer will pay from April 1, 2021 to the end of the Replacement Program installation schedule is shown in column 5 and is the sum of the street light charge (column 3) and the supplemental charge (column 4), shown in the far-right column. For a given wattage group, the effective rate during deployment is approximately 7.6 per cent higher than the current rate, due primarily to the supplemental charge.

After the Replacement Program completes, the supplemental charge ends and the rate drops down to a level close to today's rate, shown on line 9 of [Table 7](#).

Table 8 Illustrative RS 1701 Final Pricing – Fiscal 2021

1	2	3	4	5
Street Light Type/Wattage	Current Pricing	Illustrative New Pricing		
		Street Light Charge	Temporary Supplemental Charge	Effective Charge with Supplemental Charge
LED 50 W or less	n/a	15.08	2.06	17.14
HPS 100 W	19.40	18.77	2.06	20.83
LED 51 W – 80 W	n/a			
HPS 150 W	23.14	23.50	2.06	25.56
LED 81 W– 120 W	n/a			
HPS 200 W	26.72	27.57	2.06	29.63
LED >120 W	n/a			

[Table 9](#) below shows bill impact for three customer scenarios. As shown, a customer with 54 lights who completes a like for like replacement will have a bill of \$1,120 per month prior to deployment, and \$1,201 per month during deployment for a bill increase of approximately \$81 per month. However, after deployment completes, the supplemental charge ends, and the bill drops back down \$1,090 per month, which is slightly lower than the current bill.

Table 9 Illustrative RS 1701 Customer Bill Impacts

Time		Customer 1	Customer 2	Customer 3
	Number of Lights	10	54	758
Today	Current Bill	\$212 / mo.	\$1,120 / mo.	\$15,805 / mo.
Illustrative new pricing	Street Light Charge	\$209 / mo.	\$1,090 / mo.	\$15,401 / mo.
	Supplemental Charge	\$20 / mo.	\$111 / mo.	\$1,562 / mo.
	Total Bill	\$229 / mo.	\$1,201 / mo.	\$16,963 / mo.
	Bill Impact	+\$17 / mo.	+\$81 / mo.	+\$1,160 / mo.

5.3.2 Customer Consultation and Influence on Rate Design

BC Hydro presented rate design principles and illustrative rates, including the supplemental charge, at its virtual rate design engagement session on August 12, 2020. As identified in Appendix E, most participants expressed disappointment that BC Hydro is not proposing to decrease rates, as some customer have reportedly experienced significant reductions in energy costs after converting their own street lights, billed under RS 1702, to LEDs. Some customers also expressed concerns that under BC Hydro's proposal they will be required to pay the supplemental charge prior to the lights in their communities being converted to LEDs. BC Hydro acknowledges these concerns and notes the following:

- In addition to energy costs, the RS 1701 rate also includes recovery of capital investments and ongoing maintenance;
- The forecast savings (energy and maintenance) are passed onto customers under the marginal cost approach used to develop the rate however these savings are approximately off-set by forecast additional costs related to the capital investment;
- The temporary rate increase is due to the recovery of the undepreciated value of the current HPS lights and this increase will cease when all HPS lights are removed; and
- The supplemental charge is calculated based on the postage stamp rate principle that the cost is shared by all customers under this rate schedule and at the same time.

BC Hydro specifically sought feedback on the following rate design elements:

1. Whether the supplemental charge should be applied as a fixed charge per light or a percentage of customers' bills.

Of the 26 complete feedback forms received, twelve customers, including City of Burnaby, City of Coquitlam and City of Surrey, indicated the preference of the charge being a fixed charge per light. Five customers prefer the charge being a percentage of the total billed amount. These customers include City of Fort St. John, Municipality of North Cowichan, and the Tsawwassen First Nation. Other comments are related to customers who do not understand or disagree with the supplemental charge due to the age of existing lights in their areas.

Accordingly, BC Hydro is proposing a fixed charge per light supplemental charge. The same charge will be applied to each street light regardless of the wattages.

2. The timing of when the supplemental charge will start to apply.

Thirteen customers such as City of Salmon Arm, Indigenous Services Canada, and Village of Cumberland prefer to start the charge at a later date to avoid the immediate cost impact, while seven customers, including City of Coquitlam and Nuxalk Nation, prefer to start the charge earlier to minimize the monthly charge.

BC Hydro understands that an incremental charge imposed on customers on short notice could pose challenges to customers' current year budget; therefore, proposes to not charge the supplemental charge until May 1, 2021.

3. Feedback on the proposed Early Removal Fee

The Early Removal Fee would allow BC Hydro to recover the undepreciated value and removal costs of the LED fixtures if they are removed before they are fully depreciated. Nine customers provided feedback on this matter. One customer, City of Surrey, voiced support for recovering costs from customers who requested early removals. Most customers expressed interest to see more details about this proposed charge. City of Burnaby does not support the

charge and believes if an early removal charge is applied, the removed asset should be given to the customer to reuse.

5.4 Rate Schedule Elements

BC Hydro's rate design for LED street lights under RS 1701 is generally based on maintaining the structure of RS 1701 in its current form, with amendment as required to reflect the inclusion of LED rates. In the following sections, BC Hydro makes reference to the existing structure of RS 1701 and discusses the amendments proposes for each element of the rate schedule.

5.4.1 Availability and Applicability

BC Hydro proposes to maintain the Availability Provision of RS 1701, with addition of amendments to make the service available for the illumination of private property where the light is mounted on a pole that is on public property, or mounted on a pole that is on non-public property under certain conditions.

BC Hydro seeks to change the availability provision specifically to authorize the migration of approximately 370 street lights for which customers currently take service under RS 1755 Private Outdoor Lighting (Closed) onto RS 1701. These are Group 2 street lights under RS 1755 (**Group 2 Lights or Group 2 Customers**) where a light is mounted on a pole that is on public property, or an easement, and is part of BC Hydro's distribution system (see section [6.1](#) for a description of the different customer groups under RS 1755). The service provided to these Group 2 Lights is therefore very similar as that provided under RS 1701 with the exception that the lights are not used to illuminate public highways, streets and lanes. For additional details on the need for this provision please refer to section [6.3](#).

As explained in section [6](#) below, BC Hydro is proposing to terminate RS 1755. To reduce customer impacts, BC Hydro will offer to continue to provide street light service to eligible RS 1755 Group 2 customers by migrating them to RS 1701. In

1 addition, BC Hydro does not believe that it is necessary to limit offering private
2 outdoor lighting service under RS 1701 to only these customers. As a result,
3 BC Hydro has included proposed amendments to allow the provision of overhead
4 street lighting service to illuminate private property at BC Hydro's sole discretion
5 provided that:

- 6 • The street lights must be installed on existing BC Hydro distribution system
7 infrastructure that is located on public property with appropriate secondary
8 wiring. BC Hydro will not install new poles for the sole purpose of supporting
9 these street lights. RS 1701 rates do not contemplate the recovery of costs to
10 install and maintain poles and its intent is only that street lighting attachments
11 can be made to existing poles provided there is sufficient available pole space
12 to allow the attachment and wire the street light to the existing secondary
13 electrical system that is also attached to the pole;
- 14 • The customer making the request owns or has the legal rights to the property
15 being illuminated;
- 16 • The street lights are only installed on poles where there are no access or safety
17 issues related to the installation and ongoing operation and maintenance of the
18 street light including clearances for initial installation and long-term unhindered
19 access to the pole location;
- 20 • There are no other social, public nuisance or environmental sensitivities related
21 to the installation of overhead street lighting at the requested location; and
- 22 • There is a reasonable expectation that the customer will continue to receive
23 service under RS 1701 for a sufficient period for BC Hydro to recover its
24 investment in the lighting fixture.

25 Provided the above conditions are met, BC Hydro expects that approximately
26 370 RS 1755 Group 2 Lights will be migrated to RS 1701; these Group 2 Lights will
27 be replaced with LED street lights as part of the Replacement Program. If customers

do not wish to migrate service from RS 1755 to RS 1701 or if BC Hydro determines the pole is not suitable for continued provision of street light service, their Group 2 Lights will be removed as part of the Replacement Program at no charge to the RS 1755 customer.

Section [6](#) provides a further discussion of BC Hydro's proposal to terminate RS 1755 and plans to mitigate customer impacts.

5.4.2 Rate

BC Hydro proposes to maintain the existing rate structure. The approved rates are all-inclusive monthly rates, with variation to the rates charged based on the type of fixture provided and the wattage of the street light provided. The rate recovers energy, demand, capital, operating and maintenance, and overhead costs. The rate is postage stamp and is applicable throughout BC Hydro's service area including both integrated and non-integrated areas. Please refer to section [5.3](#) for proposed new pricing.

5.4.3 Special Conditions

BC Hydro proposes the following amendments to the RS 1701 Special Conditions. Details can be found in Appendix B:

1. BC Hydro proposes amendments to provide that both MV fixtures and HPS fixtures are not available for new installations following the commencement of the Replacement Program;
2. BC Hydro proposes an amendment to allow BC Hydro to recover the undepreciated value and removal costs when customers request the removal of street lights before they are fully depreciated for any reason. The current provision in RS 1701 only allows BC Hydro to recover this cost if the street light is to be replaced with a different street light. However, as the cost implications of removing a light are identical whether or not the light is replaced, the

1 amendment further protects other BC Hydro customers from incurring expenses
2 due to decisions made by a customer taking service under RS 1701 to
3 discontinue such service.

4 BC Hydro further proposes that a Customer be assessed the undepreciated
5 amount of the fixture plus the removal cost when BC Hydro removes the fixture
6 as a result of the Customer's failure to comply with the Electric Tariff. BC Hydro
7 notes that it does not typically disconnect street lighting when a customer's
8 service is disconnected for other reasons such as non-payment, and so this
9 represents an extreme circumstance.

10 RS 1755 customers include commercial and residential accounts, and some
11 are proposed to be migrated from RS 1755 to RS 1701 as explained in
12 section [6](#). In addition, with the changes to RS 1701, new requests to illuminate
13 private property can be made. BC Hydro recognizes that property ownership
14 can change and that a new residential or business owner may not wish to
15 continue receiving RS 1701 lighting service. As the new customer had not
16 requested RS 1701 service initially, in such a situation it would not be
17 appropriate to assess the new owner the undepreciated book value of the
18 lighting assets or the cost of removal. As a result, BC Hydro proposes to
19 exclude these Customers from being assessed these costs provided that the
20 Customer requests removal within one year of initiating Service at the
21 Premises. When initiating service, BC Hydro will notify the customer of the
22 existence of RS 1701 lighting service at their Premises and also explain their
23 option to accept the terms of service or request termination;

- 24 3. BC Hydro proposes to substitute references to "lamps" with "street lights" since
25 LED street light luminaires do not contain lamps. Should an LED luminaire fail,
26 the entire luminaire would require replacement;
- 27 4. BC Hydro proposes to include direct language to specify BC Hydro's right to
28 terminate the service when the pole is no longer suitable for the RS 1701

1 service. Most initial RS 1701 service agreements were signed decades ago,
2 and this special condition is obsolete in practice.

3 There are situations where BC Hydro cannot practically continue to provide the
4 RS 1701 service at certain locations, e.g., a relocation or alteration of a pole or
5 the distribution system in an area goes underground, BC Hydro needs to
6 reserve the discretion to terminate the RS 1701 service providing it provides
7 the customer a minimum of 24-month notification to seek alternative lighting;

- 8 5. BC Hydro proposes a new Special Condition to specify that BC Hydro reserves
9 the sole right to determine whether or not a street light will be installed on a
10 pole that is part of BC Hydro's distribution system and located on public
11 property.

12 In applying this Special Condition BC Hydro would include consideration of, but
13 not be limited to: the appropriateness of the requested street lighting service;
14 the availability of space on distribution poles to allow the installation of the
15 street light according to BC Hydro standards; unhindered access to the location
16 and pole where the street light would be installed, any safety concerns related
17 to installation, operation or maintenance of the street light; and the expectation
18 that the customer will continue to receive street light service for a sufficient
19 period for BC Hydro to recover its investment in the lighting fixture; and

- 20 6. BC Hydro proposes a new Special Condition No. 10 to reflect that while
21 BC Hydro undertakes vegetation maintenance as required to manage its
22 distribution system, it is not responsible for vegetation maintenance around the
23 street light that is required for illumination purposes. Similarly, while BC Hydro
24 installed and maintains the lighting fixtures, it is not responsible for the lighting
25 fixture selection.

26 **5.4.4 Rate Rider**

27 No amendments are proposed to the rate rider section of RS 1701.

1 **5.4.5 New RS 1701 Supplemental Charge Section**

2 As described in section [5.2.2](#) BC Hydro proposes a new “RS 1701 Supplemental
3 Charge” section which provides that a charge per month per fixture will be applied to
4 all street lights billed under this rate schedule, as shown on line 10, of [Table 7](#). The
5 supplemental charge ends when the Replacement Program completes.

6 **5.4.6 Eventual Complete Replacement of Older Street Lighting 7 Technologies**

8 BC Hydro notes that, following completion of the Replacement Program, there will
9 be no HPS or MV street lights remaining. The cost and revenue projections
10 BC Hydro has developed in support of this application do not support the ongoing
11 maintenance and re-lamping of HPS and MV street lights and customers will not be
12 provided with the option of retaining the older technology street lights as this would
13 not be cost-effective and BC Hydro could not confirm that the HPS lights are in
14 accordance with the PCB Regulation.

15 The removal of the HPS and MV rate components of RS 1701 are not being sought
16 as part of the Application because all three types of street lights will remain
17 in-service for two or more years following final approval, and BC Hydro will need to
18 continue to bill for HPS and MV lights.

19 **6 BC Hydro’s Proposed Termination of RS 1755**

20 **6.1 Background and Need for Termination of RS 1755**

21 RS 1755 is a grand parented private outdoor lighting service that was designed in
22 the 1960s and closed to new premises effective January 1, 1975 when BC Hydro
23 determined it was appropriate to exit the business of providing lighting service on

1 private property. Since 1975, customers requiring private outdoor lighting have had
2 to install their own lighting and wire their lighting load through their service meter.⁴

3 New customers moving into existing premises with RS 1755 lights have remained
4 eligible to take over the service, but no additional lights or alteration to the service
5 are permitted. Records indicate that BC Hydro intended to finally phase-out RS 1755
6 service in the late 1980s to early 1990s when it converted its RS 1701 street lights
7 from MV to more energy efficient HPS technology. However, BC Hydro instead
8 allowed RS 1755 lights to be left unconverted to allow attrition to continue and to
9 gradually phase-out the service.

10 The RS 1755 attrition rate is low, averaging approximately two per cent per year in
11 the past 10 years. After more than 45 years, there now remain approximately
12 5,000 lights providing service to approximately 3,500 customers under RS 1755.

13 RS 1755 breaks the lights into three pricing groups as follows:

- 14 1. Where the light is mounted on a pole that was installed by the Customer or by
15 BC Hydro at the Customer's expense (**Group 1**). As discussed below,
16 BC Hydro interprets this to mean that the Customer legally owns and is
17 responsible for the pole on which the light is mounted;
- 18 2. Where the light is mounted on a BC Hydro owned pole that is on public
19 property, or an easement, and is part of BC Hydro's distribution system. These
20 are the Group 2 lights previously discussed; and
- 21 3. Where a light is mounted on a pole that was installed on the Customer's
22 property by BC Hydro, at BC Hydro's expense, solely for the purpose of

⁴ As discussed in section 5, BC Hydro proposes to allow residential and commercial customers to utilize RS 1701 to illuminate private property when the light is attached to a BC Hydro pole located on public property and when a number of conditions are met. However, it is anticipated that in most situations it will continue to be necessary for customers to install their own lighting and wire their lighting load through their service meter.

supporting the light (**Group 3**). BC Hydro interprets this to mean that BC Hydro legally owns and is responsible for the pole on which the light is mounted.

In all cases, BC Hydro owns and maintains the lighting fixture, including luminaire, wiring and arm.

Based on the description of the groups and the pricing differences, customers that signed up for Group 1 service are considered to own the installed poles and those that signed up for Group 3 service do not.

Based on BC Hydro's records, approximately 97 per cent of these fixtures are MV lights and 3 per cent are HPS as shown in [Table 10](#).

Table 10 RS 1755 Light Counts by Group

Count	Group 1	Group 2	Group 3
MV	2,636	349	1,834
HPS	79	21	51
Total	2,715	370	1,885
Grand Total			4,970

As described in section [3.2](#), BC Hydro is required to remove or replace all equipment, including street lights, that contain PCBs by December 31, 2025 through PCB Regulation). Meeting this requirement for RS 1755 would require substantial expenditures. BC Hydro closed RS 1755 as of January 1, 1975 with the intent of no longer offering this service and eliminating the service requirement through attrition. Installation of private lighting service as is provided by BC Hydro under RS 1755 is readily available from other providers.

After assessing the benefits, costs and risks associated with continuing to provide service under RS 1755, BC Hydro has concluded that it should rescind the service. BC Hydro has grand parented RS 1755 accounts for over 45 years and cannot continue to offer this service without committing to significant new investments to replace the lights to meet the PCB Regulation. BC Hydro does not believe that it is

cost-effective to continue to offer this service and that the capital expenditure required to replace the lights would not be justifiable since:

1. The rate schedule is closed and the service is no longer offered. For all new private outdoor lighting installations, customers must install their own lighting and wire their lighting load through their service meter;
2. The provision of outdoor lighting using privately owned lamp standards in order to illuminate private property is a competitive service that can be provided by many service providers. As a result, it is not a service that is appropriately provided on a rate regulated basis by BC Hydro. Equipment and installation services are readily available from private sector organizations;
3. Significant expenditures would be required to continue to offer service under RS 1755. Lights, poles and other equipment are at or near the end of their service life and replacement of these lights with newer technology is estimated to require an initial investment of approximately \$8 million (based on Group 1 and Group 3 avoided cost), as itemized below. As annual total revenue from RS 1755 service is approximately \$1.3 million per year it is clear that it would not be sustainable to recover these costs from RS 1755 customers, and nor does BC Hydro believe that it be appropriate for all BC Hydro ratepayers to cover these costs;

Table 11 Initial Investment Required to Continue RS 1755 Service

Component	Total Initial Investment (\$ million)
Pole Testing and Replacement	3.6
Material and Labour Cost (including upgrade to LED)	2.9
Indirect Costs, Contingency, Inflation and Capital Overhead	1.5
Total	8.0

4. There is no commitment from customers to continue to take this service on an on-going basis, and certainly not for the full life of the assets to be installed,

which is up to 50 years in the case of new poles. This leads to the risk of unrecovered investments that would need to be recovered from all ratepayers. Further, while conceptually it would be possible to implement a removal fee, as noted in section [5.4.3](#), BC Hydro does not view it as being appropriate to impose such a charge in cases where a property with lighting served under RS 1755 is transferred to a new owner and the new owner does not want to continue RS 1755 service; and

5. For RS 1755 Group 1 customers, poles used for lighting service are owned by the customer but the fixtures are owned by BC Hydro. While this was permitted at the time RS 1755 was offered, BC Hydro no longer places its equipment on customer-owned poles, nor do we place BC Hydro poles on private property for illumination purposes, because of worker safety and access for maintenance.

BC Hydro now seeks to finalize its plans to exit this legacy service by removing the remaining lights and migrating customers onto other appropriate rate schedules if they wish to have continued service in accordance with the terms of the migration.

6.2 RS 1755 Customer Segmentation and Consultation

6.2.1 RS 1755 Customer Segmentation

The table below summarises the types of customer accounts that make up each of the rate groupings one, two and three as enumerated in RS 1755 and as described in section [6.1](#). As shown:

- Residential and commercial/strata customers each comprise approximately 40 per cent of the RS 1755 accounts; and
- Group 1 services comprise 55 per cent and Group 3 services comprise 38 per cent of RS 1755 lighting. Only 8 per cent of accounts are Group 2, with lights mounted on poles that are part of BC Hydro's distribution system.

Table 12 RS 1755 Customer Types by Group

Customer Type	Group 1	Group 2	Group 3	Total	Per cent
Residential	1,447	85	566	2,098	42
Commercial/Strata	876	200	887	1,963	39
Government/ Municipal/ Indigenous	232	70	280	582	12
Records Unclear	164	20	157	341	7
Grand Total	2,719	375	1,890	4,984	100
Annual Revenue	\$618K	\$100K	\$573K	\$1.29M	
Per cent	55%	8%	38%		

6.2.2 RS 1755 Customer Consultation

BC Hydro sent a letter to all RS 1755 customers on August 28, 2020 to notify them about the proposed service termination, BC Hydro's intention to submit the application, their options to migrate their service onto other rate schedules if they still require outdoor lighting, and to seek their feedback on our service termination proposal and the support they need for the transition. Appendix E provides copies of the letters that were sent to customers advising of BC Hydro's intent to apply to the BCUC to amend RS 1755 with the objective of migrating customers onto other applicable rates and terminating the rate schedule. Appendix E also includes a summary of all feedback received from RS 1755 customers, including completed feedback forms, inbound phone calls and emails.

Feedback received is summarized below:

(a) Customers who wish to continue the private outdoor lighting service.

Among the 171 customer contacts received as of the September 11, 2020, deadline for customers to submit feedback, 62 customers (36 per cent) indicated they still require the outdoor lighting. Most of them expressed that the RS 1755 light is critical to their safety as it is the only light in a rural neighbourhood or in an area where municipal street lights are not available. It is financially challenging for many customers to install their own new lights; therefore, they do not wish or do not think BC Hydro should terminate the

1 service. Several customers further indicated they are willing to pay a higher fee
2 to continue the service. Most of these customers also requested BC Hydro to
3 replace the current old lights with LEDs.

4 **(b) Customers who requested to remove the lights immediately.**

5 Twenty-two customers (13 per cent) contacted BC Hydro and requested to
6 have their RS 1755 lights removed now. BC Hydro is processing these
7 requests. Customers billing will be stopped and the lights will be removed.

8 **(c) Customer inquiring for more information and options**

9 The majority of customers contacted BC Hydro to seek more information about
10 the termination proposal or to confirm the grouping of their lights. Many also
11 inquired about possible alternatives, including purchasing the pole or the light
12 from BC Hydro.

13 The feedback indicated that many customers are not aware of being on this legacy
14 service. The letter raised customer awareness to review their bill or lighting needs
15 and take appropriate actions. Several customers indicated that the RS 1755 light
16 mentioned in our letter does not exist anymore and they were not aware they were
17 being billed for this charge. BC Hydro is working with these customers to determine
18 a reasonable date for when the lights were removed and will refund customers, with
19 interest, for the over-billed charges in accordance with section 5.7 of the Electric
20 Tariff.

21 In addition, BC Hydro raised for discussion the proposed termination of RS 1755 at a
22 Low Income Advisory Council (**LIAC**) meeting, held via a video call on
23 September 2, 2020. LIAC members in attendance didn't provide opinions on the
24 appropriateness of BC Hydro terminating RS 1755. However, the following feedback
25 was provided:

-
- 1 • It is likely that some RS 1755 have low or fixed incomes, and may not be able
 - 2 to afford installation of a replacement light; and
 - 3 • BC Hydro should consider providing funding to residential customers when
 - 4 necessary to avoid potential safety hazards should the light not be replaced.

5 BC Hydro also informed participants of its proposed termination of RS 1755 in the
6 webinar held on August 12, 2020 with RS 1701 customers as discussed in
7 sections [3.3](#) and [5.3.2](#). Some municipal customers also have service under
8 RS 1755. Three customers completed the RS 1755 section of the feedback form.
9 Two customers, City of Burnaby and Squamish-Lillooet Regional District raised the
10 concern of proper tracking and distinction between the migrated private RS 1701
11 lights and the RS 1701 lights they are responsible for. City of Surrey requests
12 BC Hydro to contact impacted customers regarding the termination proposal.

13 BC Hydro acknowledges the feedback provided and has incorporated it into plans to
14 mitigate customer impacts as described in section [6.3](#) below.

15 **6.3 BC Hydro's Proposed Approach to RS 1755**

16 BC Hydro proposes different treatments for RS 1755 Group 2 lights than for Group 1
17 and Group 3 lights. These are described below.

18 **6.3.1 Group 2 Lights**

19 BC Hydro proposes a four-year phase-out plan for Group 2 lights that are mounted
20 on poles that are part of BC Hydro's distribution system, including the following:

- 21 • Provided the lighting locations are deemed to be suitable for migration to
- 22 RS 1701 (i.e., the pole the light is mounted on is still part of BC Hydro's
- 23 distribution system and meets the proposed new RS 1701 Availability criteria),
- 24 BC Hydro would give customers the option to migrate their service onto
- 25 RS 1701 if they still require outdoor lighting.

Customers electing to take this option would be incorporated in the Street Light Replacement Program as discussed in section [4](#) above, through which BC Hydro will be replacing street lights with LED technology;

- Any lights that are unsuitable for migration would be removed from service starting October 1, 2022 and before March 31, 2024. Further, any lights for which customers do not elect to accept migration onto RS 1701 will be removed from service when requested by customers as soon as practicable. Customers will continue to be responsible for the RS 1755 charges until the light is removed by BC Hydro and would be required to make alternative arrangements if they still have outdoor lighting needs.

For clarity, the service would not meet the availability requirements of RS 1703 which is a closed rate only available to selected customers specified in RS 1703. BC Hydro does not allow customers to install their lights on its distribution poles for safety reasons;

- Group 2 customers who qualify to be migrated to RS 1701 will be required to inform BC Hydro of their acceptance of service migration by September 30, 2022; and
- All existing Group 2 lights must be converted to LED or removed from service by December 31, 2025 in order to comply with the PCB Regulation as discussed in section [3.2](#).

6.3.2 Group 1 and Group 3 Lights

BC Hydro proposes a four-year phase-out plan including the following:

- BC Hydro would notify customers about the service termination and give customers until September 30, 2022 to source an alternative if they still require outdoor lighting;

-
- 1 • Customers would be responsible for all equipment and installation costs
2 associated with migrating the service to an appropriate rate schedule;
 - 3 • BC Hydro would remove all Group 1 and Group 3 lights and wiring before
4 March 31, 2024; and
 - 5 • If Group 1 customers do not require the poles anymore, BC Hydro will offer to
6 remove and dispose the pole for customers at no charge when removed at the
7 same time the light is removed.

8 **6.3.3 Book Value of Assets Removed from Service**

9 While BC Hydro has continued to maintain the RS 1755 lights, minimal expenditures
10 have been made to replace equipment with the intent that the lights will be removed
11 from service through attrition as they reach the end of their service life. This has
12 been on-going since 1975 and there is now little remaining value of the remaining
13 installed asset base. Based on BC Hydro's review of its asset database, the net
14 book value of these assets was \$69,000 or approximately \$14 per light as of
15 March 31, 2020.

16 **6.4 Mitigating Customer Impacts**

17 BC Hydro acknowledges the need for customers to have adequate and affordable
18 illumination of their private property for safety and operational purposes. BC Hydro
19 believes that with an effective mitigation plan it is possible to meet these customer
20 needs while also achieving its objectives of terminating RS 1755 to avoid significant
21 investment and limit financial risks of not fully recovering its costs.

22 BC Hydro's proposal to allow RS 1755 Group 2 customers the option of continuing
23 service under RS 1701 mitigates any impacts to these customers. BC Hydro has
24 identified the following steps to mitigate customer impacts by reducing barriers to the
25 installation of replacement outdoor lighting once Group 1 and Group 3 lighting is

1 removed. The mitigation plan has been formed with consideration of feedback
2 provided through customer consultation as described in section [6.2](#) above.

3 **6.4.1 Service to Group 1 and Group 3 Customers that Still Require**
4 **Lighting**

5 Following termination of the rate, Group 1 and Group 3 customers that still require
6 outdoor lighting to illuminate their property will be required to install new poles and
7 lights at their own cost, and to take electricity service under the applicable rate
8 schedule. There are two configurations of service for such customers.

9 First, of the remaining 3,400 RS 1755 services, around 3,000 are dual services
10 where the RS 1755 service is included as an additional service under customers'
11 base accounts, which include various residential and general services rates as well
12 as E-Plus and Net Metering services. Ideally, if customers decide to install new
13 lighting, the new lighting fixtures will be wired to their base service meter to
14 accurately measure electricity consumption and apply the appropriate rates.

15 Second, there may be a small number of standalone RS 1755 accounts that the new
16 lights cannot be practically metered due to their location. In these cases, the service
17 can be established as unmetered SGS accounts if the customer is billed under
18 General Service rates.

19 In all cases, if an RS 1755 Group 1 or Group 3 customer requires a new Service
20 Connection to maintain their outdoor lighting, BC Hydro proposes to waive the
21 otherwise applicable Service Connection Charge until December 31, 2024. This will
22 help to mitigate the financial impacts to the customer of BC Hydro's decision to
23 terminate RS 1755, as the customer would not have incurred this cost if service had
24 continued.

25 As Connection Charges are specified within the Electric Tariff, BC Hydro requests
26 that the BCUC consent to BC Hydro's waiving the application of the Connection
27 Charge for a customer installing new lighting as a result of the termination of

1 RS 1755. The estimated maximum loss of potential revenue because of this waiver
2 is a maximum of \$3.7 million over approximately a four-year period. (i.e.,
3 4,600 services times \$799 Minimum Connection Charge); however, the actual
4 revenue reduction is likely much lower because many lights will not be replaced. For
5 example, as described in section [6.2.2](#), among the 171 customer contacts received
6 as of September 11, 2020, deadline for customers to submit feedback, only
7 62 customers (36 per cent) indicated they still require the outdoor lighting. Further,
8 some customers who do still require the lights can have their electrician re-wire the
9 lights from behind their existing meter, or install lighting powered by photo-voltaic
10 panels, thereby avoiding the need for a new Service Connection.

11 **6.4.2 Transition Assistance**

12 Customer consultation indicated that some customers are not familiar with outdoor
13 lighting technology or services available in the market. To assist customers with the
14 search and installation of appropriate new lighting solutions, BC Hydro will recruit
15 qualified outdoor lighting contractors from its Alliance of Energy Professionals
16 network. Customers can contact BC Hydro for outdoor lighting contractor referrals.

17 BC Hydro estimates that the cost to a customer of installing a replacement light
18 could range from \$1,000 to \$7,000. Costs depend largely on the customer's ability to
19 install the replacement light on the existing Group 1 pole, and on the effort required
20 to wire the light behind the customer's meter or to install a new service.

21 Although installing their own lighting may save customers money over the long-term,
22 BC Hydro recognizes that the upfront cost may be a barrier to some customers
23 being able to install replacement lighting. As a result, BC Hydro will explore with its
24 alliance network the development of a financing program such that customers can
25 avoid an upfront investment and instead allow repayment of the costs of installing
26 replacement lighting over a period of time. Such a financing plan would assist

RS 1755 customers that may find the cost of installing a replacement light to be unaffordable, which was a concern identified through customer consultation.

6.4.3 Summary of Transition Assistance

The table below summarizes BC Hydro's proposal to enable customers to continue to meet their needs for reliable and affordable illumination of their outdoor areas, for each of the three rate groups in RS 1755 and as described in section 6.1:

Table 13 RS 1755 Summary of Recommendations

Group	BC Hydro	Customer	Rate
Group 1	<ul style="list-style-type: none"> Remove and dispose of existing light, as well as the pole if requested. Offer contractor referrals. Waive the Service Connection Charge. Investigate financing options. 	<ul style="list-style-type: none"> Install their own light and pole (if required). Rewire lights to their service meter, if practical, or install a new service. 	<ul style="list-style-type: none"> Terminate RS 1755. Service on an unmetered basis under RS 13xx, or on a metered basis on the otherwise applicable rate schedule (e.g., residential)
Group 2	<ul style="list-style-type: none"> Offer to convert the light to an LED if suitable. 	<ul style="list-style-type: none"> Select type of LED to be installed. 	<ul style="list-style-type: none"> Close and migrate to RS 1701
Group 3	<ul style="list-style-type: none"> Remove and dispose of existing light and pole. Offer contractor referrals. Waive the Service Connection Charge. Investigate financing options. 	<ul style="list-style-type: none"> Install their own pole. Install their own light Rewire lights to their service meter, if practical, or install a new service. 	<ul style="list-style-type: none"> Terminate RS 1755. Service on an unmetered basis under RS 13xx, or on a metered basis on the otherwise applicable rate schedule (e.g., residential)

6.5 Proposed RS 1755 Amendments

BC Hydro proposes amendments to RS 1755 to address the following:

- Deletion of content related to BC Hydro's obligation to replace a MV unit with an HPS unit: and

-
- Add content as follows:
 - ▶ BC Hydro will commence removing its equipment October 1, 2022;
 - ▶ Service will not be available beyond December 31, 2025;
 - ▶ BC Hydro will remove Group 1 customer poles at no charge to the customers, if requested by the Customer and completed at the same time that remaining BC Hydro equipment is removed;
 - ▶ Group 2 customers may migrate to RS 1701; and
 - ▶ BC Hydro will remove all Group 3 poles.

Blackline and clean versions of BC Hydro's proposed RS 1755 are included in Appendix C.

7 BC Hydro's Proposed Electric Tariff Amendment for Back-Billing of Unmetered Service

This section provides background on the billing of unmetered services and explains BC Hydro's proposal to amend section 5.7 (Back-billing) of the Electric Tariff as it relates to under-billing and over-billing resulting from a customer's failure to notify BC Hydro of changes to the quantity of lights or electrical consumption of unmetered accounts when self-declarations are required.

7.1 Background and Need for Electric Tariff Amendments

Although the vast majority of BC Hydro electrical services are metered, BC Hydro permits unmetered services when electricity consumption can be reliably estimated over a period of time and when the installation of a metered service is not warranted or practical due to cost or operational impacts to BC Hydro or the customer.

Unmetered services include street lighting services under the following rate schedules:

-
- 1 • RS 1701 – Overhead Street Lighting;
 - 2 • RS 1702 – Public Area Ornamental Street Lighting;
 - 3 • RS 1703 – Street Lighting Service;
 - 4 • RS 1704 – Traffic Control Equipment; and
 - 5 • RS 1755 – Private Outdoor Lighting (closed).

6 In addition, unmetered services are permitted under Small General Service rate
7 schedules:

- 8 • RS 1234 – Small General Service (Under 35 KW) – Zone II
- 9 • RS 1300, RS 1301, RS 1310, and RS 1311 – Small General Service (Under
10 35 KW).

11 BC Hydro's practice has been to allow unmetered accounts for equipment with
12 predictable energy consumption including telecommunications devices (e.g., cable
13 system repeaters), display signs and signboard lighting, for example. Overall, there
14 are approximately 19,000 unmetered accounts and 86 GWh of consumption billed
15 under Small General Service rates, which is about nine per cent of all SGS accounts
16 and 2 per cent of the total consumption by BC Hydro customers.

17 After the initial service connection, customers can add, remove or alter unmetered
18 street lighting or equipment without the involvement or advanced notification of
19 BC Hydro. For instance, a municipality may have a series of unmetered street lights
20 (billed under RS 1702) behind a single connection to BC Hydro's distribution
21 network. In this situation, BC Hydro would not be aware if the municipality changed
22 light fixtures or added additional lighting. Similarly, BC Hydro has agreements with
23 some telecommunications providers to allow them to directly connect their
24 equipment to the lower-voltage secondary lines without the need for BC Hydro to
25 make the connection. As a result, using processes and tools established for this

1 purpose, customers are required to declare the number and electrical consumption
2 of unmetered street lights and equipment. In addition, timely notification of changes
3 is necessary to ensure that billing is accurate.

4 Section 5.7 of the Electric Tariff defines the way in which BC Hydro is required to
5 address an adjustment to billing that extends into prior billing periods for reasons
6 such as equipment failure or administrative errors. In short, if a customer is
7 determined to have been over-billed, section 5.7.6 generally requires BC Hydro to
8 provide a customer with a credit for the over-billed amount to the time the error is
9 deemed to have started. Interest is also to be applied to the over-billed amount.

10 Also, with the exception of specific circumstances defined in section 5.7.5, if
11 a customer is determined to have been under-billed, section 5.7.7 limits the period
12 for which BC Hydro can recover the under-billed amount. These periods are:

- 13 • Six months for Residential, Small General Service and Irrigation Service
14 customers; and
- 15 • Twelve months for all other rate schedules.

16 These limitations provided under section 5.7.7 provide an element of protection for
17 customers by limiting their financial exposure to a billing adjustment, particularly
18 when the reason for the adjustment is outside of their control.

19 Section 5.7 is applicable to both metered and unmetered services. As explained
20 further below, BC Hydro proposes changes to section 5.7 to reflect a customer's
21 obligation to provide a timely and accurate notification of the addition, removal, or
22 alteration of an unmetered service, for accounts in which a self-declaration is
23 required by the customer.

24 Customers are expected to provide BC Hydro with accurate declarations of the
25 number and electrical consumption of unmetered lighting and equipment, as well as
26 to provide timely notification of changes that may affect billing. For example, Special

1 Condition No. 6 for unmetered services provided under Small General Service rate
2 schedules, Special Condition No. 6(b) of RS 1702 and Special Condition No. 2(b) of
3 RS 1704 all specify:

4 The Customer will notify BC Hydro immediately of any proposed
5 or actual change in load, load characteristics, or hours of use.

6 While customers generally provide timely and accurate notifications, errors or delays
7 in a customer's notification of changes to unmetered equipment can result in billing
8 inaccuracies that can exist for an extended period before they are identified,
9 frequently beyond the periods of the back-billing limitations. During BC Hydro's
10 recent billing reviews of RS 1702 billing, four customers were identified to be
11 undercharged for periods potentially ranging from two years to 20 years, resulting in
12 estimated under-collected revenues of approximately \$500,000 or more because the
13 customer did not provide timely notification of changes.

14 Moreover, BC Hydro has limited ability to audit unmetered services in ways that
15 conclusively identify under or over-billing. BC Hydro utilizes its energy analytics tools
16 to identify potential billing discrepancies; however, unmetered services generally
17 have very low consumption and, therefore, variances between actual and billed
18 consumption are difficult to distinguish. In addition, visual inspections may not be
19 conclusive because in many cases the municipality's wiring for unmetered lighting
20 services is underground, making it very difficult to identify which lights are part of an
21 unmetered service connection.

22 Accordingly, BC Hydro believes that certain elements of section 5.7 should not apply
23 because the agreement to utilize unmetered services places an obligation upon
24 the customer to provide timely and accurate notification of changes. The failure to
25 provide timely and accurate notification of changes harms other ratepayers. In
26 particular:

-
- 1 • In the case of under-billing, for an extended period BC Hydro had incurred the
2 direct costs of providing electricity to the street lights or equipment, and also did
3 not recover the customer's allocation of BC Hydro's fixed costs. As a result of
4 lower revenues, these costs were borne by other customers;
 - 5 • The existing back-billing provisions do not provide customers with an incentive
6 to make timely and accurate declarations because there are no financial
7 consequences; and
 - 8 • Billing adjustments over extended periods of time can be complex and increase
9 BC Hydro's administrative costs.

10 **7.2 BC Hydro's Proposed Electric Tariff Amendments for** 11 **Back-Billing of Unmetered Service**

12 The proposed changes described below would apply to rate schedules in situations
13 where the customer is required to notify BC Hydro of the addition, removal, or
14 modification of unmetered street lights or equipment connected to BC Hydro's
15 distribution system:

- 16 • RS 1702 – Public Area Ornamental Street Lighting;
- 17 • RS 1703 – Street Lighting Service;
- 18 • RS 1704 – Traffic Control Equipment; and
- 19 • Small General Service rate schedules RS 1234, RS 1300, RS 1301, RS 1310,
20 and RS 1311.

21 These proposed changes are not applicable to street lighting rate schedules
22 RS 1701 or RS 1755. This is because BC Hydro owns the unmetered light fixtures
23 associated with these services and, therefore, has the primary obligation to ensure
24 the accuracy of its records.

1 For clarity, existing back-billing limitations would remain in situations when
2 the customer with unmetered service under the above rate schedules made a timely
3 and accurate notification, but a BC Hydro administrative error subsequently resulted
4 in the need for a billing adjustment.

5 The blackline and clean Electric Tariff pages are included as Appendix D.

6 **7.2.1 Under-billing**

7 BC Hydro proposes two changes to section 5 of the Electric Tariff to address
8 under-billing.

9 First, BC Hydro proposes to remove the six- or 12-month time limitation for
10 back-billing for self-reported unmetered accounts so that under-billed accounts can
11 be adjusted for actual consumption to the date of the addition or alteration of the
12 customer's assets that resulted in a change in electricity usage by an unmetered
13 electrical load. This will enable full recovery of BC Hydro's costs to the time that the
14 additional consumption began.

15 BC Hydro notes that section 5.7.5(a) already establishes that back-billing of an
16 under-billed amount is permitted for theft or tampering, as well as when
17 the customer should have been aware of the under-billing:

18 There are reasonable grounds to believe that the Customer has
19 tampered with or otherwise used BC Hydro's Service in an
20 unauthorized way, or evidence of fraud, theft or another criminal
21 act exists, or if a reasonable Customer should have known of an
22 under-billing and failed to promptly bring it to the attention of
23 BC Hydro;

24 The provision to back-bill when "a reasonable Customer should have known" applies
25 to a situation when a customer with unmetered services fails to notify BC Hydro of
26 changes in a timely manner. However, for additional clarity, BC Hydro proposes to
27 add content to section 5 of the Electric Tariff to address cases where the
28 under-billing or over-billing is the result of a customer's error or delay in providing

1 notification of an addition or alteration of unmetered lighting or unmetered equipment
2 for which self-declaration of changes is required.

3 Second, BC Hydro proposes to charge interest on under-billed amounts at
4 BC Hydro's Weighted Average Cost of Debt (**WACD**).

5 Applying interest at the WACD is consistent with the rate of interest applied when
6 crediting over-billed accounts and reflects the incremental borrowing costs
7 associated with the lost revenue from when the equipment was added. BC Hydro
8 considers that interest charged at the WACD is appropriate given that unmetered
9 accounts are commercial arrangements and that inaccurate reporting is most likely
10 due to oversight rather than fraud or theft, which are subject to interest applied at the
11 rate of the Late Payment Charge under section 5.7.5(a).

12 BC Hydro acknowledges that customers will require a period of time to update their
13 own asset inventories with BC Hydro following additions or alterations. In addition,
14 applying interest adds to BC Hydro's administrative effort. As a result, BC Hydro
15 proposes to follow a business practice to allow BC Hydro flexibility and discretion
16 such that interest will not be applied provided that notification is timely (e.g.,
17 generally provided within six months of a change that affects billing) or when the
18 amount of interest to be applied is less than the associated administrative cost.

19 **7.2.2 Over-billing**

20 Section 5.7.6 requires BC Hydro to provide credits with interest to customers to the
21 start of the billing error in the case of an over billing. BC Hydro proposes
22 amendments to the Electric Tariff to reflect the obligation for a customer with
23 unmetered services to provide timely notification of a change that could result in
24 over-billing within six months. In cases where the over billing occurred because a
25 Customer did not provide timely notification of changes to their load or load, refunds
26 for over-billing will be for the lesser of the date of the billing error or six months.

Further, interest will not be applied to the refund as the billing adjustment would relate only to current bills.

7.3 Jurisdictional Review

BC Hydro surveyed other Canadian Utilities regarding billing practices for their unmetered services management and received responses from five utilities including Oakville Hydro, Fortis Alberta, London Hydro, Saint John Energy and SaskPower.

- Fortis Alberta and SaskPower do not perform retroactive billing adjustments for unmetered customers' delayed self-reporting. Consumption changes are only updated on a going forward basis;
- Oakville Hydro and London Hydro's regulation allows for up to two year over- and under-billing back-billing. SaskPower back-bills up to 18 months for under-billed amounts; and
- SaskPower typically offers customers an interest free payment plan to repay the undercharge. However, if a customer cannot fulfill the plan, a standard late payment fee applies.

7.4 Consultation and Engagement

BC Hydro undertook customer consultation and engagement through an online webinar, direct contact from Key Account Managers, and letters sent to customers to inform them of the proposed changes. Customer feedback and BC Hydro's response to this feedback are described below.

7.4.1 Customer Feedback

Many RS 1701 customers also have RS 1702 and RS 1704 services. During the August 12, 2020 street light customer engagement session described in section [3.3](#), BC Hydro informed customers about its intent to amend the back-billing provisions and sought customer feedback on the proposed revisions as well. Several large

1 customers with unmetered services were also informed directly by their Key Account
2 Manager about these proposed tariff amendments. In addition, customers with
3 non-metered services under the Small General Service rates and Street Lighting
4 rates were sent a letter informing them of the proposed back-billing amendment on
5 September 4, 2020. A copy of this letter is attached as Appendix E.

6 About a dozen commercial and strata customers contacted BC Hydro to inquire
7 about their unmetered accounts and BC Hydro's proposed tariff changes after
8 receiving the letter. Most customers who provided additional feedback through the
9 engagement activities above were municipalities. In general, municipal customers
10 think removing the one-year back-billing limitation is reasonable and fair but would
11 like BC Hydro to improve its technology system and processes to assist customers
12 in validating asset and billing records and reporting consumption changes.

13 City of Burnaby indicated that the under-charged amount should be subject to the
14 *Limitation Act* and suggested that BC Hydro provide financial incentives to
15 encourage customers to move to metered services. Ministry of Transportation
16 suggests existing billing discrepancies should be grand-parented "until a mutually
17 agreed upon point of current accuracy" and BC Hydro should provide a better asset
18 management system for customers to easily differentiate metered versus unmetered
19 street lights. Village of Cumberland agrees with the proposals if the same rules apply
20 to RS 1701 street light billing when BC Hydro fails to maintain billing accuracy.

21 Most customers think it is reasonable to report their consumption changes to
22 BC Hydro within three months. The Ministry of Transportation explains that due to
23 internal processes, they will need six months to update their asset management
24 system and inform BC Hydro. City of Burnaby points out that delays over three
25 months could happen as they need to wait for contractors to report work
26 completions. City of Richmond also requested a six-month reporting period as most
27 of their new RS 1702 street lights are installed by developers and transferred to the

1 City after one year. City of Surrey and City of Vancouver indicated that the time limit
2 for over billing and under should be the same.

3 City of Vancouver also indicated that the billing correction limitations should not
4 apply to situations where delayed or incorrect billing was caused by BC Hydro
5 administrative errors. In addition, City of Vancouver suggested BC Hydro should not
6 bill for street lights that are out of order for a sustained period of time.

7 BC Hydro met with Shaw Communications Inc. (**Shaw**), who has the most
8 unmetered SGS accounts, on September 11, 2020 to discuss the proposed tariff
9 amendments on unmetered services. Shaw also suggested that the treatment for
10 over billing and under billing should be consistent – billing should be adjusted to the
11 date of consumption change for overbilling as well. In addition, Shaw raised
12 concerns on the self-reporting requirements and administrative processes as this is
13 a manual process for them.

14 **7.4.2 Influence of Customer Feedback on BC Hydro's Proposals**

15 As indicated above, there was general acceptance by customers that it is
16 appropriate for back-billing provisions to be modified for customers that have an
17 obligation to notify BC Hydro of additions, alterations and removals of unmetered
18 street lights and other equipment. Customers also provided feedback on the specific
19 aspects of how back-billing may be modified, which BC Hydro has incorporated into
20 its proposal as follows:

- 21 • BC Hydro agrees that customers should be given a period of time to review
22 their billing records and notify BC Hydro of changes, without penalty. As a
23 result, BC Hydro proposes to make these proposals effective July 1, 2022,
24 which will allow customers a grace period of approximately 14 months to review
25 their assets and update the inventories with BC Hydro before back-billing of
26 under-billed accounts will occur to the date of the equipment addition, and with
27 interest; and

-
- As several customers indicated their internal processes can take up to six months to update their asset management records, BC Hydro is now proposing that customers will have up to six months to notify BC Hydro of street light and equipment removals or modifications that reduce consumption in order to qualify for an over-billing credit to be applied. This is an increase over the three-month period that BC Hydro presented at the engagement workshop but will still be effective in maintaining the accuracy of billing records by providing a finite period for which over-billing credits can be applied.

We also acknowledge the feedback received on the processes and technology platforms used by customers to provide notification of changes to unmetered services and will examine opportunities to make improvements to enhance billing accuracy without posing administrative challenges for both parties.

8 BC Hydro's Proposed Electric Tariff Amendment for Mixed Use Loads

8.1 Background and Need for Electric Tariff Amendments

Many municipalities manage their own street lighting and traffic signalling, which requires the distribution of electricity to several points throughout the municipality. Due to considerations such as constant/consistent use of relatively small amounts of energy, physically dispersed service locations and historical reliance on manual meter readings, service arrangements typically consist of many unmetered services where consumption is estimated and charged according to the applicable rate schedule. Physically, municipal electrical infrastructure is wired in the most practical way for the municipality leading to BC Hydro service connections that may serve street lighting loads, traffic control loads, or both loads in combination. As unmetered consumption is estimated, and the applicable rate schedule is applied, the method these loads are wired has historically not been an issue.

1 With the advancement of technologies, municipalities have growing needs to attach
2 other equipment to their street light or traffic signal service connections. These
3 attachments include traffic or security cameras, lighted street signs, wireless
4 communications routers, cellular operators' equipment and so on. Additionally, a
5 municipality may have their own initiatives where flexible use of electricity in public
6 space in the future, such as electric vehicle charging, billboards and signage, food
7 trucks and event hosting, is desired. Some street light and traffic signal customers
8 started to opt for metered services for their new or existing RS 1702 and RS 1704
9 connections to minimize administrative efforts. However, the rate schedules
10 applicable to street lights and traffic control signals are generally not applicable for
11 other uses and the present configuration of metered service does not provide the
12 flexibility needed for customers to offer the services desired. Some municipalities
13 have developed new facilities, or kiosks, that will take electrical service from
14 BC Hydro to serve existing and new street lighting and traffic control signal loads as
15 well as future other loads such as curbside electric vehicle charging. As physical
16 space is always a limiting factor in municipal streets, in some cases the only
17 practical approach is to serve all the loads at one location through a single meter.
18 However, this raises an issue with respect to the applicable rate schedule.

19 Generally, mixed end uses served at distribution voltage are served under one of
20 BC Hydro's General Service rate schedules. However, the current definition of
21 General Service in the Electric Tariff is shown below, and as indicated by the
22 italicised text, it could be interpreted to preclude the use of a General Service rate
23 when any component of the load is associated with street lighting.

24 General Service is defined as:

25 Service for business, commercial, institutional or industrial use,
26 including use in nursing homes, boarding houses, rooming
27 houses, common areas of multiple occupancy buildings,
28 recreational establishments, marinas and yacht clubs, hotels,
29 motels, mobile home parks and similar establishments or parts

thereof, or for any other use not specifically provided for in the Electric Tariff.

For greater certainty, *General Service is not available for use in circumstances where Transmission Service or Street Lighting Service is available for use* and is available as an alternative to Residential Service only in the circumstances described in section 6.1.3 (General Service Election – Residential Customers) and as an alternative to Irrigation Service only in the circumstances described in section 6.1.4 (General Service Election – Irrigation Customers).

The exclusion of street light service from the definition of General Service was made through BC Hydro's 2015 Rate Design Application, approved through BCUC Order No. G-5-17. This amendment was one of many miscellaneous terms and conditions amendments that were made to BC Hydro's Electric Tariff through the 2015 RDA in an effort to improve clarity and readability and remove redundancy. While the exclusion of street lighting service from the definition of General Service did improve clarity, it has resulted in an unintended consequence not anticipated at the time the amendment was made.

Likewise, as with the availability criteria prescribed in the rate schedules for customer owned street lighting (RS 1702) and traffic control (RS 1704), it is clear that if the municipality wanted to connect other loads, such as electric charging, to new or existing services for street lighting (or traffic control), those rate schedules would not be applicable. For example, RS 1702 states that the rate schedule is available only for:

"lighting of public highways, streets and lanes and municipal pathways and for public area seasonal lighting displays, in those cases where the Customer owns, installs and maintains the standards, fixtures, conductors and controls."

Further, RS 1702 special condition 1 States that

"Receptacle loads will be permitted for Service under this Rate Schedule provided that such receptacles are used

1 predominantly for seasonal lighting displays, meaning that no
2 more than 10% of the usage may be for other purposes.”

3 Likewise, RS 1704 is available only for:

4 “For lighting of traffic signals, traffic signs and traffic warning
5 devices, and other equipment for controlling or directing
6 vehicular or pedestrian traffic on public highways in those cases
7 where the Customer owns, installs, and maintains the
8 standards, fixtures, controls and associated equipment.”

9 RS 1704 has no allowance for service to loads other than those described in the
10 availability section.

11 While by definition General Service rate schedules are applicable to, “any other use
12 not specifically provide for in the Tariff” if the italicized text above does preclude the
13 use of a General Service Rate Schedule, then it results in a situation where no
14 BC Hydro rate schedule applies to the requested load configuration, requiring
15 the customer to undertake costly, and in some cases impractical modifications to
16 install separate service for their street light component of the load. BC Hydro
17 believes a change is needed in order to:

- 18 • Be flexible for future load configurations as there is a growing need for curbside
19 electricity use;
- 20 • To minimize customer and BC Hydro administrative efforts;
- 21 • To encourage load growth; and
- 22 • To align with BC Hydro’s priority, as articulated in our Service Plan, of reliably
23 meeting the electricity requirements of customers and responding to their
24 evolving expectations.⁵

5

<https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/regulatory-planning-documents/service-plans/bchydro-service-plan-2020-21-2022-23.pdf>

8.2 BC Hydro Proposed Electric Tariff Amendments

BC Hydro is proposing the following amendments to the Electric Tariff be made to allow combined loads, including customer owned street lighting or traffic equipment, to be served under the applicable General Service rate schedule.

- Amend the definition of General Service to remove the current language that excludes street lights from the definition; and
- Add content in section 6, Rate Schedules 1702 and 1704 clarifying that General Service applies to mixed use loads.

The proposed black line and clean Electric Tariff amendments are included as Appendix D.

BC Hydro expects these amendments to have a favourable economic impact on all ratepayers because the amendment removes barriers to electrification and load growth. Further, for a given street light, BC Hydro would collect somewhat more revenue under the General Service Rate Schedules than it would under RS 1704 or RS 1702. For example, an additional 200W light would increase a customer's bills by approximately \$3.70 per month under either RS 1702 or RS 1704, versus \$4.10 under the Small General Service Rate (RS 13xx).

8.3 Consultation and Engagement

BC Hydro has received a number of mixed service connection requests from City of Vancouver; and therefore, consulted with the City regarding this proposed Electric Tariff amendment. City of Vancouver believes allowing mixed loads to be charged under the General Service rates will lead to cost savings for their small load connections.

9 Other Related Housekeeping Amendments

As a housekeeping activity, BC Hydro proposes further language changes to section 5 of the Electric Tariff to address the following:

- Add references to unmetered accounts as required for clarity in Electric Tariff references to back-billing; and
- Clarify that BC Hydro does not charge interest on under-billing resulting from minor billing adjustments or on the delayed billing of standard charges. This proposal addresses what we believe to be a typographical error and aligns the Electric Tariff with BC Hydro's business practice.

Clean and blackline Electric Tariff pages can be found in Appendix D.

9.1.1 Consolidation of Special Conditions related to Unmetered Services

Rate Schedules permitting unmetered services include a series of Special Conditions defining the terms of unmetered services. To improve readability and clarity it is proposed that the Special Conditions that are applicable to all unmetered loads be consolidated into section 5 of the Electric Tariff. These proposed amendments do not alter the meaning or intent of the provisions.

Clean and blackline Electric Tariff pages can be found in Appendix D.

10 Conclusions

In this application BC Hydro proposes Electric Tariff amendments required to respond to changing technology, customer and business needs related to street lighting services. Approval of these amendments, as proposed, is required to support BC Hydro's Street Light Replacement Program, to retire a legacy street light service that has been closed since 1975, to address revenue loss and administrative challenges regarding billing of unmetered services, and to respond to evolving customer needs for mixed use services.

BC Hydro 2020 Street Light Rates Application

Appendix A

Draft Orders

ORDER NUMBER

G-xx-xx

IN THE MATTER OF

the *Utilities Commission Act*, RSBC 1996, Chapter 473

and

British Columbia Hydro and Power Authority (BC Hydro)
2020 Street Light Rates Application

BEFORE:

Commissioner
Commissioner
Commissioner

on Date

ORDER

WHEREAS:

- A. BC Hydro provides street lighting service under Electric Tariff Rate Schedule 1701; Overhead Street Lighting, for lighting of public highways, streets and lanes where BC Hydro owns, installs and maintains the street lights;
- B. Rate Schedule 1701 provides all-inclusive monthly rates that recovers energy, demand, capital, operating and maintenance, and overhead costs for High Pressure Sodium Vapour (**H.P. Sodium Vapour**) and Mercury Vapour street lights, but does not include rates under which BC Hydro can bill for Light Emitting Diode (**LED**) street lighting;
- C. The ballasts of older H.P. Sodium Vapour and Mercury Vapour street lights may contain Poly-Chlorinated Biphenyl (**PCB**) compounds and BC Hydro is required to eliminate all PCB containing equipment by December 31, 2025 under the Federal PCB Regulation;
- D. BC Hydro has completed LED Pilot Studies, through which it installed 195 LED street lights in Richmond, B.C. and communities on Haida Gwaii B.C. with positive results;
- E. BC Hydro will undertake a street light replacement program that will see all street lights for which customers take service under Rate Schedule 1701 replaced with LED street lights over approximately three years commencing in December 2020;
- F. On November 12, 2020, BC Hydro submitted its 2020 Street Light Rates Application to amend various street lighting provisions of the Electric Tariff including street lighting service rates for inclusion in Rate Schedule 1701 for the new LED lighting fixtures;

G. The 2020 Street Light Rates Application also included additional amendments as follows:

- (i) To clarify that HPS fixtures are no longer available for new installations;
- (ii) To allow BC Hydro to recover the undepreciated value and removal costs when customers request the removal of street lights before they are fully depreciated for any reason, even if they are not replaced with a new fixture as currently provided in Special Condition No. 3, or if a light is removed by BC Hydro because a customer has failed to comply with the Service Agreement;
- (iii) To provide an exclusion for the recovery of the undepreciated value and removal costs for customers that request termination of lighting service following a change in account holder for the Premises;
- (iv) To remove the reference to lamps since LED luminaires do not contain lamps;
- (v) To provide better clarity on BC Hydro's rights and obligations when it decides to terminate the service;
- (vi) To allow for the availability of service to illuminate private property, effective May 1, 2021 with certain limitations;
- (vii) To provide that BC Hydro has sole discretion to determine what constitutes a suitable overhead distribution line in the applicability provision of RS 1701;
- (viii) To clarify that BC Hydro will only clear vegetation as required to provide reliable electricity service; and
- (ix) To allow for a temporary supplemental charge to be initiated May 1, 2021 to recover the undepreciated value of the existing lights that are being removed before the end of their useful life.

H. Through Order No. G-xx-20, the Commission established a regulatory process to consider the amendments proposed by BC Hydro in the Street Light Rates Application.

NOW THEREFORE the Commission orders as follows:

1. The proposed amendments to Rate Schedule 1701 to incorporate LED service rates and additional amendments are approved on an interim and refundable or collectible basis and are effective as of the date of this Order.
2. BC Hydro is to file the amended Tariff Pages for endorsement by the BCUC within 30 days of the date of this order

DATED at the City of Vancouver, in the Province of British Columbia, this (XX) day of (Month Year).

BY ORDER

(X. X. last name)
Commissioner

ORDER NUMBER

G-xx-xx

IN THE MATTER OF

the *Utilities Commission Act*, RSBC 1996, Chapter 473

and

British Columbia Hydro and Power Authority (BC Hydro)
2020 Street Lighting Rate Application

BEFORE:

Commissioner
Commissioner
Commissioner

on Date

ORDER

WHEREAS:

- A. On November 12, 2020, BC Hydro submitted its 2020 Street Lighting Rate Application, in which it sought orders related to street lighting and other unmetered services;
- B. BC Hydro sought approval of Rate Schedule (RS) 1701 LED rates, on an interim, refundable and collectible basis, effective December 1, 2020;
- C. BC Hydro sought approval of RS 1701 on Final Basis effective May 1, 2021.
- D. BC Hydro sought consent from the BCUC to rescind RS 1755 as of December 31, 2025. BC Hydro will remove all installed BC Hydro equipment, or transition customers to ensure that no BC Hydro owned equipment remains installed and no billing is required under this rate schedule by the termination date;
- E. BC Hydro sought consent to waive the Service Connection Charge for RS 1755 customers who request a new Service for their light;
- F. BC Hydro sought approval of amendments to RS 1755 to specify the termination date of December 31, 2025, and to specify customer options upon termination;
- G. BC Hydro sought approval of the following amendments to section 5.7 of the Electric Tariff in situations when under billing or over billing is caused by a customer's delayed or inaccurate notification of the addition, removal or alteration of unmetered street lights or equipment:
 - (i) Clarify that under billed amounts can be recovered to the date of an addition or change to an unmetered service;

- (ii) Enable the application of interest to under billed amounts resulting from a customer's delayed or incorrect notification of the addition or alteration of unmetered street lights or equipment, after a period of six months; and
 - (iii) Limit the application of credits to be applied to over billed amounts to a period no longer than six months prior to the customer notifying BC Hydro of changes;
- H. BC Hydro sought approval of amendments to the Electric Tariff to implement General Service for mixed use loads:
- (i) Amend section 1 Definition of General Service to remove the language that General Service is not available for use in circumstances where Street Lighting Service is available for use;
 - (ii) Add a new section 6.1.5 General Service for Street Lighting to indicate that General Service will be provided to mixed uses in cases where the customer chooses to connect other mixed uses through the same service connection as lighting use on a metered basis; and
 - (iii) Amend the RS 1702 and RS 1704 Special Conditions to clarify that these rate schedules do not apply in the case of mixed uses;
- I. BC Hydro sought approval of housekeeping amendments to section 5 of the Electric Tariff as well as SGS RS 1234, 1300, 1301, 1310 and 1311; RS 1702 Public Area Ornamental Street Lighting; and RS 1704 – Traffic Control Equipment to improve clarity and alignment with business practices;
- J. Through Order No. _____, the Commission established a regulatory process to consider the amendments proposed by BC Hydro in the Street Lighting Rate Application; and
- K. Through Order No. _____ the Commission approved RS 1701 on an interim, refundable and collectible basis.

NOW THEREFORE the Commission orders as follows:

1. BCUC approves RS 1701 on a final basis effective May 1, 2021.
2. BCUC approves amendments to sections 1, 5, 6 and 7 of the Electric Tariff, and to RS 1234, 1300, 1301, 1310, 1311, RS 1702, RS 1704, and RS 1755 effective May 1, 2021.
3. BCUC provides consent to rescind RS 1755 as of December 31, 2025 and for BC Hydro to waive the Service Connection Charge for RS 1755 customers who request a new Service for their light.
4. BC Hydro is to file the amended Tariff Pages for endorsement by the BCUC within 15 days of the date of this order

DATED at the City of Vancouver, in the Province of British Columbia, this (XX) day of (Month Year).

BY ORDER

(X. X. last name)
Commissioner

BC Hydro 2020 Street Light Rates Application

Appendix B

Tariff Sheets - Rate Schedule 1701 Black-lined and Clean

BC Hydro

Rate Schedule 1701 – ~~Revision 3~~ Revision 4
Effective: ~~April 1, 2020~~

Page 4-1

4. STREET LIGHTING SERVICE

RATE SCHEDULE 1701 – OVERHEAD STREET LIGHTING

Availability	<p>For lighting of public highways, streets and lanes in cases where BC Hydro owns, installs and maintains the fixtures <u>luminaires, controls</u>, conductors, controls <u>brackets</u> and poles.</p> <p><u>For lighting of private property where BC Hydro owns, installs and maintains the luminaires, controls, conductors, brackets, and poles where the light is mounted on a BC Hydro distribution system pole that is on public property. In the case of lighting of private property previously served by BC Hydro pursuant to Rate Schedule 1755, BC Hydro may in its sole discretion authorize service to be provided from a light that is mounted on a BC Hydro distribution system pole that is on non-public property.</u></p>														
Applicable in	Any area served by suitable overhead distribution lines.														
Rate	<p>Per fixture per month as set out below:</p> <table> <tr> <td><u>50 watt or less LED unit</u></td><td><u>\$15.08</u></td></tr> <tr> <td><u>51 to 80 watt LED unit</u></td><td><u>\$18.77</u></td></tr> <tr> <td><u>81 to 120 watt LED unit</u></td><td><u>\$23.50</u></td></tr> <tr> <td><u>greater than 120 watt LED unit</u></td><td><u>\$27.57</u></td></tr> <tr> <td><u>*100 watt H.P. sodium vapour unit</u></td><td>\$19.40</td></tr> <tr> <td><u>*150 watt H.P. sodium vapour unit</u></td><td>\$23.14</td></tr> <tr> <td><u>*200 watt H.P. sodium vapour unit</u></td><td>\$26.72</td></tr> </table>	<u>50 watt or less LED unit</u>	<u>\$15.08</u>	<u>51 to 80 watt LED unit</u>	<u>\$18.77</u>	<u>81 to 120 watt LED unit</u>	<u>\$23.50</u>	<u>greater than 120 watt LED unit</u>	<u>\$27.57</u>	<u>*100 watt H.P. sodium vapour unit</u>	\$19.40	<u>*150 watt H.P. sodium vapour unit</u>	\$23.14	<u>*200 watt H.P. sodium vapour unit</u>	\$26.72
<u>50 watt or less LED unit</u>	<u>\$15.08</u>														
<u>51 to 80 watt LED unit</u>	<u>\$18.77</u>														
<u>81 to 120 watt LED unit</u>	<u>\$23.50</u>														
<u>greater than 120 watt LED unit</u>	<u>\$27.57</u>														
<u>*100 watt H.P. sodium vapour unit</u>	\$19.40														
<u>*150 watt H.P. sodium vapour unit</u>	\$23.14														
<u>*200 watt H.P. sodium vapour unit</u>	\$26.72														

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1701 – ~~Revision 3~~ Revision 4
Effective: ~~April 1, 2020~~ _____

Page 4-2

	<p>*175 watt mercury vapour unit \$21.32</p> <p>*250 watt mercury vapour unit \$24.57</p> <p>*400 watt mercury vapour unit \$31.67</p> <p>Wattages are <u>unit wattages for LED and lamp watts for high pressure sodium vapour and mercury vapour.</u></p> <p>* Note Special Condition No. 2.</p>
Special Conditions	<p>1. Connection Charge</p> <p>No charge will be made for Service Connections.</p> <p>2. Mercury Vapour <u>and High Pressure Sodium Vapour</u></p> <p>Mercury vapour fixtures <u>and high pressure sodium vapour fixtures</u> are not available for new installations.</p> <p>3. Extension Policy</p> <p>BC Hydro will construct a distribution Extension if required by the applicant, <u>subject to Special Condition No. 9 and</u> in accordance with the Terms and Conditions of the Electric Tariff as applicable.</p> <p><u>4. Fixture Removal</u></p> <p>When, at the Customer's request, a new fixture replaces an existing fixture, the Customer will pay to BC Hydro the original cost of the existing fixture, less any accumulated depreciation, and the cost <u>incurred by BC Hydro in removing the existing fixture under the following circumstances:</u></p>

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1701 – ~~Revision 3~~ Revision 4
Effective: ~~April 1, 2020~~

Page 4-3

(a) When the lighting fixture is removed, or removed and replaced with another lighting fixture, at the request of the Customer; or

(b) When BC Hydro has exercised its rights to Terminate Service because the Customer fails to comply with the Electric Tariff and/or Service Agreement, and BC Hydro elects to remove the lighting fixtures.

This Special Condition is not applicable when the request to remove or replace a light fixture is made by a Customer within one year of taking Service at a Premises at which lighting service is illuminating private property and was already provided under RS 1701, or when BC Hydro terminates RS 1701 Service in accordance with Special Condition No. 8.

4.5. Relocation and Redirection of Fixtures

The Customer will pay the full cost of relocating or redirecting fixtures when the change is made at the request of the Customer.

5.6. Responsibility for Fixture Selection, Design and Installation

The Customer is responsible for the lighting design and the selection of the overhead street lighting fixture offered by BC Hydro. BC Hydro is responsible for its installation~~will design the installation of overhead street lighting fixtures.~~

6.7. ~~Lamps~~ Street Lights Failing to Operate

The Customer will report to BC Hydro all street lights that do not operate as intended. BC Hydro will, without charge, replace ~~lamps~~ street lights or components that fail to operate, unless breakage is the reason for such failure in which case the Customer will be charged the cost of the material required to make the fixture operate.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1701 – ~~Revision 3~~ Revision 4
Effective: ~~April 1, 2020~~ _____

Page 4-4

	<p>7.8. Term of Service Agreement <u>Termination of Service</u></p> <p>The term of the initial Service Agreement under this Rate Schedule will be not more than five years; renewal periods will be for five years.</p> <p><u>BC Hydro may terminate service under this Rate Schedule 1701 at any time in its sole discretion so long as it provides a minimum of 24 months' notification to Customer.</u></p> <p><u>9. Determination of Suitability</u></p> <p><u>BC Hydro reserves the sole right to determine whether or not a street light will be installed on a pole that is part of BC Hydro's distribution system.</u></p> <p><u>10. Vegetation Maintenance</u></p> <p><u>BC Hydro will only clear vegetation as required to provide reliable electricity service.</u></p>
Rate Rider	The Deferral Account Rate Rider as set out in Rate Schedule 1901 applies to all charges payable under this Rate Schedule, before taxes and levies.
<u>Supplemental Charge</u>	<u>Effective May 1, 2021, a transition rate supplemental charge equal to \$2.06 per fixture per month applies to all street lights billed under this Rate Schedule, before taxes and levies.</u>
<u>Rate Increase / Rate Decrease</u>	<p>Effective April 1, 2019 the rates under this Rate Schedule include an interim rate increase of 6.85% before rounding, approved by BCUC Order No. G-45-19.</p> <p>Effective April 1, 2020 the rates under this Rate Schedule include an interim rate decrease of 1.01% before rounding.</p>

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

4. STREET LIGHTING SERVICE

RATE SCHEDULE 1701 – OVERHEAD STREET LIGHTING

Availability	For lighting of public highways, streets and lanes in cases where BC Hydro owns, installs and maintains the luminaires, controls, conductors, brackets and poles.	
	For lighting of private property where BC Hydro owns, installs and maintains the luminaires, controls, conductors, brackets, and poles where the light is mounted on a BC Hydro distribution system pole that is on public property. In the case of lighting of private property previously served by BC Hydro pursuant to Rate Schedule 1755, BC Hydro may in its sole discretion authorize service to be provided from a light that is mounted on a BC Hydro distribution system pole that is on non-public property.	
Applicable in	Any area served by suitable overhead distribution lines.	
Rate	Per fixture per month as set out below:	
	50 watt or less LED unit	\$15.08
	51 to 80 watt LED unit	\$18.77
	81 to 120 watt LED unit	\$23.50
	greater than 120 watt LED unit	\$27.57
	*100 watt H.P. sodium vapour unit	\$19.40
	*150 watt H.P. sodium vapour unit	\$23.14
	*200 watt H.P. sodium vapour unit	\$26.72

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1701 – Revision 4
Effective:

Page 4-2

	<p>*175 watt mercury vapour unit \$21.32</p> <p>*250 watt mercury vapour unit \$24.57</p> <p>*400 watt mercury vapour unit \$31.67</p> <p>Wattages are unit wattages for LED and lamp watts for high pressure sodium vapour and mercury vapour.</p> <p>* Note Special Condition No. 2.</p>
Special Conditions	<p>1. Connection Charge</p> <p>No charge will be made for Service Connections.</p> <p>2. Mercury Vapour and High Pressure Sodium Vapour</p> <p>Mercury vapour fixtures and high pressure sodium vapour fixtures are not available for new installations.</p> <p>3. Extension Policy</p> <p>BC Hydro will construct a distribution Extension if required by the applicant, subject to Special Condition No. 9 and in accordance with the Terms and Conditions of the Electric Tariff as applicable.</p> <p>4. Fixture Removal</p> <p>The Customer will pay to BC Hydro the original cost of the existing fixture less any accumulated depreciation, and the cost incurred by BC Hydro in removing the existing fixture under the following circumstances:</p> <p>(a) When the lighting fixture is removed, or removed and replaced with another lighting fixture, at the request of the Customer; or</p> <p>(b) When BC Hydro has exercised its rights to Terminate Service because the Customer fails to comply with the Electric Tariff and/or Service Agreement, and BC Hydro elects to remove the lighting fixtures.</p>

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1701 – Revision 4
Effective:

Page 4-3

	<p>This Special Condition is not applicable when the request to remove or replace a light fixture is made by a Customer within one year of taking Service at a Premises at which lighting service is illuminating private property and was already provided under RS 1701, or when BC Hydro terminates RS 1701 Service in accordance with Special Condition No. 8.</p>
5.	<p>Relocation and Redirection of Fixtures</p> <p>The Customer will pay the full cost of relocating or redirecting fixtures when the change is made at the request of the Customer.</p>
6.	<p>Responsibility for Fixture Selection, Design and Installation</p> <p>The Customer is responsible for the lighting design and the selection of the overhead street lighting fixture offered by BC Hydro. BC Hydro is responsible for its installation.</p>
7.	<p>Street Lights Failing to Operate</p> <p>The Customer will report to BC Hydro all street lights that do not operate as intended. BC Hydro will, without charge, replace street lights or components that fail to operate, unless breakage is the reason for such failure in which case the Customer will be charged the cost of the material required to make the fixture operate.</p>
8.	<p>Termination of Service</p> <p>BC Hydro may terminate service under this Rate Schedule 1701 at any time in its sole discretion so long as it provides a minimum of 24 months' notification to Customer.</p>
9.	<p>Determination of Suitability</p> <p>BC Hydro reserves the sole right to determine whether or not a street light will be installed on a pole that is part of BC Hydro's distribution system.</p>

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1701 – Revision 4
Effective:

Page 4-4

	<p>10. Vegetation Maintenance</p> <p>BC Hydro will only clear vegetation as required to provide reliable electricity service.</p>
Rate Rider	<p>The Deferral Account Rate Rider as set out in Rate Schedule 1901 applies to all charges payable under this Rate Schedule, before taxes and levies.</p>
Supplemental Charge	<p>Effective May 1, 2021, a transition rate supplemental charge equal to \$2.06 per fixture per month applies to all street lights billed under this Rate Schedule, before taxes and levies.</p>

ACCEPTED:_____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro 2020 Street Light Rates Application

Appendix C

Tariff Sheets - Rate Schedule 1755 Black-lined and Clean

BC Hydro

Rate Schedule 1755 – ~~Revision 3~~ Revision 4
Effective: ~~April 1, 2020~~

Page 4-13

4. STREET LIGHTING SERVICE

RATE SCHEDULE 1755 – PRIVATE OUTDOOR LIGHTING (CLOSED)

Availability	<p>For outdoor lighting Service to illuminate property other than public streets or lanes (private property), where Service is provided from dusk to dawn and the supply is single phase, 60 hertz at the Secondary Voltage available.</p> <p>This Rate Schedule is available only in Premises served under this Rate Schedule on January 1, 1975 and only with respect to lights served under this Rate Schedule on January 1, 1975 and continuously thereafter, except BC Hydro may replace a mercury vapour unit with a high pressure sodium unit having approximately the same equivalent light output.</p>				
Applicable in	All Rate Zones.				
Rate	<p>Charge per fixture per month as follows:</p> <p><u>Group</u> 1. Where a light is mounted on a pole that was installed by the Customer or by BC Hydro at the Customer's expense:</p> <table> <tr> <td>175 watt mercury vapour unit or replacement 100 watt H.P. sodium vapour unit</td><td>\$18.18</td></tr> <tr> <td>400 watt mercury vapour unit or replacement 150 watt H.P. sodium vapour unit</td><td>\$31.34</td></tr> </table>	175 watt mercury vapour unit or replacement 100 watt H.P. sodium vapour unit	\$18.18	400 watt mercury vapour unit or replacement 150 watt H.P. sodium vapour unit	\$31.34
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ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1755 – ~~Revision 3~~Revision 4
Effective: ~~April 1, 2020~~

Page 4-14

	<p><u>Group 2</u>. Where a light is mounted on a pole that is on public property, or an easement, and is part of BC Hydro's distribution system:</p> <table> <tr> <td>175 watt mercury vapour unit or replacement 100 watt H.P. sodium vapour unit</td><td>\$19.31</td></tr> <tr> <td>400 watt mercury vapour unit or replacement 150 watt H.P. sodium vapour unit</td><td>\$32.48</td></tr> </table> <p><u>Group 3</u>. Where a light is mounted on a pole that was installed on the Customer's property by BC Hydro, at its expense, solely for the purpose of supporting the light:</p> <table> <tr> <td>175 watt mercury vapour unit or replacement 100 watt H.P. sodium vapour unit</td><td>\$23.78</td></tr> <tr> <td>400 watt mercury vapour unit or replacement 150 watt H.P. sodium vapour unit</td><td>\$37.43</td></tr> </table> <p>Except that if two or more <u>Group 3</u> lights are mounted at one time on the same pole the rates for the additional light or lights will be as set out under part 1 above<u>billed under Group 3</u>.</p>	175 watt mercury vapour unit or replacement 100 watt H.P. sodium vapour unit	\$19.31	400 watt mercury vapour unit or replacement 150 watt H.P. sodium vapour unit	\$32.48	175 watt mercury vapour unit or replacement 100 watt H.P. sodium vapour unit	\$23.78	400 watt mercury vapour unit or replacement 150 watt H.P. sodium vapour unit	\$37.43
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175 watt mercury vapour unit or replacement 100 watt H.P. sodium vapour unit	\$23.78								
400 watt mercury vapour unit or replacement 150 watt H.P. sodium vapour unit	\$37.43								
Special Conditions	<p>1. BC Hydro will provide and install:<u>Service under this Rate Schedule 1755 will not be available beyond December 31, 2025.</u></p> <p>(a) An outdoor light consisting of luminaire, mast arm, ballast, lamp and photo-electric control, and</p> <p>(b) Not more than one span of overhead secondary conductors per light.</p>								

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1755 – ~~Revision 3~~ Revision 4
Effective: ~~April 1, 2020~~

Page 4-15

2. ~~The Customer will be required to contribute the estimated cost of any plant required to make Secondary Voltage available at a point not more than one span from the light; such contribution is not subject to refund.~~ Commencing October 1, 2022 BC Hydro will remove all BC Hydro owned equipment associated with Service under this Rate Schedule 1755.
3. ~~BC Hydro reserves the sole right to determine whether or not a light will be installed on a pole that is part of BC Hydro's distribution system.~~
4. ~~The prior approval of BC Hydro is required if a Customer intends to install its own poles, and such poles will be maintained to BC Hydro's satisfaction at the Customer's expense.~~
- 5.3. BC Hydro will maintain all equipment owned by BC Hydro and will replace lamps which have failed until September 30, 2022. Any breakage will be repaired by BC Hydro at the Customer's expense until September 30, 2022.

- 6.4. Where a light served under this Rate Schedule 1755 is mounted on a BC Hydro distribution system pole that is on public property, prior to September 30, 2022 the Customer may request to migrate Service from Rate Schedule 1755 to Rate Schedule 1701 which migration will be subject to the terms of Rate Schedule 1701 and specifically Special Condition 9 of Rate Schedule 1701.
- 7.5. Where a light served under this Rate Schedule 1755 is mounted on a pole that was installed by the Customer or by BC Hydro at the Customer's expense, the Customer either owns the pole or is deemed for the purpose of this Special Condition to own the pole. In either case, prior to September 30, 2022 the Customer may request that BC Hydro remove the pole without charge. BC Hydro retains the right to reject this request if the pole cannot be removed at the time of removal of BC Hydro owned equipment.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1755 – ~~Revision 3~~ Revision 4
Effective: ~~April 1, 2020~~

Page 4-16

	<u>8-6. Where a light served under this Rate Schedule 1755 is mounted on a pole that was installed on the Customer's property by BC Hydro, at BC Hydro's expense, BC Hydro either owns the pole or is deemed for the purposes of this Special Condition to own the pole.</u>
Rate Rider	The Deferral Account Rate Rider as set out in Rate Schedule 1901 applies to all charges payable under this Rate Schedule, before taxes and levies.
Rate Increase / Rate Decrease	Effective April 1, 2019 the rates under this Rate Schedule include an interim rate increase of 6.85% before rounding, approved by BCUC Order No. G-45-19. Effective April 1, 2020 the rates under this Rate Schedule include an interim rate decrease of 1.01% before rounding.

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ORDER NO. _____

ACTING COMMISSION SECRETARY

4. STREET LIGHTING SERVICE

RATE SCHEDULE 1755 – PRIVATE OUTDOOR LIGHTING (CLOSED)

Availability	<p>For outdoor lighting Service to illuminate property other than public streets or lanes (private property), where Service is provided from dusk to dawn and the supply is single phase, 60 hertz at the Secondary Voltage available.</p> <p>This Rate Schedule is available only in Premises served under this Rate Schedule on January 1, 1975 and only with respect to lights served under this Rate Schedule on January 1, 1975 and continuously thereafter.</p>				
Applicable in	All Rate Zones.				
Rate	<p>Charge per fixture per month as follows:</p> <p>Group 1. Where a light is mounted on a pole that was installed by the Customer or by BC Hydro at the Customer's expense:</p> <table> <tr> <td>175 watt mercury vapour unit or replacement 100 watt H.P. sodium vapour unit</td><td>\$18.18</td></tr> <tr> <td>400 watt mercury vapour unit or replacement 150 watt H.P. sodium vapour unit</td><td>\$31.34</td></tr> </table>	175 watt mercury vapour unit or replacement 100 watt H.P. sodium vapour unit	\$18.18	400 watt mercury vapour unit or replacement 150 watt H.P. sodium vapour unit	\$31.34
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ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1755 – Revision 4
Effective

Page 4-14

	<p>Group 2. Where a light is mounted on a pole that is on public property, or an easement, and is part of BC Hydro's distribution system:</p> <table> <tr> <td>175 watt mercury vapour unit or replacement 100 watt H.P. sodium vapour unit</td><td>\$19.31</td></tr> <tr> <td>400 watt mercury vapour unit or replacement 150 watt H.P. sodium vapour unit</td><td>\$32.48</td></tr> </table> <p>Group 3. Where a light is mounted on a pole that was installed on the Customer's property by BC Hydro, at its expense, solely for the purpose of supporting the light:</p> <table> <tr> <td>175 watt mercury vapour unit or replacement 100 watt H.P. sodium vapour unit</td><td>\$23.78</td></tr> <tr> <td>400 watt mercury vapour unit or replacement 150 watt H.P. sodium vapour unit</td><td>\$37.43</td></tr> </table> <p>Except that if two or more Group 3 lights are mounted at one time on the same pole the rates for the additional light or lights will be billed under Group 3.</p>	175 watt mercury vapour unit or replacement 100 watt H.P. sodium vapour unit	\$19.31	400 watt mercury vapour unit or replacement 150 watt H.P. sodium vapour unit	\$32.48	175 watt mercury vapour unit or replacement 100 watt H.P. sodium vapour unit	\$23.78	400 watt mercury vapour unit or replacement 150 watt H.P. sodium vapour unit	\$37.43
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175 watt mercury vapour unit or replacement 100 watt H.P. sodium vapour unit	\$23.78								
400 watt mercury vapour unit or replacement 150 watt H.P. sodium vapour unit	\$37.43								
Special Conditions	<ol style="list-style-type: none"> 1. Service under this Rate Schedule 1755 will not be available beyond December 31, 2025. 2. Commencing October 1, 2022 BC Hydro will remove all BC Hydro owned equipment associated with Service under this Rate Schedule 1755. 3. BC Hydro will maintain all equipment owned by BC Hydro and will replace lamps which have failed until September 30, 2022. Any breakage will be repaired by BC Hydro at the Customer's expense until September 30, 2022. 								

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1755 – Revision 4
Effective

Page 4-15

	<p>4. Where a light served under this Rate Schedule 1755 is mounted on a BC Hydro distribution system pole that is on public property, prior to September 30, 2022 the Customer may request to migrate Service from Rate Schedule 1755 to Rate Schedule 1701 which migration will be subject to the terms of Rate Schedule 1701 and specifically Special Condition 9 of Rate Schedule 1701.</p> <p>5. Where a light served under this Rate Schedule 1755 is mounted on a pole that was installed by the Customer or by BC Hydro at the Customer's expense, the Customer either owns the pole or is deemed for the purpose of this Special Condition to own the pole. In either case, prior to September 30, 2022 the Customer may request that BC Hydro remove the pole without charge. BC Hydro retains the right to reject this request if the pole cannot be removed at the time of removal of BC Hydro owned equipment.</p> <p>6. Where a light served under this Rate Schedule 1755 is mounted on a pole that was installed on the Customer's property by BC Hydro at BC Hydro's expense, BC Hydro either owns the pole or is deemed for the purposes of this Special Condition to own the pole.</p>
Rate Rider	The Deferral Account Rate Rider as set out in Rate Schedule 1901 applies to all charges payable under this Rate Schedule, before taxes and levies.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro 2020 Street Light Rates Application

Appendix D

Tariff Sheets - Unmetered Services, Mixed Use Loads and other Amendments Black-lined and Clean

BC Hydro

Terms and Conditions, Section 1 – ~~Revision 6~~ Revision 7

Effective: ~~August 14, 2020~~ _____

Page 1-1

1. INTERPRETATION AND DEFINITIONS

1.1 Interpretation

1.1.1 Conflicts

To the extent these Terms and Conditions conflict with any applicable Rate Schedule or Electric Tariff Supplement, the terms or conditions provided in such Rate Schedule or Electric Tariff Supplement will prevail. To the extent that an applicable Rate Schedule conflicts with an applicable Electric Tariff Supplement, the terms or conditions provided in the Electric Tariff Supplement will prevail.

1.1.2 Statutes

References to statutes in the Electric Tariff will include the statute and regulations issued pursuant to it, as amended and in force from time to time, and any superseding statute or regulation.

1.1.3 Technical Terms

Technical or industry-specific phrases, units of measure or words not otherwise defined in the Electric Tariff have the well-known meaning given to those terms in the electrical industry.

1.1.4 Including

In the Electric Tariff, the word “including” will in all cases be deemed to mean “including without limitation”, unless otherwise expressly provided.

1.2 Definitions

Unless the context otherwise requires, in the Electric Tariff the following words have the meanings set out below and alternate forms of the same words have corresponding meanings.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 1 – ~~Revision 6~~ Revision 7

Effective: ~~August 14, 2020~~

Page 1-2

BC Hydro	British Columbia Hydro and Power Authority.
BC Hydro-Owned Street Lighting Service	Service for lighting of public highways, streets, lanes and other similar public applications and displays, or for lighting of private property, where BC Hydro owns, installs and maintains the fixtures, conductors, controls and poles.
Billing Demand	Maximum Demand or, where permitted by the applicable Rate Schedule, estimated Demand, used to determine Demand charges under a Rate Schedule.
COVID Relief Fund for Residential Customers	A temporary program established by BC Hydro, available until June 30, 2020, for the purpose of providing grants to qualifying Residential Service Customers, and qualifying residential tenants of a Customer, to address impacts arising from the loss of employment or inability to work as a result of the COVID pandemic.
COVID Relief Fund for Residential Customers Grant	A credit issued by BC Hydro, in its discretion, to a qualifying Residential Service Customer or to a qualifying Customer with one or more qualifying residential tenants, to that Customer's BC Hydro account.
COVID Relief Fund Return	The return of a COVID Relief Fund for Residential Customers Grant that BC Hydro determined should not have been granted.
Customer	<p>Any Person whose application for Service has been accepted by BC Hydro or, in the absence of such an application, the Person with possession of the Premises to which Service is provided or the Owner or such other Person designated as the Customer pursuant to the Electric Tariff. If a Customer receives Service at more than one Premises, such Customer will be considered a separate Customer for each Premises.</p> <p>BC Hydro will determine the number of Premises for the purpose of this definition.</p>
Customer Crisis Fund	A pilot program established by BC Hydro with the revenue received pursuant to Rate Schedule 1903, for the purpose of providing crisis grants to qualifying Residential Service Customers.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 1 – ~~Revision 6~~ Revision 7

Effective: ~~August 14, 2020~~

Page 1-3

Customer Crisis Fund Grant	A credit issued by BC Hydro, in its discretion, to a qualifying Residential Service Customer in respect of arrears owing to BC Hydro.
Customer Crisis Fund Return	The return of a Customer Crisis Fund Grant that BC Hydro determined should not have been granted.
Customer-Owned Street Lighting Service	Service for lighting of public highways, streets, lanes, traffic signals, traffic signs and other similar public applications and displays where the Customer owns, installs and maintains the fixtures, conductors and controls.
Demand	The rate at which electric energy is used in any instant or averaged over any designated period of time, measured in kilowatts (kW) or kilovolt amperes (kVA).
Disconnection	A physical deactivation of a Service Connection, including through removal of Metering Equipment and / or other BC Hydro equipment used to provide Service, regardless of duration.
Dwelling	<p>A building or part of a building comprising private living quarters and containing sleeping quarters, a kitchen and bathroom, and in which the occupants have free access to all rooms, or alternative living quarters acceptable to BC Hydro, and including single-family homes, apartments, residential strata lots, townhouses, row-houses and duplexes.</p> <p>A Dwelling may include parking stalls, garage areas, storage areas and similar areas or spaces that are used in conjunction with the living quarters of the Customer.</p>
Electric Tariff	These Terms and Conditions, the Rate Schedules and all Electric Tariff Supplements.
Electric Tariff Supplement	A form of agreement for Service entered into by a Customer and BC Hydro pursuant to section 2.2 (Electric Tariff Supplements) of these Terms and Conditions, as filed with the British Columbia Utilities Commission from time to time.
Electricity	Both Demand and Energy or either, as the context requires.
Energy	Electric consumption, measured in kilowatt hours (kWh).

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 1 – ~~Revision 6~~ Revision 7

Effective: ~~August 14, 2020~~

Page 1-4

Estimated Construction Cost	The cost estimated by BC Hydro to construct an Extension, a Service Connection or Optional Facilities pursuant to section 8.3 (Extension Fee for Rate Zone I), as the context requires.
Evacuation Order	An order issued by a local authority, provincial government, federal government, or First Nations band council during a State of Emergency, which requires Evacuee Customers remain away from their Premises until the Evacuation Order is lifted by the issuing authority.
Evacuation Period	The period during which an Evacuee Customer is under an Evacuation Order.
Evacuee Customer	<p>A Customer who receives Service under the following Rate Schedules as amended and filed with the British Columbia Utilities Commission from time to time, and who is under an Evacuation Order:</p> <ol style="list-style-type: none"> 1. Residential Service (Rate Schedules 1101, 1121, 1105, 1107, 1127, 1148, 1151 and 1161); 2. Small General Service (Rate Schedule 1234, 1205, 1300, 1301, 1310 and 1311); 3. Irrigation Service (Rate Schedule 1401); and 4. Street Lighting Service (Rate Schedule 1755).
Extension	An addition to or an increase in the capacity of BC Hydro's distribution system required to meet new or increased Service requirements, but excluding Service Connections.
Extension Fee	A contribution-in-aid of construction of an Extension, calculated as set out in section 8.3 (Extension Fee for Rate Zone I).
Financing Agreement	An agreement under which BC Hydro provides financing to a Customer for improving the energy efficiency of a Premises.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 1 – ~~Revision 6~~ Revision 7

Effective: ~~August 14, 2020~~

Page 1-5

General Service	<p>Service for business, commercial, institutional or industrial use, including use in nursing homes, boarding houses, rooming houses, common areas of multiple occupancy buildings, recreational establishments, marinas and yacht clubs, hotels, motels, mobile home parks and similar establishments or parts thereof, or for any other use not specifically provided for in the Electric Tariff.</p> <p>For greater certainty, General Service is not available for use in circumstances where Transmission Service or Street Lighting Service is available for use, and is available as an alternative to Residential Service only in the circumstances described in section 6.1.3 (General Service Election – Residential Customers) and as an alternative to Irrigation Service only in the circumstances described in section 6.1.4 (General Service Election – Irrigation Customers).</p>
Guarantor	<p>A BC Hydro Customer who agrees to be responsible for another Customer's security deposit amount as required by section 2.6.3 (Security) and who meets BC Hydro's requirements for acting as a Guarantor.</p>
Irrigation Service	<p>Except where General Service is requested pursuant to section 6.1.4 (General Service Election – Irrigation Customers), Service for irrigation and outdoor sprinkling use where associated motor loads are 746 watts (W) or more.</p>
Legacy Meter	<p>An Electricity meter, other than a Smart Meter or a Radio-off Meter, that is of a type in use by BC Hydro.</p>
Maximum Demand	<p>The highest Demand averaged over a time interval of not more than 32 consecutive minutes that is registered during a specified period by a meter with Demand measurement capability.</p>
Metering Equipment	<p>An assembly of metering and ancillary equipment, including one or more Legacy Meters, Radio-off Meters and / or Smart Meters, auxiliary control units, cabling, communication links, range extenders and any other devices owned and used by BC Hydro in connection with metering Electricity for a Premises, providing remote access to the metered data and / or monitoring the condition of the installed equipment, as applicable.</p>

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 1 – ~~Revision 6~~ Revision 7

Effective: ~~August 14, 2020~~

Page 1-6

Month	A period of from 27 to 33 consecutive days.
Owner	The legal or beneficial owner(s) of a building or Premises or an agent or other authorized representative of such owner(s), such as a property manager, strata corporation or developer, as the context requires.
Permanent Service	Service that is not Temporary Service.
Person	A natural person, partnership, corporation, society, unincorporated entity or body politic.
Point of Delivery	The location at which the Service Connection is connected to the Metering Equipment or the Customer's electrical facilities, whichever comes first.
Power Factor	<p>The ratio determined by the following formula and based on monthly measurements of kilowatt hours (kWh) and lagging kilovolt-ampere reactive hours (kVarh) or at BC Hydro's discretion by random checks from time to time.</p> $\text{Power Factor} = \frac{kWh}{\sqrt{kWh^2 + kVarh^2}}$
Premises	A building, a separate unit of a building, a Dwelling or machinery, together with the surrounding land.
Primary Voltage	A voltage of 750 volts (V) or more measured phase to phase.
Radio-off Meter	A Smart Meter adjusted so that the meter's components that transmit and receive data by radio are deactivated.
Rate Schedule	A schedule that sets out rates for Service and other terms and conditions, as filed with the British Columbia Utilities Commission from time to time.
Rate Zone I	All distribution areas served by BC Hydro within the limits from time to time outlined in Rate Map A included in these Terms and Conditions, as well as the Districts of Kingsgate-Yahk and Lardeau-Shutty Bench.
Rate Zone IB	Bella Bella.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 1 – ~~Revision 6~~ Revision 7

Effective: ~~August 14, 2020~~

Page 1-7

Rate Zone II	Anahim Lake, Atlin, Bella Coola, Dease Lake, Elhateese, Fort Ware, Good Hope Lake, Haida Gwaii, Hartley Bay, Jade City, Telegraph Creek District, Toad River and Tsay Keh Dene.
Residential Service	<p>Except as otherwise provided in section 6.1.3 (General Service Election – Residential Customers), Service for use:</p> <ol style="list-style-type: none"> 1. In Dwellings, including Dwellings where a portion is used to carry on a business; 2. In the common areas of multiple occupancy buildings if such common areas are used only for the common benefit of Dwellings in that building; and 3. At farms, in the circumstances described in section 6.1.2 (Eligibility of Farms for Residential Service).
Secondary Voltage	A voltage of less than 750 volts (V) measured phase to phase.
Service	The provision by BC Hydro of Electricity to a Premises.
Service Agreement	The agreement setting out the rights and responsibilities of BC Hydro and a Customer for Service, including the application for Service accepted by BC Hydro (if any), all applicable provisions of the Terms and Conditions and applicable Rate Schedule(s), and any additional terms and conditions of Service as agreed by BC Hydro and the Customer in an Electric Tariff Supplement or otherwise.
Service Connection	That part of the BC Hydro distribution system extending between a Point of Delivery and the first point of attachment to the rest of the BC Hydro distribution system.
Smart Meter	<p>An Electricity meter that:</p> <ol style="list-style-type: none"> 1. Meets the requirements set out in section 2 of the <i>Smart Meters and Smart Grid Regulation</i>, B.C. Reg. 368/2010, and 2. Has components that transmit data by radio and those components are activated.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 1 – ~~Revision 6~~ Revision 7

Effective: ~~August 14, 2020~~

Page 1-8

State of Emergency	A state of emergency declared by a local authority, provincial government, federal government, or First Nations band council, pursuant to a statutory authority.
Street Lighting Service	BC Hydro-Owned Street Lighting Service or Customer-Owned Street Lighting Service or both, as the context requires.
System Improvement Costs	The incremental cost of work on BC Hydro's distribution system, including substations, attributed to new or increased Service requirements, as estimated by BC Hydro.
Temporary Service	Service that will or, in BC Hydro's determination, is likely to be taken temporarily.
Termination	Cessation of Service to a Premises under any applicable Rate Schedule(s) or termination of the Service Agreement with a Customer, as the context requires.
Terms and Conditions	These terms and conditions of Service, as filed with the British Columbia Utilities Commission from time to time.
Transformation	The transformation of Primary Voltage to Secondary Voltage, including all associated labour, equipment and materials.
Transmission Service	Service for commercial, industrial and institutional Customers, provided at 60 kilovolts (kV) or more.
Two Months	A period of from 54 to 66 consecutive days.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

1.3 Map of Rate Zones

Rate map
RATE ZONE LIMITS

ZONE I	ZONE IB	ZONE II
<p>— Integrated Service Area</p> <p>Districts of:</p> <p>⊙ Fort Nelson</p> <p>⊙ Eddontenajon</p> <p>⊙ Kingsgate – Yahk</p> <p>⊙ Lardeau – Shutty Bench</p>	<p>District of:</p> <p>⚠ Bella Bella</p>	<p>Districts of:</p> <p>⋯ Haida Gwaii</p> <p>⊙ Anahim Lake</p> <p>⊙ Atlin</p> <p>⊙ Bella Coola</p> <p>⊙ Dease Lake</p> <p>⊙ Elhateese</p> <p>⊙ Fort Ware</p> <p>⊙ Good Hope Lake</p> <p>⊙ Hartley Bay</p> <p>⊙ Jade City</p> <p>⊙ Telegraph Creek</p> <p>⊙ Toad River</p> <p>⊙ Tsay Keh Dene</p>



ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

5. METER READING AND BILLING

5.1 Meter Reading

The interval between consecutive meter readings will be at the sole discretion of BC Hydro.

Where the Rate Schedule under which the Customer takes Service does not require measurement of the Customer's Demand, the meter will normally be read once every two months; otherwise meters will normally be read once per month.

5.2 Billing

5.2.1 Regular Billing

Bills will be rendered on the basis of actual Energy consumed and, where applicable, Demand, as registered by a meter or meters and in accordance with the Rate Schedule under which the Customer takes Service, except:

1. Where the Service is not metered;
2. To the extent that section 6.3 (Late Payment Charge) applies;
3. Where the bill is being rendered in accordance with section 2.6.2 (Pay As You Go Billing), or section 5.6 (Monthly Equal Payments);
4. Where section 5.2.2 (Change in Rate Schedule) applies;
5. Where a Customer Crisis Fund Grant or a COVID Relief Fund for Residential Customers Grant has been issued, or a Customer Crisis Fund Return or a COVID Relief Fund Return has been requested, by BC Hydro; or
6. To the extent that section 5.8 (Evacuation Relief) applies.

If meter readings cannot be obtained for any reason, including where the meter fails to register or registers incorrectly, the Demand or Energy consumption or both may be estimated by BC Hydro for billing purposes and the next bill for which actual meter readings are available will be adjusted for the difference between estimated and actual use over the interval between meter readings. Estimated bills are deemed to have the same force and effect under the Electric Tariff as bills that are based on actual meter readings.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 5 – ~~Revision 4~~ **Revision 5**

Effective: ~~August 14, 2020~~

Page 5-2

If meters are read at longer or shorter intervals than the period set out in the Rate Schedule under which the Customer takes Service, the minimum charge, the service charge, the number of kilowatt hours in each step and, if applicable, the Demand charge set out in such Rate Schedule will be prorated before the bill is calculated based on a 365-day year.

5.2.2 Change in Rate Schedule

In circumstances where a Rate Schedule is changed and the effective date of the change falls between the dates of two successive meter readings, BC Hydro will render a bill determined upon a prorated basis.

5.3 Payment of Bills

Bills will be rendered as often as deemed necessary by BC Hydro. The amount payable as shown on a bill is owed to BC Hydro on the billing date. To avoid a Late Payment Charge under section 6.3 (Late Payment Charge), the amount payable must be paid in full on or before the due date shown on the bill, which will be:

1. The first business day after the 21st calendar day following the billing date; or
2. Such other period as may be defined in an Electric Tariff Supplement or otherwise agreed by the Customer and BC Hydro.

Bills may be paid by any payment method set out at www.bchydro.com/payments. Information on bill payment options can also be obtained by contacting the customer service department of BC Hydro.

5.4 Billing of Fractional Demand

A Billing Demand that includes a fraction will be deemed to be the nearest whole unit of Demand below that fraction.

The minimum Billing Demand will, except where the context otherwise requires, be deemed to be 1 kW or 1 kVA, whichever is applicable.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 5 – ~~Revision 4~~ Revision 5

Effective: ~~August 14, 2020~~

Page 5-3

5.5 Waiver of Minimum Charges

Where the Owner of a motel or mobile home park is the Residential Service Customer for any separately metered unit of accommodation in the motel or mobile home park, whether pursuant to BC Hydro requirements or otherwise, and if no Electricity is consumed in such unit during an interval between meter readings, the minimum charge otherwise applicable to such interval will be waived.

In multi-unit residential buildings where separate meters for the units are installed during construction of the building, minimum charges will apply only after Service to the relevant unit is energized.

5.6 Monthly Equal Payments

On application by a Customer, BC Hydro will, provided the Customer's credit is established to the satisfaction of BC Hydro, permit the Customer to pay fixed monthly installments on account of Electricity consumed by the Customer during all or any part of a 12-month period commencing with an actual meter reading at the Customer's Premises (the Budget Period). Monthly installments will be fixed so that the sum of the installments to be paid during the Budget Period equals the amount BC Hydro estimates will be payable under the applicable Rate Schedule for Electricity consumed during the Budget Period. BC Hydro may at any time revise its estimate of a Customer's consumption and increase or decrease the amount of monthly installments payable by the Customer accordingly.

Payment of monthly installments pursuant to this section may be terminated by the Customer at any time by giving five days' notice of termination to BC Hydro, or by BC Hydro without notice if the Customer has not maintained credit to the satisfaction of BC Hydro.

At the end of each Budget Period or upon its earlier termination the amount payable by the Customer to BC Hydro for Electricity actually used during the Budget Period will be compared against the sum of the monthly installments paid by the Customer during that period, and any deficit will be paid by the Customer to BC Hydro, and any excess will be paid or credited by BC Hydro to the Customer on the next bill.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 5 – ~~Revision 4~~ Revision 5

Effective: ~~August 14, 2020~~

Page 5-4

5.7 Back-Billing

Pursuant to the *Utilities Commission Act*, this Electric Tariff constitutes the consent of the British Columbia Utilities Commission to allow BC Hydro, in the circumstances herein specified, to charge, demand, collect and receive from its Customers in respect of a regulated service rendered a greater or lesser compensation than that specified in the Terms and Conditions or applicable Rate Schedules.

1. Back-billing means the re-billing by BC Hydro for services rendered to a Customer because the original billings were discovered to be either too high (over-billed) or too low (under-billed). The discovery may be made by either the Customer or BC Hydro, including as a result of an inspection under the *Electricity and Gas Inspection Act (Canada)*. The cause of the billing error may include any one or more of the following non-exhaustive reasons:
 - (a) Stopped meter
 - (b) Metering Equipment failure
 - (c) Missing meter now found
 - (d) Switched meters
 - (e) Double metering
 - (f) Incorrect meter connections
 - (g) Incorrect use of any prescribed apparatus respecting the registration of a meter
 - (h) Incorrect meter multiplier
 - (i) Application of an incorrect rate
 - ~~(j)~~ (j) Incorrect reading of meters or data processing
 - ~~(j)(k)~~ (k) Incorrect information on the load, or load characteristics, or hours of use for unmetered services, and
 - ~~(k)(l)~~ (l) Tampering, fraud, theft or any other criminal act.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 5 – ~~Revision 4~~ Revision 5

Effective: ~~August 14, 2020~~

Page 5-5

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2. Whenever the dispute procedure of the *Electricity and Gas Inspection Act (Canada)* is invoked, the provisions of that Act will apply, except insofar as they purport to determine the nature or extent of legal liability flowing from metering or billing errors.
 3. Where metering or billing errors occur and the dispute procedure under the *Electricity and Gas Inspection Act (Canada)* is not invoked, Energy consumption and Demand for billing purposes will be determined based on the records of BC Hydro or, to the extent they are available and accurate, the records of the Customer, or if no such records are available, based on BC Hydro's reasonable and fair estimates made consistently within each Customer class or according to the agreement for Service with the Customer, if applicable.
 4. In every case of under-billing or over-billing, the cause of the error will be remedied without delay, and the Customer will be promptly notified of the error and of the effect upon the Customer's ongoing bill.
 5. The provisions of paragraph 7 below do not apply and, subject to the applicable limitation period provided by law, back-billing may be applied for the whole period of under-billing ~~or over-billing~~ if:
 - (a) There are reasonable grounds to believe that the Customer has tampered with or otherwise used BC Hydro's Service in an unauthorized way, or evidence of fraud, theft or another criminal act exists, or if a reasonable Customer should have known of an under-billing and failed to promptly bring it to the attention of BC Hydro; or
 - (b) The required adjustment to the Customer's bill is minor, such as in the case of an estimated bill under section 5.2.1 (Regular Billing) or section 5.6 (Monthly Equal Payments); or
 - ~~(c)~~ The required adjustment to the Customer's bill relates to the under-billing ~~or over-billing~~ of a standard charge set out in section 11 (Schedule Standard Charges), except Legacy Meter Charges and Radio-off Meter Charges under section 11.4 (Miscellaneous Standard Charges); ~~or~~
 - ~~(e)~~ (d) The Service is provided on an unmetered basis in accordance with the applicable rate schedule and the billing error occurred because the Customer did not immediately notify BC Hydro of changes in load, or load characteristics, or hours of use.
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ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 5 – ~~Revision 4~~Revision 5
Effective: ~~August 14, 2020~~

Page 5-6

In addition, the Customer is liable for the direct (unburdened) administrative costs incurred by BC Hydro in the investigation of any incident of tampering, unauthorized use or criminal activity, including the direct costs of repair and replacement of equipment.

Under-billing resulting from circumstances described in ~~this~~ paragraph 5.7.5 (a) will bear interest at the rate normally charged by BC Hydro on unpaid accounts from the date of the original under-billed invoice until the amount under-billed is paid in full.

Under-billing resulting from circumstances described in this paragraph 5.7.5 (b) and 5.7.5 (c) not will bear interest.

Under-billing resulting from circumstances described in paragraph 5.7.5 (d) will bear interest at BC Hydro's weighted average cost of debt, calculated for BC Hydro's most recent fiscal year, from the date of the date of the changes in load, or load characteristics, or hours of use, except when BC Hydro is notified of the change in load, load characteristics or hours of use within six months of the Customer making the change.

6. Other than as set out below, in every case of over-billing, BC Hydro will refund to the Customer all money incorrectly collected for the duration of the error, except that if the date the error first occurred cannot be determined with reasonable certainty, the maximum refund period will be two years back from the date the error was discovered.

In the case of an over-billing in the circumstances described in paragraph 5.7.5(d) above, BC Hydro will refund to the Customer all money incorrectly collected for the duration of the error back to the date on which it received from the Customer notification of the changes in load, or load characteristics, or hours of use, up to a maximum of six months.

Over-billing resulting from the circumstances described in paragraph 5.7.5 (b), (c) and (d) will not bear interest. For all other cases of over-billing, interest will be paid to the Customer at a rate equal to BC Hydro's weighted average cost of debt, calculated for BC Hydro's most recent fiscal year.

7. ~~Subject to paragraph 5 above, in~~In every case of under-billing, BC Hydro will back-bill the Customer for the duration of the error up to a maximum of:
- (a) Six months for Residential Service, small General Service (commercial) or Irrigation Service Customers; and

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 5 – ~~Revision 4~~ **Revision 5**

Effective: ~~August 14, 2020~~

Page 5-7

- (b) One year for all other Customers or such other time period as is set out in a special or individually negotiated contract with BC Hydro.

BC Hydro will offer under-billed Customers reasonable terms of payment for the under-billed amount; if requested by the Customer, the payment term will be equivalent in length to the back-billing period. All under-billed amounts will be ~~interest free and be~~ billed and paid in equal installments corresponding to the normal billing cycle.

Delinquency in payment of such installments will, ~~however,~~ be subject to the usual Late Payment Charges pursuant to section 6.3 (Late Payment Charge).

If a Customer disputes BC Hydro's assessment of an under-billed amount based on Energy consumption or Demand or duration of the error, BC Hydro will not threaten or cause Termination as a result of Customer's failure to pay the disputed portion of the back-billing, unless there are no reasonable grounds for the Customer to dispute same. The undisputed portion of the bill will be paid by the Customer and BC Hydro may threaten or cause Termination if such undisputed portion of the bill is not paid.

8. Subject to paragraph 5 above, in all instances of back-billing where changes of occupancy have occurred, BC Hydro will make a reasonable attempt to locate the former Customer. If, after a period of one year, such Customer cannot be located, the over- or under-billing applicable to that Customer will be cancelled.

5.8 Evacuation Relief

Pursuant to the *Utilities Commission Act*, this Electric Tariff constitutes the consent of the British Columbia Utilities Commission to allow BC Hydro, in the circumstances herein specified, to charge, demand, collect and receive from its Customers in respect of a regulated service rendered a greater or lesser compensation than that specified in the Terms and Conditions or applicable Rate Schedules.

The following terms and conditions will apply for evacuation relief:

1. Where BC Hydro becomes aware of an Evacuation Order, for any Evacuee Customer who is subject to that Evacuation Order BC Hydro waives the following specified charges as those charges are set out in an applicable Rate Schedule under which the Evacuee Customer takes Service on the date of the Evacuation Order, for the duration of the Evacuation Period:

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 5 – ~~Revision 4~~ Revision 5

Effective: ~~August 14, 2020~~

Page 5-8

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- (a) Residential Service (Rate Schedules 1101, 1121, 1105, 1107, 1127, 1148, 1151 and 1161) – Basic Charge, Energy Charge, and the Customer Crisis Fund Rate Rider as set out in Rate Schedule 1903 (as applicable);
 - (b) Small General Service (Rate Schedules 1234, 1205, 1300, 1301, 1310 and 1311) – Basic Charge, Energy Charge, and Minimum Charge;
 - (c) Irrigation Service (Rate Schedule 1401) – Energy Charge; and
 - (d) Street Lighting Service (Rate Schedule 1755) – Charge per fixture for each month the Evacuation Order is in effect.
 2. In addition to the charges waived in paragraph 1 above, if an Evacuee Customer's Dwelling is destroyed during the Evacuation Period, BC Hydro waives the following charges for the Evacuee Customer:
 - (a) All outstanding charges for Service for the period immediately after the last billing period, up to the date on which the Dwelling was destroyed; and
 - (b) The Service Connection charge as set out in section 3.14 (Service Connection Charges), applicable to the restoration of the same Service at a Dwelling that the Evacuee Customer rebuilds, provided that the Service Connection charge is not recoverable as part of the Evacuee Customer's insurance.

In the event that a Dwelling is destroyed immediately preceding or following the Evacuation Period, BC Hydro may, in its sole discretion, waive the charges set out in this subsection. For clarity, the charges waived in paragraph 2(b) do not include costs estimated by BC Hydro to construct, including, but not limited to, any Extension or Optional Facilities.
 3. Notwithstanding the provisions in paragraph 1 and paragraph 2, BC Hydro may, in its discretion, refuse to waive the charges in paragraph 1 and paragraph 2 above, if
 - (a) The Evacuation Period is for a period less than five consecutive days; or
 - (b) An Evacuation Order has ended more than two years before the date BC Hydro receives a request from an Evacuee Customer or otherwise becomes aware of the Evacuation Order.
 4. In addition, BC Hydro may, in its discretion, waive Energy Charges as set out in an applicable Rate Schedule for Medium General Service (Rate Schedules 1500, 1501,

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 5 – ~~Revision 4~~Revision 5

Effective: ~~August 14, 2020~~

Page 5-9

1510 and 1511), Exempt General Service (Rate Schedules 1200, 1201, 1210 and 1211), General Service (35 kW and Over) (Rate Schedules 1255, 1256, 1265, and 1266), or Large General Service (Rate Schedules 1600, 1601, 1610, and 1611), if

- (a) The Customer is subject to an Evacuation Order; and
 - (b) The Service is for use in a nursing home, boarding house, rooming house, common area of multiple occupancy building, mobile home park or similar establishment.
5. A charge waived under paragraph 1 and paragraph 2, if shown on an Evacuee Customer's bill, is in the form of a credit to the Evacuee Customer's account. Interest will not be paid on any amounts credited to the Evacuee Customer's account under this section in any circumstance.

5.9 Unmetered Loads

At its discretion, BC Hydro may permit unmetered Service when identified in the Special Conditions of specified rate schedules. Unmetered Service may be permitted if BC Hydro can estimate to its satisfaction the Energy used in kilowatt hours over a billing period based on the connected load, load characteristics and hours of use.

The Customer, if required by BC Hydro, will provide and maintain such controls, including timing devices, as BC Hydro considers necessary, and facilities satisfactory to BC Hydro for the maintenance of such controls. The Customer will supply, install and maintain all wiring, fixtures, control devices and equipment at the Customers expense. All wiring, fixtures, control devices and equipment and the method of installing, operating and maintaining the same are subject to the approval of BC Hydro which approval may be withdrawn by BC Hydro, at any time, at BC Hydro's sole discretion.

The electricity use of the Customer's unmetered Service will be as specified by the Customer or as estimated by BC Hydro, whichever is greater.

The Customer will notify BC Hydro as soon as practicable but within six months of any proposed or actual change in load, load characteristics, or hours of use.

BC Hydro may at any time, in its sole discretion, require the Customer to install Metering Equipment, and thereafter bill the Customer on the appropriate Rate Schedule as a metered account. The installation of Metering Equipment will be at the Customer's expense if

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 5 – ~~Revision 4~~ Revision 5

Effective: ~~August 14, 2020~~ _____

Page 5-10

BC Hydro determines that the Customer's proposed or actual change in load or load characteristics is no longer appropriate for an unmetered service and BC Hydro can no longer estimate to its satisfaction the the Energy used in kilowatt hours over a billing period based on load, load characteristics and hours of use.

For display signs and signboard lighting, where hours of use are controlled by timing devices, the following turn-on times will apply, unless BC Hydro otherwise agrees in writing:

Period Turn-on Time

January 1 to January 15: 4:00 p.m.

January 16 to February 28: 4:30 p.m.

March 1 to April 30: 6:30 p.m.

May 1 to August 15: 8:30 p.m.

August 16 to September 30: 6:30 p.m.

October 1 to November 15: 4:30 p.m.

November 16 to December 31: 4:00 p.m.

In all cases, where hours of use of display signs or signboard lighting commence at dusk and are controlled either by timing devices or by photo-electric cells, the following hours of use for a period of two months will be deemed for billing purposes:

Dusk to 10 p.m.: 216 hours

Dusk to 11 p.m.: 270 hours

Dusk to 12 p.m.: 330 hours

Dusk to 1 a.m.: 380 hours

Dusk to Dawn: 666 hours

(All times are Pacific Time.)

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

6. RATES AND CHARGES

6.1 Rates

6.1.1 Application of Rate Schedules

The rates to be charged by and paid to BC Hydro for Service will be the rates set out in the Rate Schedules from time to time in effect or elsewhere in the Electric Tariff, available at www.bchydro.com or upon request.

Customers may be served under any Rate Schedule for which they meet the applicability criteria. BC Hydro will endeavour to provide the Customer with information and advice regarding rates available to the Customer from time to time, but will not be responsible if the most favourable rate is not selected.

BC Hydro may conduct periodic reviews of a Customer's account and, where the Customer no longer meets the applicability criteria of a particular Rate Schedule, change the Customer to the appropriate Rate Schedule.

The Customer may also apply at any time to be billed on a different Rate Schedule and BC Hydro may, in its sole discretion, reject, defer or approve such application. BC Hydro will not approve a Customer request to move to another Rate Schedule where:

1. The Customer was billed under such Rate Schedule at any time during the preceding 12-month period; or
2. Such Rate Schedule is, in the opinion of BC Hydro, not available to the Customer.

6.1.2 Eligibility of Farms for Residential Service

Residential Service is available for use at farms, except:

1. Lodging on a farm that is not a Dwelling;
2. For use in the processing of farm products produced elsewhere;
3. For use in selling farm or other products to the general public, other than from a small roadside stand; or
4. For use for any commercial operation not ordinarily conducted on a farm.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 6 – ~~Revision 1~~Revision 2
Effective: ~~April 29, 2019~~

Page 6-2

6.1.3 General Service Election – Residential Customers

General Service is available as an alternative to Residential Service only where (i) the Customer or applicant for Service (as applicable) is eligible for Residential Service but requests General Service, and (ii) the Service will be used:

1. In a Dwelling, a portion of which is used to carry on a business, where Billing Demand and Energy consumption at the Premises meet the availability requirements of Medium General Service or Large General Service; or
2. At a farm, where the Billing Demand and Energy consumption at the Premises meet the availability requirements of Medium General Service or Large General Service; or
3. In the common areas of multiple occupancy buildings if such common areas are used only for the common benefit of Dwellings in that building.

6.1.4 General Service Election – Irrigation Customers

General Service is available as an alternative to Irrigation Service only where the Customer or applicant for Service (as applicable) is eligible for Irrigation Service but requests General Service.

6.1.5 General Service for Street Lighting

If a Customer or applicant for Service (as applicable) is eligible for Street Lighting Service and the Customer or applicant for Service chooses to connect the lighting use through the same Service Connection on a metered basis as a use or uses that are eligible for General Service, then Service to such mixed uses will be provided on the applicable General Service Rate Schedule.

6.2 Use of Electricity

A Customer will use Electricity only for the purposes permitted under the availability clause of the Rate Schedule under which the Customer takes Service.

6.3 Late Payment Charge

If the amount payable shown on a bill is not paid in accordance with section 5.3 (Payment of Bills), and if the unpaid balance is \$30 or more, the subsequent bill will, in addition to the overdue amount, include a Late Payment Charge calculated from the billing date as set out in

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 6 – ~~Revision 1~~Revision 2
Effective: ~~April 29, 2019~~

Page 6-3

section 11.4 (Miscellaneous Standard Charges). To allow time for payments made to BC Hydro to reach BC Hydro's payment processing centre and to coordinate the billing of Late Payment Charges with scheduled billing cycles, BC Hydro may, in its discretion, waive Late Payment Charges.

6.4 Returned Payment Charge

If a cheque received by BC Hydro from a Customer or a pre-authorized payment deduction or electronic funds transfer in payment of any account or Financing Agreement amount is returned or stopped by the Customer's bank, trust company or financial institution because of insufficient funds, or any reason other than clerical error, a Returned Payment Charge, as set out in section 11.4 (Miscellaneous Standard Charges), for processing each failed payment will be added to the amount due and payable by the Customer whether or not the Service has been Disconnected.

6.5 Account Charge

When a change of Customer on an account for a Premises occurs an Account Charge as set out in section 11.4 (Miscellaneous Standard Charges) will be paid by the new Customer with respect to each account in that Customer's name for which a separate bill is rendered by BC Hydro, except that:

1. If the new Customer is, or was, the spouse of the former Customer, no such Account Charge will apply; and
2. If the new Customer is the Owner of a multi-tenant building, an Account Charge will apply only the first time a particular Dwelling account in the building is changed to the name of such Owner.

6.6 Call-Back Charges

6.6.1 Service Connection Call-Back Charge

A Service Connection Call-Back Charge, as set out in section 11.4 (Miscellaneous Standard Charges), will be paid by the Customer each time a BC Hydro representative attends the Customer's Premises to install or modify a Service Connection at the request of the Customer and is unable to complete the work because the facilities required to be provided by the Customer, for the purpose of the Service Connection are deficient.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 6 – ~~Revision 1~~Revision 2
Effective: ~~April 29, 2019~~

Page 6-4

6.6.2 Failed Installation Charge

A Failed Installation Charge, as set out in section 11.4 (Miscellaneous Standard Charges), will be paid by the Customer each time a BC Hydro representative attends the Customer's Premises to install Metering Equipment but is unable to complete the work because of an obstruction or an objection made by the Customer.

6.7 Minimum Reconnection Charge

A Customer will pay a Minimum Reconnection Charge, as set out in section 11.3 (Minimum Reconnection Charges), when Service is reconnected to a Premises previously Disconnected for the following reasons, and where all Metering Equipment and other BC Hydro equipment used to provide Service remains in place:

1. To permit the Customer to make alterations to or on private property;
2. Because BC Hydro was ordered to Disconnect by the appropriate inspection authority;
or
3. Where Service was Disconnected for any reason set out in section 2.4 (Refusal to Provide Service and Termination by BC Hydro).

BC Hydro may add to the Minimum Reconnection Charges set out in section 11.3 (Minimum Reconnection Charges), an amount to cover the costs incurred by BC Hydro when there are unusual circumstances.

A Customer will not be required to pay a Minimum Reconnection Charge under section 11.3 (Minimum Reconnection Charges) when the Disconnection was made:

1. For reasons of public safety, unless attributable to actions of the Customer;
2. By BC Hydro because no application for Service had been received in respect of such Service; or
3. For service requirements of BC Hydro.

6.8 Taxes and Levies

The rates and charges set out in the Electric Tariff do not include the goods and services tax (**GST**), the provincial services tax (**PST**) or any other tax or levy which BC Hydro may be lawfully authorized or required to add to its normal rates and charges.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1234 – ~~Revision 4~~ Revision 5

Effective: April 2, 2020

Page 2-7

2. GENERAL SERVICE

RATE SCHEDULE 1234 – SMALL GENERAL SERVICE (UNDER 35 KW) – ZONE II

Availability	<p>For all purposes where a meter with Demand measurement capability is not installed because the Customer's Demand as estimated by BC Hydro is less than 35 kW.</p> <p>Supply is 60 hertz, single or three phase at an available Secondary Voltage.</p>
Applicable in	Rate Zone II.
Rate	<p>Basic Charge: 26.46 ¢ per day</p> <p>plus</p> <p>Energy Charge:</p> <p>First 7000 kWh per month @ 12.59 ¢ per kWh</p> <p>All additional kWh per month @ 20.96 ¢ per kWh</p> <p>Minimum Charge: The Basic Charge</p>
Special Conditions	<p>Special Conditions for Unmetered Service:</p> <ol style="list-style-type: none"> <u>BC Hydro at its discretion may permit unmetered Service under this Rate Schedule 1234</u>BC Hydro may permit unmetered Service under this Rate Schedule if it can estimate to its satisfaction the Energy used in kilowatt hours over a period of two months based on the connected load and the hours of use. The Customer, if required by BC Hydro, will provide and maintain such controls, including timing devices, as BC Hydro considers necessary, and facilities satisfactory to BC Hydro for the maintenance of such controls. The hours of use per period will be as specified by the Customer or as estimated by BC Hydro, whichever is greater.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1234 – ~~Revision 4~~Revision 5

Effective: April 2, 2020

Page 2-8

- ~~4. The Customer will supply, install and maintain all wiring, fixtures, control devices and equipment, including the controls and devices described in Special Condition No. 2, at the expense of the Customer.~~
- ~~5. All wiring, fixtures, control devices and equipment and the method of installing, operating and maintaining the same are subject to the approval of BC Hydro which approval may be withdrawn by BC Hydro, at any time, at BC Hydro's sole discretion.~~
- ~~6. The Customer will notify BC Hydro immediately of any proposed or actual change in load, load characteristics, or hours of use.~~
- ~~7. BC Hydro may at any time, in its sole discretion, install Metering Equipment, and thereafter bill the Customer on the appropriate Rate Schedule as a metered account.~~
8. For display signs and signboard lighting, where hours of use are controlled by timing devices, the following turn-on times will apply, unless BC Hydro otherwise agrees in writing:

Period	Turn-on Time
January 1 to January 15:	4:00 p.m.
January 16 to February 28:	4:30 p.m.
March 1 to April 30:	6:30 p.m.
May 1 to August 15:	8:30 p.m.
August 16 to September 30:	6:30 p.m.
October 1 to November 15:	4:30 p.m.
November 16 to December 31:	4:00 p.m.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1234 – ~~Revision 4~~ Revision 5

Effective: ~~April 2, 2020~~ _____

Page 2-9

	<p>9. In all cases, where hours of use of display signs or signboard lighting commence at dusk and are controlled either by timing devices or by photo-electric cells, the following hours of use for a period of two months will be deemed for billing purposes:</p> <p>Dusk to 10 p.m.: 216 hours</p> <p>Dusk to 11 p.m.: 270 hours</p> <p>Dusk to 12 p.m.: 330 hours</p> <p>Dusk to 1 a.m.: 380 hours</p> <p>Dusk to Dawn: 666 hours</p> <p>(All times are Pacific Time.)</p>
Rate Rider	The Deferral Account Rate Rider as set out in Rate Schedule 1901 applies to all charges payable under this Rate Schedule, before taxes and levies.
Rate Increase / Rate Decrease	<p>Effective April 1, 2019 the rates under this Rate Schedule include an interim rate increase of 6.85% before rounding, approved by BCUC Order No. G-45-19.</p> <p>Effective April 1, 2020 the rates under this Rate Schedule include an interim rate decrease of 1.01% before rounding.</p>

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedules 1300, 1301, 1310, 1311 – ~~Revision 5~~ Revision 6

Effective: ~~April 2, 2020~~

Page 2-18

2. GENERAL SERVICE

RATE SCHEDULES 1300, 1301, 1310, 1311 – SMALL GENERAL SERVICE (UNDER 35 KW)

Availability	For Customers who qualify for General Service and whose Demand, metered or estimated by BC Hydro, as applicable, is less than 35 kW. Supply is 60 hertz, single or three phase at a Secondary or Primary Voltage.
Applicable in	Rate Zone I and Rate Zone IB.
Rate	Basic Charge: 36.08 ¢ per day plus Energy Charge: 12.40 ¢ per kWh Minimum Charge: The Basic Charge
Discounts	<ol style="list-style-type: none"> 1. A discount of 1½% will be applied to the above charges if Customer's supply of Electricity is metered at a Primary Voltage. 2. A discount of 25 ¢ per month per kW of Demand will be applied if a Customer supplies Transformation. 3. If a Customer is entitled to both of the above discounts, the discount for metering at a Primary Voltage will be applied first.
Rate Schedules	<ol style="list-style-type: none"> 1. Rate Schedule 1300: Applies if a Customer's supply of Electricity is metered at a Secondary Voltage and BC Hydro supplies Transformation. 2. Rate Schedule 1301: Applies if a Customer's supply of Electricity is metered at a Primary Voltage and BC Hydro supplies Transformation.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedules 1300, 1301, 1310, 1311 – ~~Revision 5~~ Revision 6

Effective: ~~April 2, 2020~~

Page 2-19

	<p>3. Rate Schedule 1310:</p> <p>Applies if a Customer's supply of Electricity is metered at a Secondary Voltage and the Customer supplies Transformation.</p> <p>4. Rate Schedule 1311:</p> <p>Applies if a Customer's supply of Electricity is metered at a Primary Voltage and the Customer supplies Transformation.</p>
Special Conditions	<p><u>1.</u> Special Conditions for Unmetered Service:</p> <p>4.1.1. BC Hydro at its discretion may permit unmetered Service under this these Rate Schedules 1300, 1301, 1310, and 1311. BC Hydro may permit unmetered Service under these Rate Schedules if it can estimate to its satisfaction the Energy used in kilowatt hours over a period of two months based on the connected load and the hours of use.</p> <p>2. The Customer, if required by BC Hydro, will provide and maintain such controls, including timing devices, as BC Hydro considers necessary, and facilities satisfactory to BC Hydro for the maintenance of such controls.</p> <p>3. The hours of use per period will be as specified by the Customer, or as estimated by BC Hydro, whichever is greater.</p> <p>4. The Customer will supply, install and maintain all wiring, fixtures, control devices and equipment, including the controls and devices described in Special Condition No. 2, at the expense of the Customer.</p> <p>5. All wiring, fixtures, control devices and equipment and the method of installing, operating and maintaining the same are subject to the approval of BC Hydro which approval may be withdrawn by BC Hydro, at any time, at BC Hydro's sole discretion.</p> <p>6. The Customer will notify BC Hydro immediately of any proposed or actual change in load, load characteristics, or hours of use.</p>

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedules 1300, 1301, 1310, 1311 – ~~Revision 5~~Revision 6

Effective: ~~April 2, 2020~~

Page 2-20

- ~~7. BC Hydro may at any time, in its sole discretion, install Metering Equipment, and thereafter bill the Customer on the appropriate Rate Schedule as a metered account.~~
8. ~~For display signs and signboard lighting, where hours of use are controlled by timing devices, the following turn-on times will apply, unless BC Hydro otherwise agrees in writing:~~
- | Period | Turn-on Time |
|----------------------------------------|-------------------------|
| January 1 to January 15: | 4:00 p.m. |
| January 16 to February 28: | 4:30 p.m. |
| March 1 to April 30: | 6:30 p.m. |
| May 1 to August 15: | 8:30 p.m. |
| August 16 to September 30: | 6:30 p.m. |
| October 1 to November 15: | 4:30 p.m. |
| November 16 to December 31: | 4:00 p.m. |
9. ~~In all cases, where hours of use of display signs or signboard lighting commence at dusk and are controlled either by timing devices or by photo-electric cells, the following hours of use for a period of two months will be deemed for billing purposes:~~
- | | |
|-----------------------------|----------------------|
| Dusk to 10 p.m.: | 216 hours |
| Dusk to 11 p.m.: | 270 hours |
| Dusk to 12 p.m.: | 330 hours |
| Dusk to 1 a.m.: | 380 hours |
| Dusk to Dawn: | 666 hours |
- ~~(All times are Pacific Time.)~~

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedules 1300, 1301, 1310, 1311 – ~~Revision 5~~ Revision 6

Effective: ~~April 2, 2020~~

Page 2-21

	<p><u>2.</u> Migration Rules:</p> <p><u>4-2.1.</u> Migration rules from Small General Service:</p> <p>Customers taking Service under these Rate Schedules will be moved to Service:</p> <p>(a) Under Rate Schedules 1500, 1501, 1510 or 1511 (Medium General Service) if Demand in half of the last six bi-monthly billing periods or half of the last 12 monthly billing periods (as applicable) was 35 kW or more, but less than 150 kW.</p> <p>(b) Under Rate Schedules 1600, 1601, 1610 or 1611 (Large General Service) if Demand in half of the last six bi-monthly billing periods or half of the last 12 monthly billing periods (as applicable) was 150 kW or more, or if total Energy consumption in any 12 consecutive month period exceeded 550,000 kWh.</p> <p><u>2-3.</u> Migration rules to Small General Service:</p> <p>Customers will be moved to Service under these Rate Schedules (Small General Service) from Rate Schedules 1600, 1601, 1610 or 1611 (Large General Service) or Rate Schedules 1500, 1501, 1510 or 1511 (Medium General Service) if Billing Demand in each of the last 12 billing periods was less than 35 kW.</p>
Rate Rider	The Deferral Account Rate Rider as set out in Rate Schedule 1901 applies to all charges payable under these Rate Schedules, before taxes and levies.
Rate Increase / Rate Decrease	<p>Effective April 1, 2019 the rates under these Rate Schedules include an interim rate increase of 6.85% before rounding, approved by BCUC Order No. G-45-19.</p> <p>Effective April 1, 2020 the rates under these Rate Schedules include an interim rate decrease of 1.01% before rounding.</p>

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1702 – ~~Revision 3~~ Revision 4

Effective: April 1, 2020

Page 4-4

4. STREET LIGHTING SERVICE

RATE SCHEDULE 1702 – PUBLIC AREA ORNAMENTAL STREET LIGHTING

Availability	For lighting of public highways, streets and lanes and municipal pathways and for public area seasonal lighting displays, in those cases where the Customer owns, installs and maintains the standards, fixtures, conductors and controls.
Applicable in	All Rate Zones.
Rate	Energy Charge: For each unmetered fixture: 3.73 ¢ per watt of Billing Wattage per month For each metered fixture: 11.21 ¢ per kWh
Definitions	Billable Wattage is the sum of all wattage, on all fixtures used by the Customer. For fixtures without dimming controls, the watts per fixture will include the wattage of the lamp plus, where applicable, the wattage of the ballast. For fixtures with dimming controls, the watts per fixture will be equal to: <ol style="list-style-type: none">1. The wattage of the lamp plus, where applicable, the wattage of the ballast, multiplied by2. The ratio of effective fixture wattage after dimming to fixture wattage before dimming.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1702 – ~~Revision 3~~ Revision 4

Effective: April 1, 2020

Page 4-5

**Special
Conditions**

1. Service Connection

Where necessary BC Hydro will provide an overhead or underground Service Connection in accordance with the Terms and Conditions of the Electric Tariff. No Service Connection will be made to add any ornamental street lighting system which does not provide for eight or more street lighting fixtures except that, if the potential is 120/240 volts, at BC Hydro's discretion, a Service Connection may be made for a system of less than eight.

Receptacle loads will be permitted for Service under this Rate Schedule provided that such receptacles are used predominantly for seasonal lighting displays, meaning that no more than 10% of the usage may be for other purposes.

Service to mixed uses including but not exclusively for lighting will be provided on the applicable General Service Rate Schedule.

2. Extension Policy

BC Hydro will construct a distribution Extension if required by the applicant in accordance with the Terms and Conditions of the Electric Tariff.

3. Power Factor

All installations of mercury vapour, sodium vapour or fluorescent lamps will be equipped with the necessary auxiliaries to assure that a Power Factor of not less than 90% lagging will be maintained.

4. Term of Service Agreement

The term of the initial Service Agreement under this Rate Schedule will be not more than five years; renewal periods will be for five years.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1702 – ~~Revision 3~~ Revision 4

Effective: ~~April 1, 2020~~ _____

Page 4-6

5. Fixtures with Automated Dimming Controls

The following special terms and conditions apply to lighting fixtures fitted with dimming controls:

- (a) For purposes of this Special Condition No. 5, “dimming controls” means control units or fittings attached to, or forming part of, a street lighting fixture capable of being programmed or remotely operated so as to reduce the lumens output of the lamps during specified hours each day while the lamps are in operation. The reductions may vary according to the hours of the day, the days of the week, and the seasons of the year.
- (b) A Customer wishing to have fixtures with dimming controls separately rated under this Rate Schedule must submit a dimming schedule satisfactory to BC Hydro listing each light fixture fitted with dimming controls, the wattage of the fixture (including the lamp and, where applicable, the ballast), the dimming control setting or settings and the hours each day that the dimming control setting or settings will be in operation.
- (c) Whenever the Customer wishes to make changes in the lighting fixtures listed in the dimming schedule or in the dimming control settings or hours of operation, the Customer will submit an updated lighting fixture schedule to BC Hydro listing any changes. Changes will be permitted on a semi-annual basis (twice per year).

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1702 – ~~Revision 3~~ Revision 4

Effective: ~~April 1, 2020~~ _____

Page 4-7

	<p>6. Unmetered Service</p> <p>(a) BC Hydro <u>at its sole discretion</u> may permit unmetered Service under this Rate Schedule. if it can estimate to its satisfaction the Energy used in kilowatt hours over a period of one month based on the connected load and hours of use.</p> <p>(b) The Customer will notify BC Hydro immediately of any proposed or actual change in load, or load characteristics, or hours of use.</p> <p>(c) BC Hydro, in its discretion, may at any time install Metering Equipment and thereafter bill the Customer on the Energy consumption registered.</p>
Rate Rider	The Deferral Account Rate Rider as set out in Rate Schedule 1901 applies to all charges payable under this Rate Schedule, before taxes and levies.
Rate Increase / Rate Decrease	<p>Effective April 1, 2019 the rates under this Rate Schedule include an interim rate increase of 6.85% before rounding, approved by BCUC Order No. G-45-19.</p> <p>Effective April 1, 2020 the rates under this Rate Schedule include an interim rate decrease of 1.01% before rounding.</p>

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1704 – ~~Revision 3~~ Revision 4
Effective: ~~April 1, 2020~~

Page 4-11

4. STREET LIGHTING SERVICE

RATE SCHEDULE 1704 – TRAFFIC CONTROL EQUIPMENT

Availability	For lighting of traffic signals, traffic signs and traffic warning devices, and other equipment for controlling or directing vehicular or pedestrian traffic on public highways in those cases where the Customer owns, installs, and maintains the standards, fixtures, controls and associated equipment.
Applicable in	All Rate Zones.
Rate	Energy Charge: 11.21 ¢ per kWh
Special Conditions	<p>1. Service Connections</p> <p>Where necessary BC Hydro will provide an overhead or underground Service Connection in accordance with section 3 of the Terms and Conditions (Provision of Electricity).</p> <p><u>Service to mixed uses including but not exclusively for lighting and / or traffic control will be provided under the applicable General Service Rate Schedule.</u></p> <p>2. Unmetered Service</p> <p>BC Hydro <u>at its discretion</u> may permit unmetered Service under this Rate Schedule if it can estimate to its satisfaction the Energy used in kilowatt hours over a period of one month based on the connected load and hours of use.</p> <p>(a) The Customer shall notify BC Hydro immediately of any proposed or actual change in load, or load characteristics, or hours of use.</p> <p>(b)(a) BC Hydro, in its discretion, may at any time install a meter or meters and thereafter bill the Customer on the consumption registered.</p>

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1704 – ~~Revision 3~~ Revision 4

Effective: ~~April 1, 2020~~ _____

Page 4-12

	<p>3. Term of Service Agreement</p> <p>The term of the initial Service Agreement under this Rate Schedule will be not more than five years; renewal periods will be for five years.</p>
Rate Rider	<p>The Deferral Account Rate Rider as set out in Rate Schedule 1901 applies to all charges payable under this Rate Schedule, before taxes and levies.</p>
Rate Increase / Rate Decrease	<p>Effective April 1, 2019 the rate under this Rate Schedule includes an interim rate increase of 6.85% before rounding, approved by BCUC Order No. G-45-19.</p> <p>Effective April 1, 2020 the rate under this Rate Schedule includes an interim rate decrease of 1.01% before rounding.</p>

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

1. INTERPRETATION AND DEFINITIONS

1.1 Interpretation

1.1.1 Conflicts

To the extent these Terms and Conditions conflict with any applicable Rate Schedule or Electric Tariff Supplement, the terms or conditions provided in such Rate Schedule or Electric Tariff Supplement will prevail. To the extent that an applicable Rate Schedule conflicts with an applicable Electric Tariff Supplement, the terms or conditions provided in the Electric Tariff Supplement will prevail.

1.1.2 Statutes

References to statutes in the Electric Tariff will include the statute and regulations issued pursuant to it, as amended and in force from time to time, and any superseding statute or regulation.

1.1.3 Technical Terms

Technical or industry-specific phrases, units of measure or words not otherwise defined in the Electric Tariff have the well-known meaning given to those terms in the electrical industry.

1.1.4 Including

In the Electric Tariff, the word “including” will in all cases be deemed to mean “including without limitation”, unless otherwise expressly provided.

1.2 Definitions

Unless the context otherwise requires, in the Electric Tariff the following words have the meanings set out below and alternate forms of the same words have corresponding meanings.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 1 – Revision 7
Effective:

Page 1-2

BC Hydro	British Columbia Hydro and Power Authority.
BC Hydro-Owned Street Lighting Service	Service for lighting of public highways, streets, lanes and other similar public applications and displays, or for lighting of private property, where BC Hydro owns, installs and maintains the fixtures, conductors, controls and poles.
Billing Demand	Maximum Demand or, where permitted by the applicable Rate Schedule, estimated Demand, used to determine Demand charges under a Rate Schedule.
COVID Relief Fund for Residential Customers	A temporary program established by BC Hydro, available until June 30, 2020, for the purpose of providing grants to qualifying Residential Service Customers, and qualifying residential tenants of a Customer, to address impacts arising from the loss of employment or inability to work as a result of the COVID pandemic.
COVID Relief Fund for Residential Customers Grant	A credit issued by BC Hydro, in its discretion, to a qualifying Residential Service Customer or to a qualifying Customer with one or more qualifying residential tenants, to that Customer's BC Hydro account.
COVID Relief Fund Return	The return of a COVID Relief Fund for Residential Customers Grant that BC Hydro determined should not have been granted.
Customer	<p>Any Person whose application for Service has been accepted by BC Hydro or, in the absence of such an application, the Person with possession of the Premises to which Service is provided or the Owner or such other Person designated as the Customer pursuant to the Electric Tariff. If a Customer receives Service at more than one Premises, such Customer will be considered a separate Customer for each Premises.</p> <p>BC Hydro will determine the number of Premises for the purpose of this definition.</p>
Customer Crisis Fund	A pilot program established by BC Hydro with the revenue received pursuant to Rate Schedule 1903, for the purpose of providing crisis grants to qualifying Residential Service Customers.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 1 – Revision 7
Effective:

Page 1-3

Customer Crisis Fund Grant	A credit issued by BC Hydro, in its discretion, to a qualifying Residential Service Customer in respect of arrears owing to BC Hydro.
Customer Crisis Fund Return	The return of a Customer Crisis Fund Grant that BC Hydro determined should not have been granted.
Customer-Owned Street Lighting Service	Service for lighting of public highways, streets, lanes, traffic signals, traffic signs and other similar public applications and displays where the Customer owns, installs and maintains the fixtures, conductors and controls.
Demand	The rate at which electric energy is used in any instant or averaged over any designated period of time, measured in kilowatts (kW) or kilovolt amperes (kVA).
Disconnection	A physical deactivation of a Service Connection, including through removal of Metering Equipment and / or other BC Hydro equipment used to provide Service, regardless of duration.
Dwelling	<p>A building or part of a building comprising private living quarters and containing sleeping quarters, a kitchen and bathroom, and in which the occupants have free access to all rooms, or alternative living quarters acceptable to BC Hydro, and including single-family homes, apartments, residential strata lots, townhouses, row-houses and duplexes.</p> <p>A Dwelling may include parking stalls, garage areas, storage areas and similar areas or spaces that are used in conjunction with the living quarters of the Customer.</p>
Electric Tariff	These Terms and Conditions, the Rate Schedules and all Electric Tariff Supplements.
Electric Tariff Supplement	A form of agreement for Service entered into by a Customer and BC Hydro pursuant to section 2.2 (Electric Tariff Supplements) of these Terms and Conditions, as filed with the British Columbia Utilities Commission from time to time.
Electricity	Both Demand and Energy or either, as the context requires.
Energy	Electric consumption, measured in kilowatt hours (kWh).

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 1 – Revision 7
Effective:

Page 1-4

Estimated Construction Cost	The cost estimated by BC Hydro to construct an Extension, a Service Connection or Optional Facilities pursuant to section 8.3 (Extension Fee for Rate Zone I), as the context requires.
Evacuation Order	An order issued by a local authority, provincial government, federal government, or First Nations band council during a State of Emergency, which requires Evacuee Customers remain away from their Premises until the Evacuation Order is lifted by the issuing authority.
Evacuation Period	The period during which an Evacuee Customer is under an Evacuation Order.
Evacuee Customer	<p>A Customer who receives Service under the following Rate Schedules as amended and filed with the British Columbia Utilities Commission from time to time, and who is under an Evacuation Order:</p> <ol style="list-style-type: none"> 1. Residential Service (Rate Schedules 1101, 1121, 1105, 1107, 1127, 1148, 1151 and 1161); 2. Small General Service (Rate Schedule 1234, 1205, 1300, 1301, 1310 and 1311); 3. Irrigation Service (Rate Schedule 1401); and 4. Street Lighting Service (Rate Schedule 1755).
Extension	An addition to or an increase in the capacity of BC Hydro's distribution system required to meet new or increased Service requirements, but excluding Service Connections.
Extension Fee	A contribution-in-aid of construction of an Extension, calculated as set out in section 8.3 (Extension Fee for Rate Zone I).
Financing Agreement	An agreement under which BC Hydro provides financing to a Customer for improving the energy efficiency of a Premises.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 1 – Revision 7
Effective:

Page 1-5

General Service	<p>Service for business, commercial, institutional or industrial use, including use in nursing homes, boarding houses, rooming houses, common areas of multiple occupancy buildings, recreational establishments, marinas and yacht clubs, hotels, motels, mobile home parks and similar establishments or parts thereof, or for any other use not specifically provided for in the Electric Tariff.</p> <p>For greater certainty, General Service is not available for use in circumstances where Transmission Service is available for use, and is available as an alternative to Residential Service only in the circumstances described in section 6.1.3 (General Service Election – Residential Customers) and as an alternative to Irrigation Service only in the circumstances described in section 6.1.4 (General Service Election – Irrigation Customers).</p>
Guarantor	<p>A BC Hydro Customer who agrees to be responsible for another Customer's security deposit amount as required by section 2.6.3 (Security) and who meets BC Hydro's requirements for acting as a Guarantor.</p>
Irrigation Service	<p>Except where General Service is requested pursuant to section 6.1.4 (General Service Election – Irrigation Customers), Service for irrigation and outdoor sprinkling use where associated motor loads are 746 watts (W) or more.</p>
Legacy Meter	<p>An Electricity meter, other than a Smart Meter or a Radio-off Meter, that is of a type in use by BC Hydro.</p>
Maximum Demand	<p>The highest Demand averaged over a time interval of not more than 32 consecutive minutes that is registered during a specified period by a meter with Demand measurement capability.</p>
Metering Equipment	<p>An assembly of metering and ancillary equipment, including one or more Legacy Meters, Radio-off Meters and / or Smart Meters, auxiliary control units, cabling, communication links, range extenders and any other devices owned and used by BC Hydro in connection with metering Electricity for a Premises, providing remote access to the metered data and / or monitoring the condition of the installed equipment, as applicable.</p>

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 1 – Revision 7
Effective:

Page 1-6

Month	A period of from 27 to 33 consecutive days.
Owner	The legal or beneficial owner(s) of a building or Premises or an agent or other authorized representative of such owner(s), such as a property manager, strata corporation or developer, as the context requires.
Permanent Service	Service that is not Temporary Service.
Person	A natural person, partnership, corporation, society, unincorporated entity or body politic.
Point of Delivery	The location at which the Service Connection is connected to the Metering Equipment or the Customer's electrical facilities, whichever comes first.
Power Factor	<p>The ratio determined by the following formula and based on monthly measurements of kilowatt hours (kWh) and lagging kilovolt-ampere reactive hours (kVarh) or at BC Hydro's discretion by random checks from time to time.</p> $\text{Power Factor} = \frac{kWh}{\sqrt{kWh^2 + kVarh^2}}$
Premises	A building, a separate unit of a building, a Dwelling or machinery, together with the surrounding land.
Primary Voltage	A voltage of 750 volts (V) or more measured phase to phase.
Radio-off Meter	A Smart Meter adjusted so that the meter's components that transmit and receive data by radio are deactivated.
Rate Schedule	A schedule that sets out rates for Service and other terms and conditions, as filed with the British Columbia Utilities Commission from time to time.
Rate Zone I	All distribution areas served by BC Hydro within the limits from time to time outlined in Rate Map A included in these Terms and Conditions, as well as the Districts of Kingsgate-Yahk and Lardeau-Shutty Bench.
Rate Zone IB	Bella Bella.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 1 – Revision 7
Effective:

Page 1-7

Rate Zone II	Anahim Lake, Atlin, Bella Coola, Dease Lake, Elhateese, Fort Ware, Good Hope Lake, Haida Gwaii, Hartley Bay, Jade City, Telegraph Creek District, Toad River and Tsay Keh Dene.
Residential Service	<p>Except as otherwise provided in section 6.1.3 (General Service Election – Residential Customers), Service for use:</p> <ol style="list-style-type: none"> 1. In Dwellings, including Dwellings where a portion is used to carry on a business; 2. In the common areas of multiple occupancy buildings if such common areas are used only for the common benefit of Dwellings in that building; and 3. At farms, in the circumstances described in section 6.1.2 (Eligibility of Farms for Residential Service).
Secondary Voltage	A voltage of less than 750 volts (V) measured phase to phase.
Service	The provision by BC Hydro of Electricity to a Premises.
Service Agreement	The agreement setting out the rights and responsibilities of BC Hydro and a Customer for Service, including the application for Service accepted by BC Hydro (if any), all applicable provisions of the Terms and Conditions and applicable Rate Schedule(s), and any additional terms and conditions of Service as agreed by BC Hydro and the Customer in an Electric Tariff Supplement or otherwise.
Service Connection	That part of the BC Hydro distribution system extending between a Point of Delivery and the first point of attachment to the rest of the BC Hydro distribution system.
Smart Meter	<p>An Electricity meter that:</p> <ol style="list-style-type: none"> 1. Meets the requirements set out in section 2 of the <i>Smart Meters and Smart Grid Regulation</i>, B.C. Reg. 368/2010, and 2. Has components that transmit data by radio and those components are activated.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 1 – Revision 7
Effective:

Page 1-8

State of Emergency	A state of emergency declared by a local authority, provincial government, federal government, or First Nations band council, pursuant to a statutory authority.
Street Lighting Service	BC Hydro-Owned Street Lighting Service or Customer-Owned Street Lighting Service or both, as the context requires.
System Improvement Costs	The incremental cost of work on BC Hydro's distribution system, including substations, attributed to new or increased Service requirements, as estimated by BC Hydro.
Temporary Service	Service that will or, in BC Hydro's determination, is likely to be taken temporarily.
Termination	Cessation of Service to a Premises under any applicable Rate Schedule(s) or termination of the Service Agreement with a Customer, as the context requires.
Terms and Conditions	These terms and conditions of Service, as filed with the British Columbia Utilities Commission from time to time.
Transformation	The transformation of Primary Voltage to Secondary Voltage, including all associated labour, equipment and materials.
Transmission Service	Service for commercial, industrial and institutional Customers, provided at 60 kilovolts (kV) or more.
Two Months	A period of from 54 to 66 consecutive days.

ACCEPTED: _____

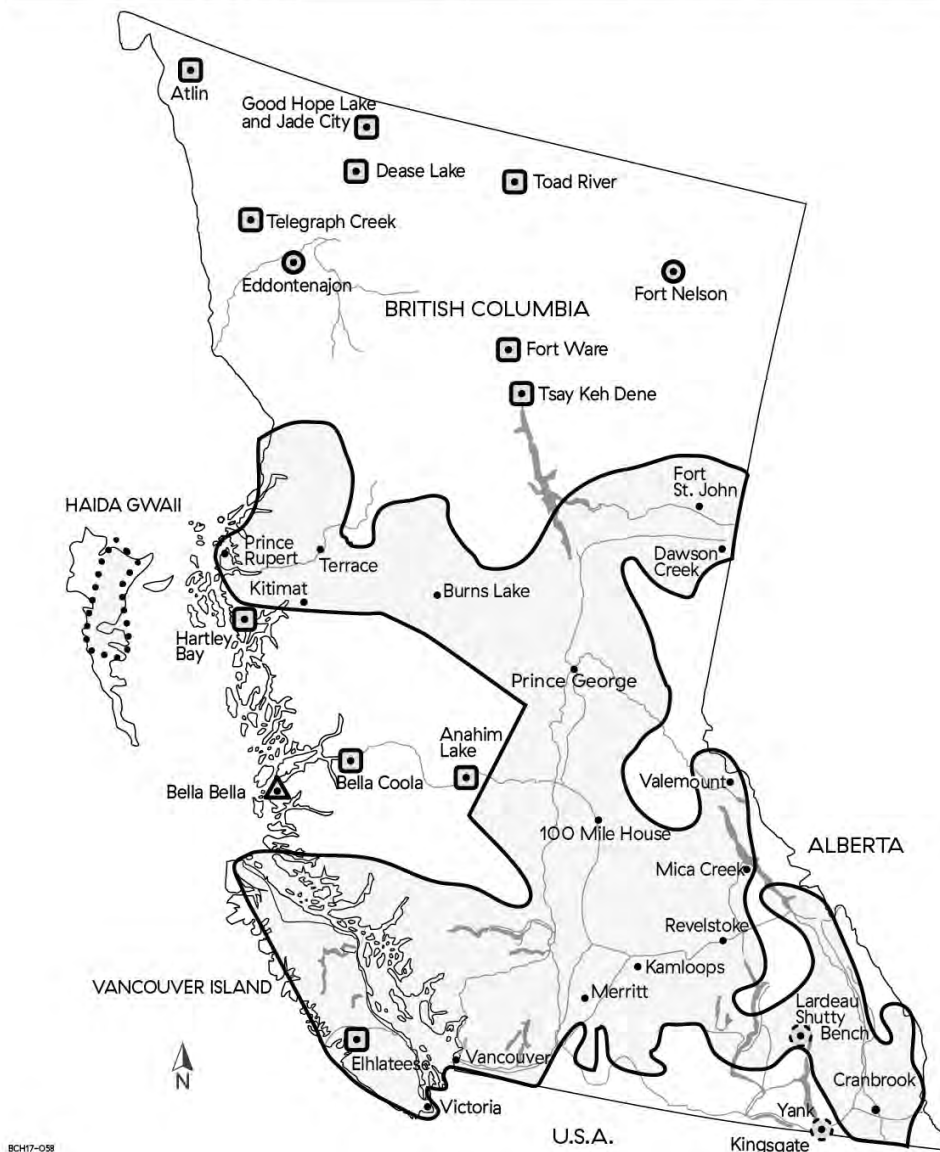
ORDER NO. _____

ACTING COMMISSION SECRETARY

1.3 Map of Rate Zones

Rate map RATE ZONE LIMITS

ZONE I	ZONE IB	ZONE II
<p>— Integrated Service Area</p> <p>Districts of:</p> <p>⊙ Fort Nelson Eddontenajon</p> <p>⊙ Kingsgate – Yahk Lardeau – Shutty Bench</p>	<p>District of:</p> <p>⚠ Bella Bella</p>	<p>Districts of:</p> <p>⋯⋯ Haida Gwaii</p> <p>⊠ Anahim Lake Atlin Bella Coola Dease Lake</p> <p>Elhlateese Fort Ware Good Hope Lake Hartley Bay</p> <p>Jade City Telegraph Creek Toad River Tsay Keh Dene</p>



ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

5. METER READING AND BILLING

5.1 Meter Reading

The interval between consecutive meter readings will be at the sole discretion of BC Hydro.

Where the Rate Schedule under which the Customer takes Service does not require measurement of the Customer's Demand, the meter will normally be read once every two months; otherwise meters will normally be read once per month.

5.2 Billing

5.2.1 Regular Billing

Bills will be rendered on the basis of actual Energy consumed and, where applicable, Demand, as registered by a meter or meters and in accordance with the Rate Schedule under which the Customer takes Service, except:

1. Where the Service is not metered;
2. To the extent that section 6.3 (Late Payment Charge) applies;
3. Where the bill is being rendered in accordance with section 2.6.2 (Pay As You Go Billing), or section 5.6 (Monthly Equal Payments);
4. Where section 5.2.2 (Change in Rate Schedule) applies;
5. Where a Customer Crisis Fund Grant or a COVID Relief Fund for Residential Customers Grant has been issued, or a Customer Crisis Fund Return or a COVID Relief Fund Return has been requested, by BC Hydro; or
6. To the extent that section 5.8 (Evacuation Relief) applies.

If meter readings cannot be obtained for any reason, including where the meter fails to register or registers incorrectly, the Demand or Energy consumption or both may be estimated by BC Hydro for billing purposes and the next bill for which actual meter readings are available will be adjusted for the difference between estimated and actual use over the interval between meter readings. Estimated bills are deemed to have the same force and effect under the Electric Tariff as bills that are based on actual meter readings.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 5 – Revision 5
Effective:

Page 5-2

If meters are read at longer or shorter intervals than the period set out in the Rate Schedule under which the Customer takes Service, the minimum charge, the service charge, the number of kilowatt hours in each step and, if applicable, the Demand charge set out in such Rate Schedule will be prorated before the bill is calculated based on a 365-day year.

5.2.2 Change in Rate Schedule

In circumstances where a Rate Schedule is changed and the effective date of the change falls between the dates of two successive meter readings, BC Hydro will render a bill determined upon a prorated basis.

5.3 Payment of Bills

Bills will be rendered as often as deemed necessary by BC Hydro. The amount payable as shown on a bill is owed to BC Hydro on the billing date. To avoid a Late Payment Charge under section 6.3 (Late Payment Charge), the amount payable must be paid in full on or before the due date shown on the bill, which will be:

1. The first business day after the 21st calendar day following the billing date; or
2. Such other period as may be defined in an Electric Tariff Supplement or otherwise agreed by the Customer and BC Hydro.

Bills may be paid by any payment method set out at www.bchydro.com/payments. Information on bill payment options can also be obtained by contacting the customer service department of BC Hydro.

5.4 Billing of Fractional Demand

A Billing Demand that includes a fraction will be deemed to be the nearest whole unit of Demand below that fraction.

The minimum Billing Demand will, except where the context otherwise requires, be deemed to be 1 kW or 1 kVA, whichever is applicable.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

5.5 Waiver of Minimum Charges

Where the Owner of a motel or mobile home park is the Residential Service Customer for any separately metered unit of accommodation in the motel or mobile home park, whether pursuant to BC Hydro requirements or otherwise, and if no Electricity is consumed in such unit during an interval between meter readings, the minimum charge otherwise applicable to such interval will be waived.

In multi-unit residential buildings where separate meters for the units are installed during construction of the building, minimum charges will apply only after Service to the relevant unit is energized.

5.6 Monthly Equal Payments

On application by a Customer, BC Hydro will, provided the Customer's credit is established to the satisfaction of BC Hydro, permit the Customer to pay fixed monthly installments on account of Electricity consumed by the Customer during all or any part of a 12-month period commencing with an actual meter reading at the Customer's Premises (the Budget Period). Monthly installments will be fixed so that the sum of the installments to be paid during the Budget Period equals the amount BC Hydro estimates will be payable under the applicable Rate Schedule for Electricity consumed during the Budget Period. BC Hydro may at any time revise its estimate of a Customer's consumption and increase or decrease the amount of monthly installments payable by the Customer accordingly.

Payment of monthly installments pursuant to this section may be terminated by the Customer at any time by giving five days' notice of termination to BC Hydro, or by BC Hydro without notice if the Customer has not maintained credit to the satisfaction of BC Hydro.

At the end of each Budget Period or upon its earlier termination the amount payable by the Customer to BC Hydro for Electricity actually used during the Budget Period will be compared against the sum of the monthly installments paid by the Customer during that period, and any deficit will be paid by the Customer to BC Hydro, and any excess will be paid or credited by BC Hydro to the Customer on the next bill.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

5.7 Back-Billing

Pursuant to the *Utilities Commission Act*, this Electric Tariff constitutes the consent of the British Columbia Utilities Commission to allow BC Hydro, in the circumstances herein specified, to charge, demand, collect and receive from its Customers in respect of a regulated service rendered a greater or lesser compensation than that specified in the Terms and Conditions or applicable Rate Schedules.

1. Back-billing means the re-billing by BC Hydro for services rendered to a Customer because the original billings were discovered to be either too high (over-billed) or too low (under-billed). The discovery may be made by either the Customer or BC Hydro, including as a result of an inspection under the *Electricity and Gas Inspection Act (Canada)*. The cause of the billing error may include any one or more of the following non-exhaustive reasons:
 - (a) Stopped meter
 - (b) Metering Equipment failure
 - (c) Missing meter now found
 - (d) Switched meters
 - (e) Double metering
 - (f) Incorrect meter connections
 - (g) Incorrect use of any prescribed apparatus respecting the registration of a meter
 - (h) Incorrect meter multiplier
 - (i) Application of an incorrect rate
 - (j) Incorrect reading of meters or data processing
 - (k) Incorrect information on the load, or load characteristics, or hours of use for unmetered services, and
 - (l) Tampering, fraud, theft or any other criminal act.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 5 – Revision 5

Effective:

Page 5-5

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2. Whenever the dispute procedure of the *Electricity and Gas Inspection Act (Canada)* is invoked, the provisions of that Act will apply, except insofar as they purport to determine the nature or extent of legal liability flowing from metering or billing errors.
 3. Where metering or billing errors occur and the dispute procedure under the *Electricity and Gas Inspection Act (Canada)* is not invoked, Energy consumption and Demand for billing purposes will be determined based on the records of BC Hydro or, to the extent they are available and accurate, the records of the Customer, or if no such records are available, based on BC Hydro's reasonable and fair estimates made consistently within each Customer class or according to the agreement for Service with the Customer, if applicable.
 4. In every case of under-billing or over-billing, the cause of the error will be remedied without delay, and the Customer will be promptly notified of the error and of the effect upon the Customer's ongoing bill.
 5. The provisions of paragraph 7 below do not apply and, subject to the applicable limitation period provided by law, back-billing may be applied for the whole period of under-billing if:
 - (a) There are reasonable grounds to believe that the Customer has tampered with or otherwise used BC Hydro's Service in an unauthorized way, or evidence of fraud, theft or another criminal act exists, or if a reasonable Customer should have known of an under-billing and failed to promptly bring it to the attention of BC Hydro; or
 - (b) The required adjustment to the Customer's bill is minor, such as in the case of an estimated bill under section 5.2.1 (Regular Billing) or section 5.6 (Monthly Equal Payments); or
 - (c) The required adjustment to the Customer's bill relates to the under-billing of a standard charge set out in section 11 (Schedule Standard Charges), except Legacy Meter Charges and Radio-off Meter Charges under section 11.4 (Miscellaneous Standard Charges); or
 - (d) The Service is provided on an unmetered basis in accordance with the applicable rate schedule and the billing error occurred because the Customer did not immediately notify BC Hydro of changes in load, or load characteristics, or hours of use.
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ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 5 – Revision 5
Effective:

Page 5-6

In addition, the Customer is liable for the direct (unburdened) administrative costs incurred by BC Hydro in the investigation of any incident of tampering, unauthorized use or criminal activity, including the direct costs of repair and replacement of equipment.

Under-billing resulting from circumstances described in paragraph 5.7.5 (a) will bear interest at the rate normally charged by BC Hydro on unpaid accounts from the date of the original under-billed invoice until the amount under-billed is paid in full.

Under-billing resulting from circumstances described in paragraph 5.7.5 (b) and 5.7.5 (c) not will bear interest.

Under-billing resulting from circumstances described in paragraph 5.7.5 (d) will bear interest at BC Hydro's weighted average cost of debt, calculated for BC Hydro's most recent fiscal year, from the date of the changes in load, or load characteristics, or hours of use, except when BC Hydro is notified of the change in load, load characteristics or hours of use within six months of the Customer making the change.

6. Other than as set out below, in every case of over-billing BC Hydro will refund to the Customer all money incorrectly collected for the duration of the error, except that if the date the error first occurred cannot be determined with reasonable certainty, the maximum refund period will be two years back from the date the error was discovered.

In the case of an over-billing in the circumstances described in paragraph 5.7.5(d) above, BC Hydro will refund to the Customer all money incorrectly collected for the duration of the error back to the date on which it received from the Customer notification of the changes in load, or load characteristics, or hours of use, up to a maximum of six months.

Over-billing resulting from the circumstances described in paragraph 5.7.5 (b), (c) and (d) will not bear interest. For all other cases of over-billing, interest will be paid to the Customer at a rate equal to BC Hydro's weighted average cost of debt, calculated for BC Hydro's most recent fiscal year.

7. In every case of under-billing, BC Hydro will back-bill the Customer for the duration of the error up to a maximum of:
- (a) Six months for Residential Service, small General Service (commercial) or Irrigation Service Customers; and

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 5 – Revision 5
Effective:

Page 5-7

- (b) One year for all other Customers or such other time period as is set out in a special or individually negotiated contract with BC Hydro.

BC Hydro will offer under-billed Customers reasonable terms of payment for the under-billed amount; if requested by the Customer, the payment term will be equivalent in length to the back-billing period. All under-billed amounts will be billed and paid in equal installments corresponding to the normal billing cycle. Delinquency in payment of such installments will be subject to the usual Late Payment Charges pursuant to section 6.3 (Late Payment Charge).

If a Customer disputes BC Hydro's assessment of an under-billed amount based on Energy consumption or Demand or duration of the error, BC Hydro will not threaten or cause Termination as a result of Customer's failure to pay the disputed portion of the back-billing, unless there are no reasonable grounds for the Customer to dispute same. The undisputed portion of the bill will be paid by the Customer and BC Hydro may threaten or cause Termination if such undisputed portion of the bill is not paid.

8. Subject to paragraph 5 above, in all instances of back-billing where changes of occupancy have occurred, BC Hydro will make a reasonable attempt to locate the former Customer. If, after a period of one year, such Customer cannot be located, the over- or under-billing applicable to that Customer will be cancelled.

5.8 Evacuation Relief

Pursuant to the *Utilities Commission Act*, this Electric Tariff constitutes the consent of the British Columbia Utilities Commission to allow BC Hydro, in the circumstances herein specified, to charge, demand, collect and receive from its Customers in respect of a regulated service rendered a greater or lesser compensation than that specified in the Terms and Conditions or applicable Rate Schedules.

The following terms and conditions will apply for evacuation relief:

1. Where BC Hydro becomes aware of an Evacuation Order, for any Evacuee Customer who is subject to that Evacuation Order BC Hydro waives the following specified charges as those charges are set out in an applicable Rate Schedule under which the Evacuee Customer takes Service on the date of the Evacuation Order, for the duration of the Evacuation Period:

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 5 – Revision 5
Effective:

Page 5-8

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- (a) Residential Service (Rate Schedules 1101, 1121, 1105, 1107, 1127, 1148, 1151 and 1161) – Basic Charge, Energy Charge, and the Customer Crisis Fund Rate Rider as set out in Rate Schedule 1903 (as applicable);
 - (b) Small General Service (Rate Schedules 1234, 1205, 1300, 1301, 1310 and 1311) – Basic Charge, Energy Charge, and Minimum Charge;
 - (c) Irrigation Service (Rate Schedule 1401) – Energy Charge; and
 - (d) Street Lighting Service (Rate Schedule 1755) – Charge per fixture for each month the Evacuation Order is in effect.
 2. In addition to the charges waived in paragraph 1 above, if an Evacuee Customer's Dwelling is destroyed during the Evacuation Period, BC Hydro waives the following charges for the Evacuee Customer:
 - (a) All outstanding charges for Service for the period immediately after the last billing period, up to the date on which the Dwelling was destroyed; and
 - (b) The Service Connection charge as set out in section 3.14 (Service Connection Charges), applicable to the restoration of the same Service at a Dwelling that the Evacuee Customer rebuilds, provided that the Service Connection charge is not recoverable as part of the Evacuee Customer's insurance.

In the event that a Dwelling is destroyed immediately preceding or following the Evacuation Period, BC Hydro may, in its sole discretion, waive the charges set out in this subsection. For clarity, the charges waived in paragraph 2(b) do not include costs estimated by BC Hydro to construct, including, but not limited to, any Extension or Optional Facilities.
 3. Notwithstanding the provisions in paragraph 1 and paragraph 2, BC Hydro may, in its discretion, refuse to waive the charges in paragraph 1 and paragraph 2 above, if
 - (a) The Evacuation Period is for a period less than five consecutive days; or
 - (b) An Evacuation Order has ended more than two years before the date BC Hydro receives a request from an Evacuee Customer or otherwise becomes aware of the Evacuation Order.
 4. In addition, BC Hydro may, in its discretion, waive Energy Charges as set out in an applicable Rate Schedule for Medium General Service (Rate Schedules 1500, 1501,

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 5 – Revision 5

Effective:

Page 5-9

1510 and 1511), Exempt General Service (Rate Schedules 1200, 1201, 1210 and 1211), General Service (35 kW and Over) (Rate Schedules 1255, 1256, 1265, and 1266), or Large General Service (Rate Schedules 1600, 1601, 1610, and 1611), if

- (a) The Customer is subject to an Evacuation Order; and
 - (b) The Service is for use in a nursing home, boarding house, rooming house, common area of multiple occupancy building, mobile home park or similar establishment.
5. A charge waived under paragraph 1 and paragraph 2, if shown on an Evacuee Customer's bill, is in the form of a credit to the Evacuee Customer's account. Interest will not be paid on any amounts credited to the Evacuee Customer's account under this section in any circumstance.

5.9 Unmetered Loads

At its discretion, BC Hydro may permit unmetered Service when identified in the Special Conditions of specified rate schedules. Unmetered Service may be permitted if BC Hydro can estimate to its satisfaction the Energy used in kilowatt hours over a billing period based on the connected load, load characteristics and hours of use.

The Customer, if required by BC Hydro, will provide and maintain such controls, including timing devices, as BC Hydro considers necessary, and facilities satisfactory to BC Hydro for the maintenance of such controls. The Customer will supply, install and maintain all wiring, fixtures, control devices and equipment at the Customers expense. All wiring, fixtures, control devices and equipment and the method of installing, operating and maintaining the same are subject to the approval of BC Hydro which approval may be withdrawn by BC Hydro, at any time, at BC Hydro's sole discretion.

The electricity use of the Customer's unmetered Service will be as specified by the Customer or as estimated by BC Hydro, whichever is greater.

The Customer will notify BC Hydro as soon as practicable but within six months of any proposed or actual change in load, load characteristics, or hours of use.

BC Hydro may at any time, in its sole discretion, require the Customer to install Metering Equipment, and thereafter bill the Customer on the appropriate Rate Schedule as a metered account. The installation of Metering Equipment will be at the Customer's expense if

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Terms and Conditions, Section 5 – Revision 5

Effective:

Page 5-10

BC Hydro determines that the Customer's proposed or actual change in load or load characteristics is no longer appropriate for an unmetered service and BC Hydro can no longer estimate to its satisfaction the the Energy used in kilowatt hours over a billing period based on load, load characteristics and hours of use.

For display signs and signboard lighting, where hours of use are controlled by timing devices, the following turn-on times will apply, unless BC Hydro otherwise agrees in writing:

Period Turn-on Time

January 1 to January 15: 4:00 p.m.

January 16 to February 28: 4:30 p.m.

March 1 to April 30: 6:30 p.m.

May 1 to August 15: 8:30 p.m.

August 16 to September 30: 6:30 p.m.

October 1 to November 15: 4:30 p.m.

November 16 to December 31: 4:00 p.m.

In all cases, where hours of use of display signs or signboard lighting commence at dusk and are controlled either by timing devices or by photo-electric cells, the following hours of use for a period of two months will be deemed for billing purposes:

Dusk to 10 p.m.: 216 hours

Dusk to 11 p.m.: 270 hours

Dusk to 12 p.m.: 330 hours

Dusk to 1 a.m.: 380 hours

Dusk to Dawn: 666 hours

(All times are Pacific Time.)

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

6. RATES AND CHARGES

6.1 Rates

6.1.1 Application of Rate Schedules

The rates to be charged by and paid to BC Hydro for Service will be the rates set out in the Rate Schedules from time to time in effect or elsewhere in the Electric Tariff, available at www.bchydro.com or upon request.

Customers may be served under any Rate Schedule for which they meet the applicability criteria. BC Hydro will endeavour to provide the Customer with information and advice regarding rates available to the Customer from time to time, but will not be responsible if the most favourable rate is not selected.

BC Hydro may conduct periodic reviews of a Customer's account and, where the Customer no longer meets the applicability criteria of a particular Rate Schedule, change the Customer to the appropriate Rate Schedule.

The Customer may also apply at any time to be billed on a different Rate Schedule and BC Hydro may, in its sole discretion, reject, defer or approve such application. BC Hydro will not approve a Customer request to move to another Rate Schedule where:

1. The Customer was billed under such Rate Schedule at any time during the preceding 12-month period; or
2. Such Rate Schedule is, in the opinion of BC Hydro, not available to the Customer.

6.1.2 Eligibility of Farms for Residential Service

Residential Service is available for use at farms, except:

1. Lodging on a farm that is not a Dwelling;
2. For use in the processing of farm products produced elsewhere;
3. For use in selling farm or other products to the general public, other than from a small roadside stand; or
4. For use for any commercial operation not ordinarily conducted on a farm.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

6.1.3 General Service Election – Residential Customers

General Service is available as an alternative to Residential Service only where (i) the Customer or applicant for Service (as applicable) is eligible for Residential Service but requests General Service, and (ii) the Service will be used:

1. In a Dwelling, a portion of which is used to carry on a business, where Billing Demand and Energy consumption at the Premises meet the availability requirements of Medium General Service or Large General Service; or
2. At a farm, where the Billing Demand and Energy consumption at the Premises meet the availability requirements of Medium General Service or Large General Service; or
3. In the common areas of multiple occupancy buildings if such common areas are used only for the common benefit of Dwellings in that building.

6.1.4 General Service Election – Irrigation Customers

General Service is available as an alternative to Irrigation Service only where the Customer or applicant for Service (as applicable) is eligible for Irrigation Service but requests General Service.

6.1.5 General Service for Street Lighting

If a Customer or applicant for Service (as applicable) is eligible for Street Lighting Service and the Customer or applicant for Service chooses to connect the lighting use through the same Service Connection on a metered basis as a use or uses that are eligible for General Service, then Service to such mixed uses will be provided on the applicable General Service Rate Schedule.

6.2 Use of Electricity

A Customer will use Electricity only for the purposes permitted under the availability clause of the Rate Schedule under which the Customer takes Service.

6.3 Late Payment Charge

If the amount payable shown on a bill is not paid in accordance with section 5.3 (Payment of Bills), and if the unpaid balance is \$30 or more, the subsequent bill will, in addition to the overdue amount, include a Late Payment Charge calculated from the billing date as set out in

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

section 11.4 (Miscellaneous Standard Charges). To allow time for payments made to BC Hydro to reach BC Hydro's payment processing centre and to coordinate the billing of Late Payment Charges with scheduled billing cycles, BC Hydro may, in its discretion, waive Late Payment Charges.

6.4 Returned Payment Charge

If a cheque received by BC Hydro from a Customer or a pre-authorized payment deduction or electronic funds transfer in payment of any account or Financing Agreement amount is returned or stopped by the Customer's bank, trust company or financial institution because of insufficient funds, or any reason other than clerical error, a Returned Payment Charge, as set out in section 11.4 (Miscellaneous Standard Charges), for processing each failed payment will be added to the amount due and payable by the Customer whether or not the Service has been Disconnected.

6.5 Account Charge

When a change of Customer on an account for a Premises occurs an Account Charge as set out in section 11.4 (Miscellaneous Standard Charges) will be paid by the new Customer with respect to each account in that Customer's name for which a separate bill is rendered by BC Hydro, except that:

1. If the new Customer is, or was, the spouse of the former Customer, no such Account Charge will apply; and
2. If the new Customer is the Owner of a multi-tenant building, an Account Charge will apply only the first time a particular Dwelling account in the building is changed to the name of such Owner.

6.6 Call-Back Charges

6.6.1 Service Connection Call-Back Charge

A Service Connection Call-Back Charge, as set out in section 11.4 (Miscellaneous Standard Charges), will be paid by the Customer each time a BC Hydro representative attends the Customer's Premises to install or modify a Service Connection at the request of the Customer and is unable to complete the work because the facilities required to be provided by the Customer, for the purpose of the Service Connection are deficient.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

6.6.2 Failed Installation Charge

A Failed Installation Charge, as set out in section 11.4 (Miscellaneous Standard Charges), will be paid by the Customer each time a BC Hydro representative attends the Customer's Premises to install Metering Equipment but is unable to complete the work because of an obstruction or an objection made by the Customer.

6.7 Minimum Reconnection Charge

A Customer will pay a Minimum Reconnection Charge, as set out in section 11.3 (Minimum Reconnection Charges), when Service is reconnected to a Premises previously Disconnected for the following reasons, and where all Metering Equipment and other BC Hydro equipment used to provide Service remains in place:

1. To permit the Customer to make alterations to or on private property;
2. Because BC Hydro was ordered to Disconnect by the appropriate inspection authority;
or
3. Where Service was Disconnected for any reason set out in section 2.4 (Refusal to Provide Service and Termination by BC Hydro).

BC Hydro may add to the Minimum Reconnection Charges set out in section 11.3 (Minimum Reconnection Charges), an amount to cover the costs incurred by BC Hydro when there are unusual circumstances.

A Customer will not be required to pay a Minimum Reconnection Charge under section 11.3 (Minimum Reconnection Charges) when the Disconnection was made:

1. For reasons of public safety, unless attributable to actions of the Customer;
2. By BC Hydro because no application for Service had been received in respect of such Service; or
3. For service requirements of BC Hydro.

6.8 Taxes and Levies

The rates and charges set out in the Electric Tariff do not include the goods and services tax (**GST**), the provincial services tax (**PST**) or any other tax or levy which BC Hydro may be lawfully authorized or required to add to its normal rates and charges.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1234 – Revision 5

Effective:

Page 2-7

2. GENERAL SERVICE

RATE SCHEDULE 1234 – SMALL GENERAL SERVICE (UNDER 35 KW) – ZONE II

Availability	<p>For all purposes where a meter with Demand measurement capability is not installed because the Customer's Demand as estimated by BC Hydro is less than 35 kW.</p> <p>Supply is 60 hertz, single or three phase at an available Secondary Voltage.</p>
Applicable in	Rate Zone II.
Rate	<p>Basic Charge: 26.46 ¢ per day</p> <p>plus</p> <p>Energy Charge:</p> <p>First 7000 kWh per month @ 12.59 ¢ per kWh</p> <p>All additional kWh per month @ 20.96 ¢ per kWh</p> <p>Minimum Charge: The Basic Charge</p>
Special Conditions	<p>Special Conditions for Unmetered Service:</p> <ol style="list-style-type: none"> 1. BC Hydro at its discretion may permit unmetered Service under this Rate Schedule 1234.
Rate Rider	The Deferral Account Rate Rider as set out in Rate Schedule 1901 applies to all charges payable under this Rate Schedule, before taxes and levies.
Rate Increase / Rate Decrease	<p>Effective April 1, 2019 the rates under this Rate Schedule include an interim rate increase of 6.85% before rounding, approved by BCUC Order No. G-45-19.</p> <p>Effective April 1, 2020 the rates under this Rate Schedule include an interim rate decrease of 1.01% before rounding.</p>

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

2. GENERAL SERVICE

RATE SCHEDULES 1300, 1301, 1310, 1311 – SMALL GENERAL SERVICE (UNDER 35 KW)

Availability	For Customers who qualify for General Service and whose Demand, metered or estimated by BC Hydro, as applicable, is less than 35 kW. Supply is 60 hertz, single or three phase at a Secondary or Primary Voltage.
Applicable in	Rate Zone I and Rate Zone IB.
Rate	Basic Charge: 36.08 ¢ per day plus Energy Charge: 12.40 ¢ per kWh Minimum Charge: The Basic Charge
Discounts	<ol style="list-style-type: none"> 1. A discount of 1½% will be applied to the above charges if Customer's supply of Electricity is metered at a Primary Voltage. 2. A discount of 25 ¢ per month per kW of Demand will be applied if a Customer supplies Transformation. 3. If a Customer is entitled to both of the above discounts, the discount for metering at a Primary Voltage will be applied first.
Rate Schedules	<ol style="list-style-type: none"> 1. Rate Schedule 1300: Applies if a Customer's supply of Electricity is metered at a Secondary Voltage and BC Hydro supplies Transformation. 2. Rate Schedule 1301: Applies if a Customer's supply of Electricity is metered at a Primary Voltage and BC Hydro supplies Transformation.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedules 1300, 1301, 1310, 1311 – Revision 6
Effective:

Page 2-19

	<p>3. Rate Schedule 1310:</p> <p>Applies if a Customer's supply of Electricity is metered at a Secondary Voltage and the Customer supplies Transformation.</p> <p>4. Rate Schedule 1311:</p> <p>Applies if a Customer's supply of Electricity is metered at a Primary Voltage and the Customer supplies Transformation.</p>
Special Conditions	<p>1. Special Conditions for Unmetered Service:</p> <p>1.1. BC Hydro at its discretion may permit unmetered Service under these Rate Schedules 1300, 1301, 1310, and 1311.</p> <p>2. Migration Rules:</p> <p>2.1. Migration rules from Small General Service:</p> <p>Customers taking Service under these Rate Schedules will be moved to Service:</p> <p>(a) Under Rate Schedules 1500, 1501, 1510 or 1511 (Medium General Service) if Demand in half of the last six bi-monthly billing periods or half of the last 12 monthly billing periods (as applicable) was 35 kW or more, but less than 150 kW.</p> <p>(b) Under Rate Schedules 1600, 1601, 1610 or 1611 (Large General Service) if Demand in half of the last six bi-monthly billing periods or half of the last 12 monthly billing periods (as applicable) was 150 kW or more, or if total Energy consumption in any 12 consecutive month period exceeded 550,000 kWh.</p> <p>3. Migration rules to Small General Service:</p> <p>Customers will be moved to Service under these Rate Schedules (Small General Service) from Rate Schedules 1600, 1601, 1610 or 1611 (Large General Service) or Rate Schedules 1500, 1501, 1510 or 1511 (Medium General Service) if Billing Demand in each of the last 12 billing periods was less than 35 kW.</p>

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedules 1300, 1301, 1310, 1311 – Revision 6
Effective:

Page 2-20

Rate Rider	The Deferral Account Rate Rider as set out in Rate Schedule 1901 applies to all charges payable under these Rate Schedules, before taxes and levies.
Rate Increase / Rate Decrease	<p>Effective April 1, 2019 the rates under these Rate Schedules include an interim rate increase of 6.85% before rounding, approved by BCUC Order No. G-45-19.</p> <p>Effective April 1, 2020 the rates under these Rate Schedules include an interim rate decrease of 1.01% before rounding.</p>

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

4. STREET LIGHTING SERVICE

RATE SCHEDULE 1702 – PUBLIC AREA ORNAMENTAL STREET LIGHTING

Availability	For lighting of public highways, streets and lanes and municipal pathways and for public area seasonal lighting displays, in those cases where the Customer owns, installs and maintains the standards, fixtures, conductors and controls.
Applicable in	All Rate Zones.
Rate	Energy Charge: For each unmetered fixture: 3.73 ¢ per watt of Billing Wattage per month For each metered fixture: 11.21 ¢ per kWh
Definitions	Billable Wattage is the sum of all wattage, on all fixtures used by the Customer. For fixtures without dimming controls, the watts per fixture will include the wattage of the lamp plus, where applicable, the wattage of the ballast. For fixtures with dimming controls, the watts per fixture will be equal to: <ol style="list-style-type: none">1. The wattage of the lamp plus, where applicable, the wattage of the ballast, multiplied by2. The ratio of effective fixture wattage after dimming to fixture wattage before dimming.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1702 – Revision 4

Effective:

Page 4-5

**Special
Conditions**

1. Service Connection

Where necessary BC Hydro will provide an overhead or underground Service Connection in accordance with the Terms and Conditions of the Electric Tariff. No Service Connection will be made to add any ornamental street lighting system which does not provide for eight or more street lighting fixtures except that, if the potential is 120/240 volts, at BC Hydro's discretion, a Service Connection may be made for a system of less than eight.

Receptacle loads will be permitted for Service under this Rate Schedule provided that such receptacles are used predominantly for seasonal lighting displays, meaning that no more than 10% of the usage may be for other purposes.

Service to mixed uses including but not exclusively for lighting will be provided on the applicable General Service Rate Schedule.

2. Extension Policy

BC Hydro will construct a distribution Extension if required by the applicant in accordance with the Terms and Conditions of the Electric Tariff.

3. Power Factor

All installations of mercury vapour, sodium vapour or fluorescent lamps will be equipped with the necessary auxiliaries to assure that a Power Factor of not less than 90% lagging will be maintained.

4. Term of Service Agreement

The term of the initial Service Agreement under this Rate Schedule will be not more than five years; renewal periods will be for five years.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1702 – Revision 4

Effective:

Page 4-6

	<p>5. Fixtures with Automated Dimming Controls</p> <p>The following special terms and conditions apply to lighting fixtures fitted with dimming controls:</p> <p>(a) For purposes of this Special Condition No. 5, “dimming controls” means control units or fittings attached to, or forming part of, a street lighting fixture capable of being programmed or remotely operated so as to reduce the lumens output of the lamps during specified hours each day while the lamps are in operation. The reductions may vary according to the hours of the day, the days of the week, and the seasons of the year.</p> <p>(b) A Customer wishing to have fixtures with dimming controls separately rated under this Rate Schedule must submit a dimming schedule satisfactory to BC Hydro listing each light fixture fitted with dimming controls, the wattage of the fixture (including the lamp and, where applicable, the ballast), the dimming control setting or settings and the hours each day that the dimming control setting or settings will be in operation.</p> <p>(c) Whenever the Customer wishes to make changes in the lighting fixtures listed in the dimming schedule or in the dimming control settings or hours of operation, the Customer will submit an updated lighting fixture schedule to BC Hydro listing any changes. Changes will be permitted on a semi-annual basis (twice per year).</p> <p>6. Unmetered Service</p> <p>(a) BC Hydro at its sole discretion may permit unmetered Service under this Rate Schedule.</p>
Rate Rider	<p>The Deferral Account Rate Rider as set out in Rate Schedule 1901 applies to all charges payable under this Rate Schedule, before taxes and levies.</p>

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1702 – Revision 4

Effective:

Page 4-7

**Rate Increase /
Rate Decrease**

Effective April 1, 2019 the rates under this Rate Schedule include an interim rate increase of 6.85% before rounding, approved by BCUC Order No. G-45-19.

Effective April 1, 2020 the rates under this Rate Schedule include an interim rate decrease of 1.01% before rounding.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

4. STREET LIGHTING SERVICE

RATE SCHEDULE 1704 – TRAFFIC CONTROL EQUIPMENT

Availability	For lighting of traffic signals, traffic signs and traffic warning devices, and other equipment for controlling or directing vehicular or pedestrian traffic on public highways in those cases where the Customer owns, installs, and maintains the standards, fixtures, controls and associated equipment.
Applicable in	All Rate Zones.
Rate	Energy Charge: 11.21 ¢ per kWh
Special Conditions	<ol style="list-style-type: none"> Service Connections Where necessary BC Hydro will provide an overhead or underground Service Connection in accordance with section 3 of the Terms and Conditions (Provision of Electricity). <u>Service to mixed uses including but not exclusively for lighting and / or traffic control will be provided under the applicable General Service Rate Schedule.</u> Unmetered Service BC Hydro at its discretion may permit unmetered Service under this Rate Schedule. Term of Service Agreement The term of the initial Service Agreement under this Rate Schedule will be not more than five years; renewal periods will be for five years.
Rate Rider	The Deferral Account Rate Rider as set out in Rate Schedule 1901 applies to all charges payable under this Rate Schedule, before taxes and levies.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro

Rate Schedule 1704 – Revision 4

Effective:

Page 4-12

**Rate Increase /
Rate Decrease**

Effective April 1, 2019 the rate under this Rate Schedule includes an interim rate increase of 6.85% before rounding, approved by BCUC Order No. G-45-19.

Effective April 1, 2020 the rate under this Rate Schedule includes an interim rate decrease of 1.01% before rounding.

ACCEPTED: _____

ORDER NO. _____

ACTING COMMISSION SECRETARY

BC Hydro 2020 Street Light Rates Application

Appendix E

Customer Engagement Materials

Workshop invitation: Street light rate design[Register by August 10](#)[Read this email online](#)

Register now

Hi,

We're writing to let you know that later this year we'll be starting work to replace our street lights across the province with energy-efficient LEDs.

The replacement of street lights is to comply with new federal regulations that require all light ballasts containing Poly-Chlorinated Biphenyls (PCBs) be removed by the end of 2025.

These new street lights will help improve public safety by increasing the visibility of sidewalks and roads at night, as well as help reduce light pollution. LEDs also last longer and require less maintenance.

Register for the street light engagement session

Later this year, we plan to submit an application to the BC Utilities Commission to update the current overhead street light rate to better reflect the costs of this project.

To learn more about the rate change and share your feedback, we invite you to [attend a virtual workshop](#) via WebEx:

Date: Wednesday, August 12

Time: 2 p.m. – 4:30 p.m., PDT

Please register for the workshop and provide the requested information **by Monday, August 10, 2020**. If you're unable to attend, the workshop slides and online feedback form will be [posted](#) after the workshop.

[Register now](#)

Thank you,
BC Hydro regulatory group

[Log in to MyHydro](#)

[Outages & Safety](#)

[Accounts](#)

[Contact Us](#)

[Energy Savings](#)

[Unsubscribe](#)

You've received this email at [\[email address\]](#) because you've been involved in previous rate design proceedings, or you've expressed interest in the street light rates.

No longer interested? [Unsubscribe](#).

© BC Hydro, 333 Dunsmuir Street, Vancouver, B.C. V6B 5R3 | [Privacy Statement](#)

Rate Schedule 1701 Overhead Street Lighting

LED Street Light Program & Preliminary Rates

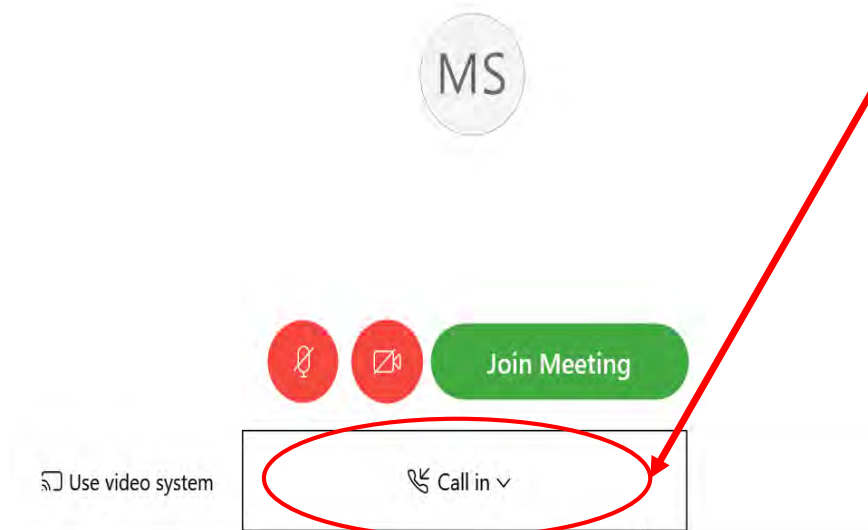


August 12, 2020

To access the session call in using the Webex phone-line **(604-449-3026) local*** and enter your access code and personal ID.

Your video and audio should be automatically turned off upon entry **(will be in red=OFF)** - if not please turn off video by clicking it.

Thank you



STEP 1. Before, you hit join meeting a second time, change the setting for your audio to **“Call in”**

STEP 2. Now click on Join Meeting button and go to next slide for dial in instructions

*to access global call in numbers see next slide.

The following box will appear with call in instructions – NOTE down the attendee ID # as this is unique to you as a participant

STEP 3: dial number and enter access info:

The screenshot shows a 'Call In' dialog box with a close button (X) in the top right corner. Below the title bar, there is a text input field containing 'Call in from another application' with an information icon (i) to its right. Below this, the first step is '1. Call', followed by 'Canada Toll (Vancouver)' and the number '+1-604-449-3026'. A red oval highlights the number, and a red arrow points from the text '1. Call the toll free number – ensure it is the Vancouver line (not US)' to it. Below the number is a link 'Show all global call-in numbers'. The second step is '2. Enter', followed by 'Access code' and 'Attendee ID'. To the right of these labels is a yellow box with 'XXXX' in each line. A red arrow points from the text '2. Enter your access code and attendee ID' to this box.

Call In

Call in from another application ⓘ

1. **Call**

Canada Toll (Vancouver)
+1-604-449-3026

[Show all global call-in numbers](#)

2. **Enter**

Access code
Attendee ID

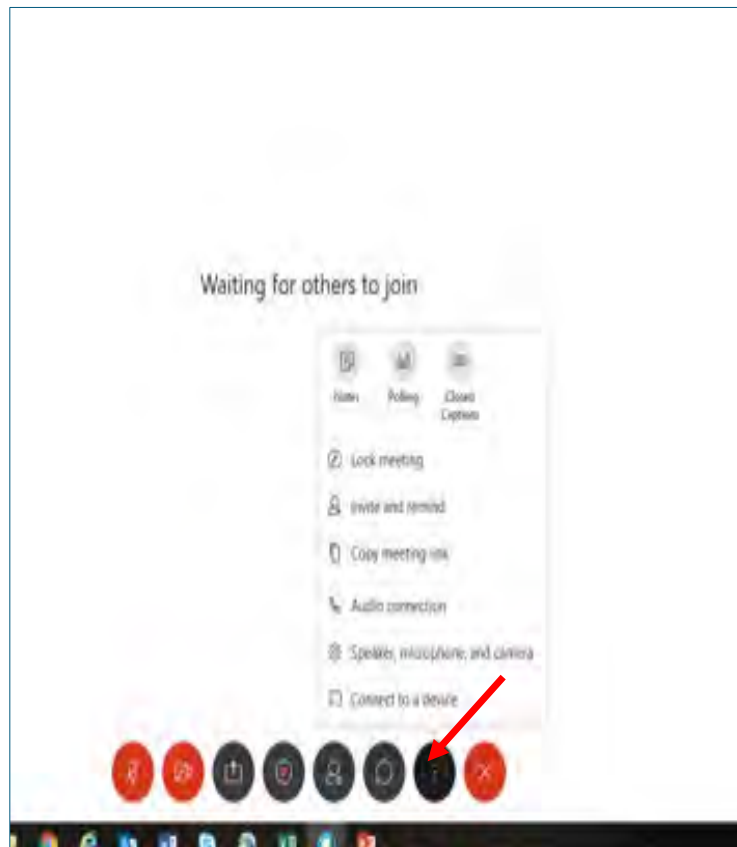
XXXX
XXXX

1. Call the toll free number – ensure it is the Vancouver line (not US)

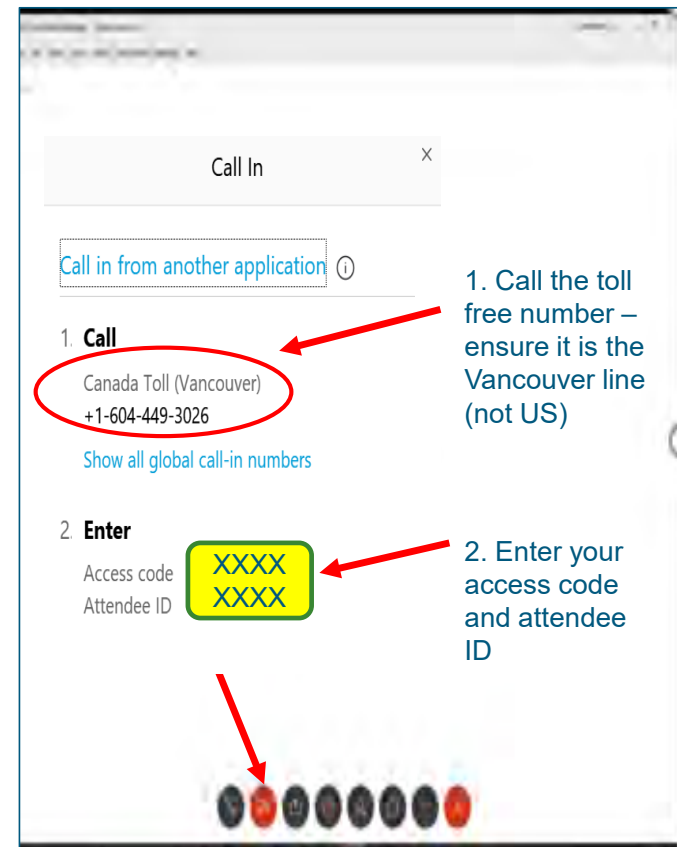
2. Enter your access code and attendee ID

*see [global call-in numbers](#) for different areas.

If call in information does not appear, you can access it by following these steps:



STEP 1 - Click more options box ... and choose "audio connection"

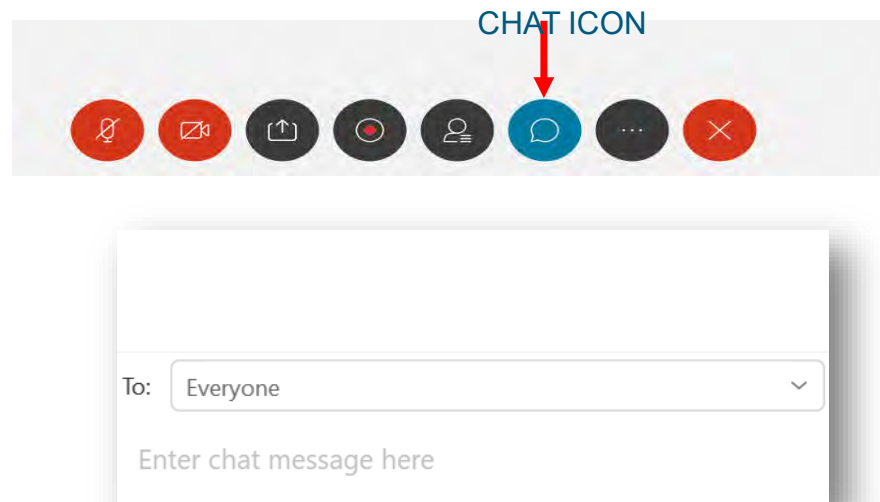


STEP 2 - Enter your access code, and attendee ID and turn off your video.

How to Participate and ask Questions

With the large number of registrants we ask that you click the **chat box icon shown** below and direct your question to “**Everyone**” to ensure one of the moderators captures it. However, if you wish to send a question specifically to BC Hydro or one of the presenters that option is available as well. Confidential questions can be forwarded to the email below.

We will endeavor to answer questions at the session as time permits, additional or follow-up questions can be also be sent to bchydroregulatorygroup@bchydro.com. Thank you.



Agenda

- **Opening Remarks**

Daren Sanders, Director, Contact Centre & Billing Operations

- **The Street Light Replacement Program & Streetlights Options**

DJ Feinstadt, Program Manager, Street Light Replacement Program

Ed Mah, Team Lead, Distribution Sustainment Planning

- **RS1701 Rates**

Anthea Jubb, Senior Regulatory Manager, Tariffs

- **Closing Remarks**

Fred James, Chief Regulatory Officer

Purpose of today's session

Rate Schedule (RS) 1701 Overhead Street Lighting service

BC Hydro requests your feedback on proposed amendments to Rate Schedule (RS) 1701 Overhead Street Lighting service.

- BC Hydro owned & maintained street lights on BC Hydro distribution poles

A rate application is required to continue billing RS1701 once lighting is converted to LED. Issues to address include:

- Updating Electric Tariff language
- Adjusting rates to reflect operating & maintenance cost savings, and recovery of new capital costs

Street lights in B.C.

BC Hydro supplies electricity to over 350,000 street lights



95,000 BC Hydro owned

RS1701 Overhead Street Lighting

RS1755 Private Outdoor Lighting (Closed)



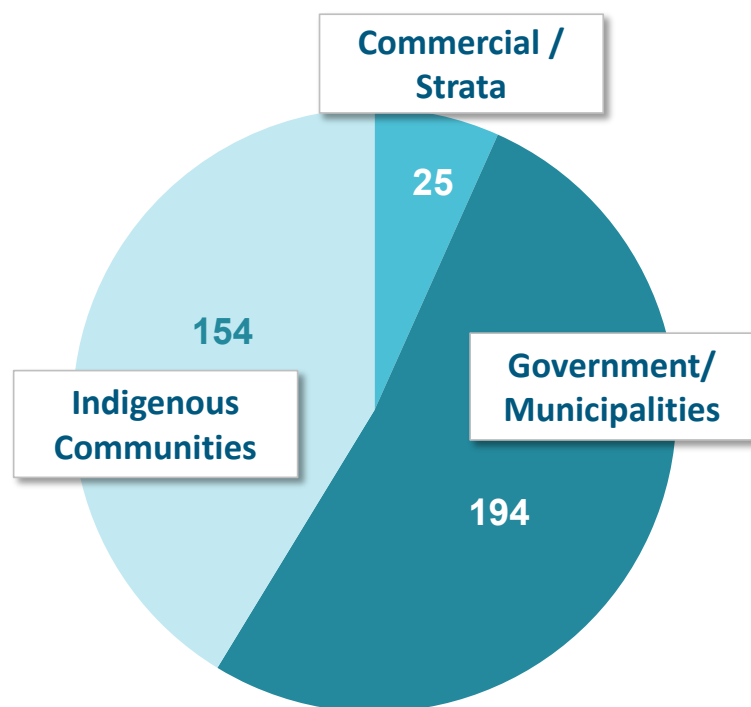
260,000+ Customer owned

RS1702 Public Area Ornamental Street Lighting

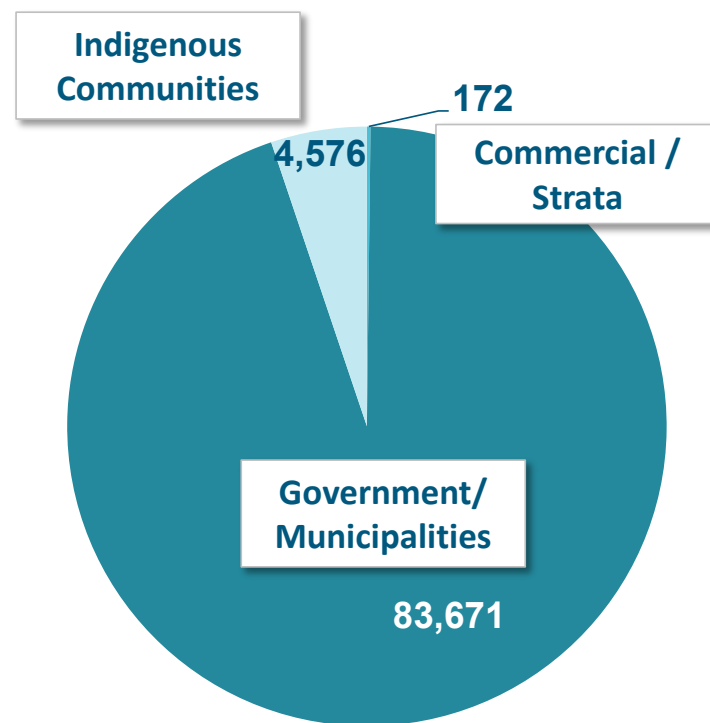
RS1703 Street Lighting Service (Closed)

RS1704 Traffic Control Equipment

Customers on RS1701



373 Customers



88,419 Street Lights

Drivers for LED Street Light Program

Proactive replacement of HPS fixtures to LEDs



- Compliance with Federal Environmental PCB Regulations



- Energy conservation
- Better quality lighting with fewer failures, resulting in improved public safety



- Meet customers' expectations for converting street lights to LEDs



- More efficient than replacing fixtures as HPS lights failed
- Improved coordination with customers

About the LED Street Light Program



HPS v LED Street Lights

LEDs provide better quality, whiter light and require less maintenance

Current HPS Street Lights




New LED Street Lights



Photocells



Street Light Options

Current	Street Light Type		Wattage
	High Pressure Sodium (HPS)		100W 150W 200W
	Mercury Vapour (MV)		175W 250W 400W



Future	Street Light Type		Wattage	Colour Temperature	Equivalent HPS MV
	LED		39W 75W 114W 162W	Warm 3000K Cool 4000K	- 100W 175W 150W 250W 200W 400W

- Customers responsible for LED selections & lighting design

Customer Communications

- ✓ July | Initial notification email & invite to rate engagement session
- ❑ August | Request for LED types for use in street light repairs
- ❑ September | Program deployment & technical lighting session
- ❑ Based on Deployment Schedule | Request for detailed LED light selections for use in the conversion of existing RS1701 street lights to LEDs
- ❑ Notification of the completion of LED deployment in their community

LED Street Program Deployment Plan

2020	<p>September</p> <ul style="list-style-type: none"> Submission of Rates Application to the BC Utilities Commission <p>November</p> <ul style="list-style-type: none"> Start <u>Proactive LED conversions</u> <ul style="list-style-type: none"> <i>Detailed deployment schedule to be finalized and will be based on an efficient and cost effective deployment plan</i> <u>New Installations</u> completed with LEDs <u>Failed street lights repaired</u> with LEDs
2021-2022	<ul style="list-style-type: none"> Continue deployment of LED street lights
2023	<p>Mid-2023</p> <ul style="list-style-type: none"> Deployment complete

Program Support

- bchydro.com/streetlights
- E. LightingSupport@BCHydro.com
- P. 1.833.828.2224 (toll-free)
- Lighting Design Consultants - referrals available via [BC Hydro's Alliance of Energy Professionals](#)



Rates



Rate application process

- BC Hydro requires an update to rate schedule 1701 to reflect conversion to LED technology
- This fall we will apply to our regulator, the BC Utilities Commission (BCUC) for approval of our proposed changes to rate schedule 1701
- The BCUC will administer an open and transparent process to examine our rate proposal, and will decide on what changes to are appropriate
- All interested and impacted parties may participate in the BCUC process, by submitting letters of comment, asking questions, and/or making an argument

Bonbright rate design criteria

Bonbright Criteria	Grouping	Performance	Remarks
1. Price signals to encourage efficient use and discourage inefficient use	Economic Efficiency	Good	The marginal value of electric energy and capacity related savings are reflected in the RS 1701 rate
2. Fair apportionment of costs among customers	Fairness	Very Good	All savings, and all costs associated with the LED conversion are reflected in the proposed new rate - no impacts on other ratepayers
3. Avoid undue discrimination			
4. Customer understanding and acceptance; practical and cost effective to implement			
5. Freedom from controversies as to proper interpretation	Practicality	Good/Fair	<ul style="list-style-type: none"> The proposed rate is easy to understand and practical to administer The proposed rate results in a temporary bill increase which may not align with customer expectations
6. Recovery of the revenue requirement			
7. Revenue stability	Stability	Good	The only element of the rate that changes is the supplemental charge – this temporary charge ends when deployment completes. Otherwise the rate will be stable over time, changing only with general rate increases or decreases
8. Rate stability			

BC Hydro rate design objectives

Rate Design Objectives	How they apply to RS 1701
Economic Efficiency	<ul style="list-style-type: none"> The marginal value of electric energy and capacity related savings are reflected in the RS 1701 rate
Decarbonization	<ul style="list-style-type: none"> The energy and capacity savings associated with the conversion to LED will make a positive contribution to decarbonization
Flexibility	<ul style="list-style-type: none"> The new rates are responsive to changes to our business and policy environment

About the current rate

- RS 1701 is a combined electricity and equipment rental rate for BC Hydro owned street lighting, billed as \$ / month / lighting unit.
- Annual RS1701 revenue is ~\$22.65 million

Current RS 1701 pricing:

Streetlight Type	Wattages	Rate F2021 Rates (\$/month/unit)
High Pressure Sodium	100 W	\$19.40
	150W	\$23.14
	200W	\$26.72
Mercury Vapour Unit	175 W	\$21.32
	250 W	\$24.57
	400 W	\$31.67

Inputs to the new rate

Component	Illustrative Annual Cost (savings)	Illustrative Impact on pricing
Maintenance Savings	\$(1.3) million	-6%
Electricity Savings	\$(1.9) million	-9%
Capital Cost	\$2.6 million	+12%
Total	\$(0.6) million	-3%

- The total savings determine the RS 1701 Rate for LED lights
- A total savings of \$0.6 million / year has been used in rate design
- This amount is passed on to customers in the new rate
- This represents an overall 3% saving

Supplemental charge due to early replacement of existing lights

Component	Cost (savings)
Current Net Book Value (NBV)	\$7.5 million
Depreciation during program	\$(0.7) million
NBV to be recovered	\$6.8 million
Duration of recovery (illustrative)*	48 months
NBV Recovery per year	\$1.7 million

- BC Hydro must recover the undepreciated value of street lights that are removed before the end of their service life (the Net Book Value or NBV).
- A Supplemental Charge will be applied until the NBV is fully recovered, at which point it will be discontinued – applies to all street lights.
- A total average additional cost of \$1.7 million / year has been used in rate design.
- This amount is passed on to customers in the new rate
- This represents an additional 8% cost

²⁴ *The actual duration will depend on when the charge is first applied to customer bills and when the deployment finishes

Illustrative pricing

Streetlight Type / Wattage	Current Pricing	Illustrative New Pricing		
		Streetlight Charge	Temporary Supplemental Charge*	Effective Charge with Supplemental Charge
LED <45W	n/a	15.24	1.57	16.81
HPS 100W	19.40	18.84	1.57	20.41
LED 45 – 80W	n/a			
HPS 150W	23.14	23.44	1.57	25.02
LED 81 – 120W	n/a			
HPS 200W	26.72	27.44	1.57	28.99
LED >120W	n/a			

- Bills are based upon the rate times the number of street lights, charged monthly
- Supplemental charge results in a temporary rate increase of approximately 6%
- Supplemental charge drops off after at the end of deployment

²⁵ * Based on a 48 month duration assumption

Illustrative bill impact examples

Time		Customer 1	Customer 2	Customer 3
	Number of Lights	10	54	758
Today	Current Bill	\$223 / mo.	\$1,174 / mo.	\$16,568 / mo.
Illustrative new pricing	Street Charge	\$221 / mo.	\$1,156 / mo.	\$16,326 / mo.
	Charge			
	Supplemental Charge	\$15 / mo.	\$85 / mo.	\$1,197 / mo.
	Total Bill	\$237 / mo.	\$1,240 / mo.	\$17,523 / mo.
	Bill Impact	+\$14 / mo.	+\$66 / mo.	+\$955 / mo.

- Actual bill increases are depend on the number and proportion of lights

Notes

- Assumes like-for-like replacement and no new low wattage lights (<45 W)
- Includes taxes, all-in bill based on current (F21) rates

Maintenance savings

Maintenance costs	Cost savings
Cost reduction	\$1.3 million

- LED lights have lower maintenance because no re-lamping is required.
- A total savings of \$1.3 million/ year has been used in rate design
- This amount is passed on to customers in the new rate
- This represents an approximate 6% saving

Electricity savings

Electricity Savings	Cost Savings
Annual energy reduction	\$0.9 million
Annual capacity reduction	\$1.0 million
Total annual electricity reduction	\$1.9 million

- These savings arise because LED technology has lower energy and peak demand
- A total savings of \$1.95 million / year has been used in rate design
- This amount is passed on to customers on the new rate
- This represents an approximate 9% saving

Capital cost of the LED technology

Capitalization of replacement program costs	Cost Increase
Annual increase	\$2.7 million

- Program costs are amortized over the asset service life (e.g. 20 years)
- These are costs to acquire and install the new equipment
- A total average additional cost of \$2.7 million/ year has been used in rate design
- This amount is passed on to customers in the new rate
- This represents an additional 12% cost

Feedback Requested

- BC Hydro has relatively few options for updating RS 1701
 - The costs to provide service under RS 1701 are largely fixed
 - The load profile of RS 1701 electricity usage is largely fixed
 - The program timeline is set by the Federal Environmental PCB Regulation
- There are rate elements that we would like your feedback on:

Should the supplemental charge be a fixed charge per light, or a % of bill?

- Under a fixed charge per light, all customers pay the same charge
- Under a % of bill, customers with lower wattage lights will pay a lower effective rate

Do you have a view as to whether the supplemental charge should take effect this fiscal year, which may result in a somewhat lower monthly charge, or take effect after the final BCUC decision (expected by March 31, 2021), which may result in a somewhat higher monthly charge?

Rates during the deployment

All customers will be charged the same rate, regardless of when their individual lights are converted

- Benefits of this approach
 - Practical and cost effective to implement: eliminated rate incentive for customers to advocate for a specific deployment schedule, thereby ensuring deployment can be scheduled in the most cost effective and practical manner
 - Stability: improves revenue and bill stability
- Jurisdictional support for this approach
 - SaskPower ten year deployment of LED street lights
<https://www.saskpower.com/Our-Power-Future/Infrastructure-Projects/Construction-Projects/Current-Projects/LED-Streetlights>

Early light removal fee

- Currently, if a customer requests to replace a fixture, they are required to pay to BC Hydro the original cost of the existing fixture, less any accumulated depreciation, and the cost of removing the existing fixture
- Proposed amendment would add that if a Customer requests to remove a fixture they will be required to pay original cost of the existing fixture, less any accumulated depreciation, and the cost of removing the existing fixture
- The amendment will protect BC Hydro ratepayers from the cost of stranded assets, which could arise if a Customer chose to leave RS 1701 service shortly after their fixtures are converted to LED
- If an RS1701 customer would like to remove and not replace a light, this decision should be made prior to LED conversion.

Termination of Rate Schedule 1755

- Under RS 1755 BC Hydro provides outdoor lighting on private property
- RS 1755 has been closed since 1975
- There are 5,000 RS 1755 lights in service and \$1.3 million per year in revenue
- Due to the 2008 Federal PCB Regulation, almost all of the RS1755 lights have to be removed by December 31, 2025
- Continuing to offer RS 1755 service would require significant capital investment
- There is an existing competitive market of contractors who supply outdoor lighting for private property, no need for a BC Hydro regulated service
- RS 1755 customers will be contacted directly about next steps
- Please let us know if there is interest in a follow up webinar on RS 1755

Other Unmetered Services

- BC Hydro provides electricity on an unmetered basis to all other street lighting service rates and some Small General Service accounts.
- BC Hydro relies on customers to self-report light or equipment additions, removals or modifications to update billing.
- In some cases customers are not reporting these changes to BC Hydro in a timely manner. This can result in BC Hydro underbilling without recourse.
- We propose to amend the Electric Tariff to allow BC Hydro to back bill the customer to the time of the light or equipment change.
- Changes would apply to:
 - Terms and Conditions Section 5.7 Back Billing
 - Special conditions of RS1702, 1703, 1704, 1300 and 1234



Closing Remarks: Rate Application Milestones

2020	• August 12	Public engagement via webinar
	• August 19	Deadline for feedback on webinar
	• Late September	BC Hydro will file rate application with BCUC
	• Early October	Likely date of intervener and interested party registration
	• October 31	BC Hydro will request this be the effective date for tariff updates to enable us to bill for LED service
	• Fall 2020	Rate proceeding underway
2021	• Winter 2021	Rate proceeding underway
	• March 2021	Requested BCUC approval of final RS 1701 rate <ul style="list-style-type: none"> • May result in customers receiving a refund or charge

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: bchydroregulatory@bchydro.com
- Submit your feedback form by August 19,2020

Contact Information

BC Hydro Regulatory

- E. BCHydroRegulatoryGroup@bchydro.com
- For this presentation and the feedback form of the session
bchydro.com/about/planning_regulatory/regulatory

Streetlight Replacement Program Support

- bchydro.com/streetlights
- E. LightingSupport@BCHydro.com |
- P. 1.833.828.2224 (toll-free)
- Lighting Design Consultants - referrals available via [BC Hydro's Alliance of Energy Professionals](#)



Summary Notes

Rate Schedule 1701 Amendment / Street Lighting Replacement Program

August 12, 2020

WebEx / D02 BC Hydro Auditorium

Type of Meeting	Street Lighting Replacement Workshop – Customers and Interveners			
Agenda	<ul style="list-style-type: none"> • Opening Remarks • The Street Light Replacement Program & Streetlights Options • RS1701 Rates • Other Matters • Closing Remarks 			
Abbreviations	BCUC	British Columbia Utilities Commission	ICCP	Indigenous Communities Conservation Program
	GPS	Geographic Positioning System	LED	Light-emitting Diode
	GIS	Geographic Information System	PCB	Polychlorinated Biphenyls
	HPS	High Pressure Sodium	RS	Rate Schedule
	ICIP	Indigenous Community Input Program		

[Link to Presentation](#)

BC Hydro Presenters: Anthea Jubb, Daren Sanders, DJ Feinstadt, Ed Mah, Calvin Hastings, Fred James.

See Appendix 1 for list of Customers and Interveners.

Near Term Actions or Tasks:

- Customer feedback form, August 29, 2020
- BC Hydro application, September 2020

Questions and Answers:

1. LED Street Replacement Program

The purpose of going to LED's is based on PCB's being reduced. Where are the PCB's in HPS lights?

- There could be PCBs in the ballasts of some older High-Pressure Sodium (HPS) and mercury vapour street lights.

Do Federal PCB regulations mean that communities have to update the lights they own too in addition to BC Hydro owned lights? What is the timeline for the regulation?¹

- Federal PCB regulation applies to several types of equipment, with few exceptions. Newer equipment may not contain PCBs and therefore would not be subject to the regulation, but each owner of the equipment is responsible for verifying the content of PCB in their equipment.

Based upon installation date, do all BC Hydro lights have the PCB issue or just old fixtures?

- We know approximately 20% of the BC Hydro owned street lights may contain PCBs. However, our records do not indicate which lights may.
- Testing each one is cost prohibitive and a mass replacement is most cost effective.

For the lights that we have under this rate structure, it would cost us more over 20 years (the lifespan) under the new pricing scheme. Can we opt out of the upgrade?

- Customers may decide to leave the service and install their own lights and poles at their expense under RS1702.
- If customers want to continue to use the RS1701 service, they cannot opt out from the LED conversion. BC Hydro cannot retain or offer HPS lighting because of the federal regulation and the obsolescence of the technology.

2. LED Product and Vendor Information

What is the life expectancy of the Photocells being considered?

- Approximately 20 years.

What LED vendor/product is BC Hydro using? Does a customer have a choice of LED product?

- BC Hydro's LED street light vendor is LED Roadway Lighting that is based out of Halifax.
- BC Hydro will offer eight different street lights: four different wattages and two-colour temperatures for each wattage.
- Customers can select the wattage and colour temperature for each of the RS1701 street lights in their community.
- Information about the wattage and colour temperature options will be posted on BC Hydro's website shortly.

The LED street lights have the option for a smart controller node to monitor energy consumption. Can you update on Measurement Canada's decision to allow for billing on this type of method vs the flat rate system?

- BC Hydro explored smart controller solutions but decided not to pursue the technology at this time because it was cost prohibitive.
- The street lights we selected are compatible with smart controllers. If there is a business case to add controllers in the future, it can be added to these LED street lights.

¹ <https://laws-lois.justice.gc.ca/eng/regulations/sor-2008-273/index.html>

2. LED Product and Vendor Information

- We cannot comment on the Measurement Canada decision as we have no insight into whether a decision on this matter is imminent.

Will samples be provided so we can compare colour temperatures/brightness? Photos in winter conditions will be important. Recommendations for arterial vs local streets would be very helpful.

- We will be posting information on website, with photos to show how the different colour temperatures and wattages look. We will look into options for getting photos taken in winter and other conditions.
- We suggest customers work with their street light design consultants on selecting the appropriate lighting for different locations in their community.

Does choosing warmer colour LED lights negatively impact the improvements in visibility that come with LEDs (e.g. being able to better see the yellow vs white lines on pavement)?

- Both the 3000K and 4000K LED street lights have better colour rendering than the current HPS lights (~2300K).
- Customers need to decide their preference.
- Our understanding is that some customers (including Burnaby, Surrey and Coquitlam) who started their LED conversions chose 4000K for intersections, main roads and industrial areas for better visibility and 3000K for residential areas for the warmer look.

Where necessary, we would request some support from Hydro to help with selection of appropriate wattages with those without in-house expertise.

Are the cities responsible for the lighting design, e.g., wattages? Do BC Hydro LED designers meet the municipalities' street lighting standards/specifications?

The lighting designers to whom you are referring we can connect to through the link, is this a service that is sponsored by BC Hydro?

- Customers are responsible for their lighting design.
- A design consultant would be the best resource to answer customers' questions on lighting designs for their communities.
- BC Hydro can provide referrals to qualified street light designers who are part of our [Alliance of Energy Professionals](#). We reviewed and verified their qualifications, but we do not sponsor their service.

3. Deployment Plan

Are you planning to defer current new installations until November for better efficiency?

- If customers who are requesting new street lights before LED deployment starts can wait until November, we would prefer to install new LED lights then for efficiency of deployment.
- If customers need new street lights now for safety or other considerations, we will install HPS lights. These HPS lights will be converted to LEDs in the future.

As part of the LED conversion process will you be verifying and correcting your lease light data base?

- We will be verifying all RS1701 street lights in our database.

Does BC Hydro have an inventory of Hydro-owned lights in each community that can be shared with us?

Is there going to be an excel spread sheet that the municipalities update for each light location? Can this be tied to GIS that makes it easier to understand the location?

We received information on an excel spreadsheet with pole # that should match a GIS program that would

3. Deployment Plan

help us identify if these poles are ours and where they are etc. - e.g. if you click on pole # on excel spreadsheet and it should automatically go to GIS map this way we can take a proper inventory of poles and streetlighting.

- BC Hydro will send all customers a detailed list of their RS1701 street lights with pole IDs and GPS coordinates prior to deployment starting in their area.
- There will also be a Google earth file for customers to easily locate the street lights on a map.
- If customers would like a detailed list of their street lights now, they can contact our Street Light Support Team at LightingSupport@bchydro.com to obtain it.

Could there be a detailed session offered on completing the LED light selection spreadsheet? The timeline is very short to have funding approved for a designer to complete the design by this fall.

What kind of timelines will Hydro be expecting from cities after the file is shared?

- The detailed selection spreadsheet will be provided to customers months in advance of deployment starting in each area. Customers can also request for the file now or at anytime by contacting our Street Light Support Team at LightingSupport@bchydro.com.
- Detailed instructions on how to complete the selection spreadsheet are included in the file.
- We plan to hold another customer session in September to provide more information on the new LED street lights and the deployment processes, including showing customers how to complete the detailed selection spreadsheet.
- Our Street Light Support team will also be available to provide customers assistance in completing the detailed selection spreadsheet.
- Of the customers we have talked to, most of them told us they need a couple of months to complete the lighting design. We are happy to work with customers to accommodate their needs.

We welcome customer feedback on how much time they will need to complete lighting design. We will incorporate customer feedback into our deployment process.

Will there be information packages we can share with our communities/councils? Is BC Hydro going to make an announcement?

- Information packages are under development right now. Let us know the information that will be helpful. We will consider how to best explain the different types of LED lighting and BC Hydro's timelines for different communities.

Will Hydro be sharing the tentative deployment schedule?

- Yes. We are working with installation contractors to develop the most cost-effective deployment schedule.
- We will post a high-level development schedule on our website.

What is your conversion area prioritization criteria?

How will BC Hydro set the priorities for LED replacement? Will NIA communities be prioritized because of the high cost of energy?

- We are working with installation contractors to determine the most cost-effective deployment schedule.
- Recognizing the costs to travel, the roll-out of the LEDs will in part be based on geography to ensure that the installation crews can efficiently work their way around the province.
- The high energy cost in NIA communities will be considered in developing our deployment plan.

Will it be a direct replacement scenario, i.e., the existing HPS wattage replaced with the equivalent LED?

3. Deployment Plan

How do we know what the colouring will be for the new lights?

- Customers need to specify the colour temperature and the wattage they want for each street light.
- The colour temperature selection depends on each customer's preference. Both 3000K and 4000K are whiter than the current HPS street lights. The 4000K lights offer better colour rendering and the 3000K lights give a warmer look.
- Customers can take the opportunity to identify the over- and under-lit areas, areas needing additional street lights and areas that no longer require street lights.

If an HPS street light goes out, are they being replaced with LED's?

- Starting in November, if an HPS street light fails, and BC Hydro has received the customer's initial default selection, the HPS light will be repaired with an LED street light.
- If we have not received customer's initial selection, our Street Light Support Team will reach out to the customer to determine which LED light they want to replace the failed HPS street light.

4. Potential Community/Public Concerns

Big concern is residents complaining about new lights being too white/bright. Can you please provide examples of the lighting design concepts in terms of the extension of the light from the pole out to the road and what impacts this has residential areas, what is most ideal in rural areas?

How about the impact on people such as light pollution? Will we be able to access someone to help design light layouts?

- LED lighting shines more directly downward and has more defined cut-off, thus it has less light pollution.
- A design consultant would be the best resource to answer customers' questions on lighting designs for their communities.
- BC Hydro can provide referrals to qualified street light designers who are part of our [Alliance of Energy Professional](#).

For the street light repairs, if BC Hydro does spot replacements, there will be inconsistent lighting levels. Any safety concerns with this?

- There may be some short-term inconsistencies but, generally, the new LED lights will provide better lighting output. BC Hydro believes there is minimal safety concerns.

We have street lights that burn out because of the infrastructure as we can see the casing fills with water.

- The entire HPS lighting fixture, not just the bulb, will be removed and a new LED luminaire will be installed.
- The new LED street light selected meets BC Hydro's water resistance standards.

What about communities with Dark Sky policies? It would be great to have information on dark sky compliance of new lights.

- The lights are designed to meet Dark Sky requirements; however, Dark Sky compliance only applies to 3000K lights. 4000K lights are not considered dark sky compliant based on the output light colour.

Is house side shielding going to be an option?

- The LED lighting provides better cut-off, so there should be less light spill into the residence.
- Most light spill can be minimized by adjusting light angles.
- We do not anticipate light spill issues whereby light shields are needed but can assess individual circumstances during LED deployment.

5. Specific Questions relating to Indigenous Communities

Is this the right place to ask about infrastructure on reserve? Some cement poles supporting street lights still remain in Tseshaht community. Will these be changed out at that time as well?

- Generally where a light is mounted on a concrete pole that is part of our distribution backbone, we will be replacing the lights and the poles in these cases.

Would a company of First Nation electricians in community be able to do this work? or bid on this?

- The installation services for Vancouver Island and the Northern Interior regions were procured through a public RFP process. For the Southern Interior region, an RFP was completed in compliance with BC Hydro's Indigenous procurement policies. There is also an open public RFP that is posted on BCBid for installation services in the Lower Mainland.

Would the equipment and services delivered into Indigenous Communities not be tax free (as appropriate on-reserve)?

- The tax-exempt status for property and services delivered to a First Nations Reserve area is only available to Indigenous people, the First Nation Band, and certain Band Enabled Entities who are located on the Reserve. In this case BC Hydro will be acquiring the LED lights for installation on poles that we own on the Reserve, so no PST or GST exemption is available.
- However, because BC Hydro can recover the GST we pay on the project from the government, only the PST we pay on LED street lights, photocells and other materials is included in the project costs used for rate calculation.

For Indigenous Communities, is there any opportunity to add this to the BC Hydro ICIP programs where we are implementing other measures to reduce costs and become more energy efficient?

- BC Hydro's Indigenous Communities Conservation Program (ICCP) provides support to Bands to conduct residential energy upgrades in their communities. ICCP is not applicable to the LED street light replacement project.

How would you take inventory or detail of indigenous near other nearby communities?

- Each street light is tagged with customer information in our asset database. We will provide the detailed street light list to customers to verify the lights they are responsible for in their communities.

6. Rate Design and Costs

General

Is the Street Light Charge the permanent charge for the new LED lights moving forward?

- Yes. BC Hydro will apply for an on-going rate as shown on slide 25 as the Street Light Charge.
- This charge will be subject to the annual increases or decreases that are approved for BC Hydro's revenue requirements applications.

Is it going to cost us extra to have BC Hydro lights removed from Hydro poles if we have our own street lights installed?

We will be rebuilding some streets and installing City lights, replacing Hydro lease lights. Will we have to pay depreciation if replacing a brand-new LED light?

We have a significant frontage improvement program over the next 5 year, so we may remove 100+ lease lights. Will we need to pay for the LED fixtures even after many have been removed or can we pay the costs in a one-time charge?

- At this time if customers want to discontinue the existing service and not install LEDs, there is no charge to do this.
- However, BC Hydro will apply to the BCUC for approval to impose a charge for early removal of any street lights that are converted to LED. The intent of the charge will recover the undepreciated value of the street light that BC Hydro is requested to remove and is intended to protect other customers.
- We encourage customers to plan ahead. Customers can contact our Street Light Support Team at LightingSupport@bchydro.com if they need to discuss their specific city light conversion plan further.

Will someone contact us on how it will personally affect us, and when we will start seeing changes?

- This customer has been contacted by our Street Light Support Team.
- Customers are welcome to contact our Street Light Support Team at LightingSupport@bchydro.com to learn more about the project and the impact to their accounts.

Do not agree with rate increases occurring months prior to actual service improvements!

6. Rate Design and Costs

So our bills will be going up before the changes happen?

- RS 1701 is a postage stamp rate schedule. All customers are charged the same rate.
- BC Hydro will apply for an interim LED rate to be effective while the BCUC reviews the application. We expect that rate will be equal to the existing HPS rate. In this respect, the rate will not increase from current rates.
- We are proposing to initiate the supplemental charge before all customers' lights have been converted in keeping with the postage stamp nature of the rate.
- We have not decided on whether the interim rate should include the supplemental charge or the supplemental charge should start with the permanent rate and be recovered over fewer months, in which case it may be higher
- We will be requesting BCUC approval of an October 31 effective date for the Tariff change to enable lights to be replaced with LED fixtures and customers to be billed. BC Hydro will be seeking an interim and refundable rate that becomes effective on this date assuming a regulatory process will extend beyond this date.
- We need your feed back on the implementation of the supplemental charges. The total amount of the supplemental charge must be recovered but there is some limited flexibility related to when and how the charge is applied.

What would the cost be if we wanted to purchase these lights and pay for the installation on our own poles? Then we do not have to pay anything but the power moving forward.

- Customers can choose to take service under RS 1702 and be responsible for the installation and maintenance costs associated with the lights and pay BC Hydro only for the electricity consumed.
- We are not in a position to provide cost estimate information for this option as BC Hydro does not provide the service and is not familiar with the market information of such a service.

We are currently in the budget process and a \$1.50 increase would result in \$20,000 annual increase for our community. This is a difficult situation given most communities will be under the direction to have minimal increases after the implications of the pandemic.

- We acknowledge the difficulty and the timing of the rate change. However, we are required by the federal requirement to remove PCBs from our system.

Most municipalities are budgeting for 2021 right now. If an increased charge is being applied for next year, we need to know now.

- We will provide our best estimates on customer bill impacts in our rate application which will be submitted to the BCUC in late September.
- If customers require further assistance on bill payments upon the final decision by the BCUC, they are welcome to contact our Street Light Support Team at LightingSupport@bchydro.com to discuss payment plan options.

7. Request for More Information

Will we have to pay depreciation if replacing a brand-new LED light?

- There are currently no LED lights installed under RS 1701. Depreciation of the LED lights that will be installed is a component of the street light charge. The undepreciated value of the existing HPS lights that are removed before the end of their service life is recovered by the supplemental charge.
- BC Hydro will propose that where BC Hydro has installed an LED street light and the

7. Request for More Information

customer then requests that street light be removed, the customer will be charged for the undepreciated value of the street light and the BC Hydro's costs to remove it,

Can BC Hydro provide information/inputs into how the streetlight charge is calculated?

- The slide deck provides a high-level overview on how the rate change from HPS to LED lights is determined on an average basis. This is done by applying marginal savings and additional costs to the current rate and RS1701 revenue.
- The detailed calculation will be included in our rate application

Can we be given the formula that calculates the \$1 increase per light? How long will the additional \$1/month/light be?

- The calculation of the supplemental charge is included in the slide deck. The supplemental charge will be in place until all LED lights are deployed. The charge is expected to end in 2024.
- The detailed calculation will be included in our rate application.

8. Costs to Customers

Will we see cost reduction after the initial increase to reflect decrease in cost for Hydro due to LED lights?

I can understand the initial increase due to capital cost to install the LED, I don't understand why the rate in future are not lower to reflect reduction in cost to hydro. Why is streetlight charge increasing when LED's are more efficient and you should 3% savings overall in the previous slide?

What savings are communities going to realize by switching to LED's? And how are costs of switching the equipment over going to be covered by the customer?

- The initial rate increase is not due to the capital costs associated with the replacement program, it is due to recovery of the value of the existing HPS street lights that are removed before the end of their service life.
- As shown in the slide deck, BC Hydro expects the average street lighting rate be reduced slightly following completion of the replacement program. This is the result of passing on maintenance and electricity savings, and the cost of the LED conversion (depreciating over the 20-year life expectancy of the new LED lights) to the customers.
- The actual rate experienced by individual customers may decrease or increase slightly and is dependent on the specific mix of lighting wattages for each customer.

If the charges are for capital and equipment, does that mean ongoing energy charges will be reduced? Since the LEDs will be using less energy than the old HPS lights and the equipment would have already been paid for.

- The per month pricing includes energy and demand related charges, maintenance and equipment costs as depreciation. Energy savings are reflected in the rate.
- Cost reduction is shown in the illustrative examples (slide 25).

Existing lights have not been fully paid for. They will be removed before they are fully depreciated; thus, we have proposed to recover this remaining value through the supplemental charge.

It will be very confusing for our City elected officials to understand why the rates will go up with new LED lights even after the additional temporary fee is paid off. We have done two large LED upgrades to municipal buildings this year and they both delivered positive return on investment. How do we explain to Council that LED streetlights will cost more?

8. Costs to Customers

- Coordinating the replacement of 90,000 street lights across the province with hundreds of customers adds complexity and costs to the program compared to other municipal LED street light conversions.
- The energy and maintenance savings of LED street lights will be offset by the cost of the replacement program.
- The rate increase (Supplemental Charge) is due to the need to recover the undepreciated value of the HPS lights. This charge will end when the LED conversion is complete.

Why did you decide to implement a supplemental charge rather than establishing a self-sustaining charge so you do not have to implement another supplemental fee when the LED lights need to be replaced in 20 years?

- We are proposing the supplemental charge because some of the existing equipment is not at the end of its service life and the under depreciated value must be recovered as the lights are replaced.
- A future supplement charge is only required when there is a fundamental change of street light technology to replace the LED lights. We anticipate the new LED street lights will last for at least the 20-year life span.
- BC Hydro cannot predict the development of street light technology or the requirement for a new street light rate application in 20 years.

9. Pricing/Rate Design Elements

Is the average capital cost per year based on a 20-year life of the fixture?

- The average capital cost calculation was based on 20-year depreciation for luminaires, and 40 years for the arms and wiring (if required).

For net book value, I would like to see details of that calculation. Life current fixture and current age of fixture. The actual age of the fixture can possibly exceed the life expectancy.

- All street lights are currently recorded in BC Hydro's asset database as mass assets. The net book value per light is therefore the average net book value for all lights installed as extracted from the asset database. We are not able to determine the net book value for individual lights or a specific customer's lights.
- Certainly some fixtures have little remaining value however we have continued to undertake maintenance and replacement of street lights as required as well as installing new street lights per customer requests, so not all fixtures are fully depreciated.
- More details will be included in the upcoming rate application.

Would we then pay for "mass" rather than for individual communities in terms of amount of lights?

- The total net book value for all street lights is divided by the total number of street lights to get an average net book value per light. This is the amount that must be recovered for each street light through the supplemental charge.
- Communities would then pay the supplemental charge based on the number of lights or their total street light bill amount in their community.
- We welcome customers' feedback on how the supplement charge should be calculated: a fixed amount for each light or a percentage of the total bill.

How do we explain to our Board that if our area may be last to be converted that we will be paying for the conversion for a number of months/years prior?

Shouldn't the charge be based on actual costs of number of lights and actual wattage for said lights to determine how much each customer pays? Your methodology implies an average shared amongst customers?

- Rate Schedule 1701 is an average rate for the entire system; BC Hydro is not proposing a specific rate for each community. This aligns with our postage stamp rate approach.
- The rates paid before and after conversion will be similar and may be slightly lower or higher than current rates depending on the customers specific lighting mix.
- The supplemental charge temporarily makes the rate higher during the implementation period, but the total amount of this charge is essentially the same regardless of when it is applied.
- Charging customers based on the actual conversion status adds complexity to billing and potentially the scheduling of the deployment, which would add costs.
- The Supplemental Charge would be applied based on the number of street lights that are billed under each customer account.
- There are options on how this charge is applied: either as a fixed charge per light or as a percentage of the billing amount.
- If applied as a percentage, the charge would vary by wattage. Higher wattage lights reflect the higher energy/demand and capital cost of the street light and this is reflected in the higher rate for these lights.
- We are seeking feedback from customer on their preference for how/ when the Supplement Charge is applied.

I'm having as difficult time understanding the rates and payback to cover capital cost...for example under rate 1702 where customer only pays for the hydro usage for 83 W LED approximately \$3/month per light and under rate 1701 same wattage is approximately \$18/mo. for a difference of \$15/month over 12 months = \$180. So if a fixture cost is \$720 the capital would be paid for over 4 years. Would this not result in significant reduction over

9. Pricing/Rate Design Elements

the expected life of 20+ years for light and 40+ years for the assembly.

- In RS 1702, the charge is for electricity only. In RS 1701, the charge includes investment for capital equipment, as well as the installation and ongoing maintenance of this equipment.

10. Salvage

What are the plans for the lights being replaced that are still usable? could there be some revenue to offset? Are the components being replaced recyclable? And would that reduce costs?

- When the HPS or MV street lights are removed, all components that are recyclable, e.g. metal, glass, etc., will be recycled.

Is rate schedule taking into account any salvage value from lights being recycled?

- Yes. The salvage value of the removed assets is already included in the costs. BC Hydro's installation contractors will recycle or dispose of the removed equipment, and the resulting revenues were factored into their pricing.

11. Carbon Credits

Will BC Hydro receive all carbon credits, or will the customers receive the carbon credits applicable to their Communities?

- BC Hydro does not anticipate that any credits that would give rise to financial benefits will arise as a result of the streetlight replacement.

12. General / Comments Questions

Electricity savings of the LED street light in the city of Richmond is over 40%, 9% is very low!!

- Please note that the RS 1701 rate is not an energy-only rate. Electricity (energy plus demand) represents less than 50% of the rate.
- We expect the energy consumption of the average LED street light will be reduced by approximately 40% from the current HPS street lights including ballast.
- However the RS 1701 rate also includes demand, maintenance and equipment components.
- The energy savings from the LED street lights will reduce the total RS1701 costs mentioned above by 9%.

Coquitlam used 4,000 on collectors, arterials, bus routes, and 3,000 on local roads. Burnaby does the same.

- Thank you for sharing your experience.

Would the Statute of Limitations apply to any potential back bill?

- BC Hydro is subject to the laws of British Columbia, including the provisions of the Utilities Commission Act, and acts in accordance with tariffs approved by the BCUC under the Utilities Commission Act. Back billing will need to be consistent with both.

Will BC Hydro also be applying to the Commission to rebalance the street lighting billing rates relative to other customer classes?

- No, this will not be a rate re-balancing application. The application will be about establishing rates for LED street lights under RS 1701.

Appendix 1

List of External Customers and Interveners – Street Lighting Engagement Workshop - August 12, 2020

First name	Last name	Company
Alex	Adams	District of Chetwynd
Pardeep	Agnihotri	City of Abbotsford
	Alexis	Saik'uz First Nation
Mark	Allen	Town of Smithers
Ali	Alnaggar	Township of Langley
Chris	Anderson	City of West Kelowna
Bill	Andrews	BCSEA
Gayle	Andrews	Lil'wat Nation
Paul	Appelt	District of Sechelt
Poroshat	Assadian	City Of Richmond
Tania	Banke	Indigenous Services Canada
Rod	Bate	Village of Lytton
	Beale	District of Tumbler Ridge
Jordon	Beger	Skwah First Nation
Dylan	Bennett	Ministry of Transportation and Infrastructure
Dustin	Bennett	Comox Valley Regional District
Laura	Benson	City of Maple Ridge
Olivier	Bergevin	City of Courtenay
Evan	Berry	City of Cranbrook
Ernst	Bezema	District of Clearwater
Cory	Bob	Nanoose First Nation
Kerri	Borne	District of Mackenzie
Charles	Boulet	Cariboo Regional District
Kevin	Bowbyes	Town of View Royal
Holly	Brown	District of Houston
Kevin	Brown	Old Massett Village Council
Jack	Buchanan	EMPR
Meredith	Burmaster	Regional District of Fraser-Fort George
Melony	Burton	City of Port Coquitlam
Brian	Cairney	City of Kelowna
Ryan	Campeau	Town of Sidney
Rory	Card	District of Lillooet
Shaun	Chadburn	Municipality of North Cowichan
Sterling	Chan	FVRD
Marcus	Chan	City of Surrey
Ronald	Chand	City Of Fort St John
Adrian	Cheng	City of Burnaby
Hillary	Cheung	BCUC
Darrel	Chorney	City of Fort St. John
Vinh	Chung	Port Moody
Deborah	Churko	Regional District of Nanaimo
Boyd	Clark	Cooks Ferry Indian Band

First name	Last name	Company
Philip	Clement	Metlakatla First Nation
Jonathan	Coca	City of Surrey
Chris	Cochran	Town of Golden
Rob	Crisfield	Village of Cumberland
Graeme	Cross	City of Surrey
Elizabeth	Cumming	Village of Port Clements
Chris	Cvik	District of Hudson's Hope
Korbin	Davis	Doig River First Nation
Gil	Davis	West Moberly First Nations
Bruce	DeMaere	Town of Sidney
Maggie	Dennis	Iskut Band
Chris	Desautels	City of Duncan
John	Diggins	City of Parksville
Patrick	Donaghy	Regional District of Mount Waddington
Linda	Dong	Linda Dong Associates
Joe	Doxey	City of Parksville
Karen	Dube	Village of McBride
Katarina	Duke	FVRD
Robert	Ells	Transport Canada - Sandspit Airport
Will	Emo	University Endowment Lands
Duminda	Epa	City of Vancouver
Jim	Ervin	private
Asiyeh	Eslami	City of Delta
Tom	Eustache	SIMPCW First Nation
Jim	Fast	McLeod Lake Indian Band
Daniel	Fok	City of Abbotsford
Donna	Forseille	District of Wells
Kerri Jo	Fortier	Simpcw First Nation
Chris	Foskett	City Of Kamloops
Gabe	Fourchalk	District of Wells
Rod	Fraser	Ditidaht First Nation
Ernie	French-Downey	Takla First Nation
Wendy	Fulla	City of Nanaimo
Lisa	Gallic	Tseshah First Nation
Darin	Gerow	City of Salmon Arm
Hirod	Gill	City of Langley
Daris	Gillis	District of Mackenzie
Michael	Gjaltema	City of Maple Ridge
Brian	Goble	District of Sooke
Jackie	Good	Snuneymuxw first nation
Dana	Graves	City of West Kelowna
Kelsey	Green	Corp. of the Village of Hazelton
Sukhmeet	Grewal	City of Delta
Thomas	Hackney	
Jerry	Halldorson	Township of Langley

First name	Last name	Company
Sue	Hanley	Homalco First Nation
Karl	Hansen	Village of Clinton
Evangeline	Hanuse	CCRD
Susan	Harney	Nanoose First Nation
Alan	Harris	Tomorrow Smithers
Lev	Hartfeil	Village of Telkwa
Jim	Hemstock	City of Nanaimo Engineering
George	Henshall	City of Langford
Ariane	Herzog	Town of Smithers
Scott	Hickling	Takla Nation
Shane	Hixson	Municipality of North Cowichan
Henry	Hon	City of Vancouver
Katie	Hooper	Esquimalt Nation
Terri-Ann	Houghton	District of Fort St. James
Wendy	Hunt	District of New Hazelton
John	Illes	Regional District of Bulkley Nechako
Christine	Ingham	Ministry of Transportation & Infrastructure
Nikki	Jackson	Squiala First Nation
Arnold	John	Tkemlups te Secwepemc
Alec	Johnnie	Cowichan Tribes
Bryce	Jones	Splatsin
Stephen	Judd	Port Moody
Hans	Karow	Eldorado Senior Mobile Home Park
Tyson	Koch	Village of Harrison Hot Springs
Nicole	Kohnert	Regional District of North Okanagan
Brandon	Kreager	Regional District of Mount Waddington
Kliment	Kuzmanovski	City of North Vancouver
Suzanne	Lafrance	Squamish-Lillooet Regional District
James	Lapointe	City of Kamloops
Iain	Larkin	District of Squamish
Connie	Larson	Village of Alert Bay
Leo	Lawson	Heiltsuk First Nation
Thomas	Liversidge	Village of Granisle
Pam	London	District of North Vancouver
Doug	Louie	City of Burnaby
Susan	Loutet	Village of Lions Bay
Ana	Lukyanova	City of Powell River
Brian	Lutke	Resort Municipality of Whistler
Robert	Machial	District of Kitimat
Steve	Magnusson	Township of Langley
Sheila	McCutcheon	Village of McBride
Danny	McGill	Union Bay Improvement District
Robert	McGuire	City of Fort St. John
Mandy	McKague	The Village of Clinton
Laura	McMaster	Village of Fraser Lake

First name	Last name	Company
Jeff	Miller	Township of Esquimalt
Stacey	Miranda	City of Fort St. John
Jarrod	Mitchell	City of Coquitlam
Robert	Moretti	TSIDELDEL First Nation
Shannon	Moskal	Regional District of East Kootenay
Shawn	Munro	District of North Saanich
Michael	Nash	City of New Westminster
Ryan	Nelson	District of Taylor
Victor	Nguyen	Tsawwassen First Nation
Sharon	Noble	none
Teneal	Nole	Tahltan Band Council
Stewart	Novak	Village of Belcarra
Ryan	Oss	District of North Vancouver
Chris	Ovens	City of Vernon
Scott	Pamminger	City of Nanaimo
Cindy	Paton	Regional District of Fraser-Fort George
Trevor	Pelletier	Village of Valemount
Tim	Perepolkin	City of Salmon Arm
Cameron	Perkin	City of Langley
Rosanna	Peters	Douglas First Nation
Rose	Peters	Chawathil First Nation
Allen	Peters	Lower Nicola Waterworks Improvement District
John	Pite	City of Duncan
Amit	Plaha	BCUC
Rochelle	Porter	Skeetchestn Indian Band
Snead	Prasad	City of Delta
Cougan	Purington	fnfn
Alex	Ramos-Espinoza	District of Kitimat
Rajesh	Reddy	City of Surrey
Paul	Riegert	Transportation
Leanne	Rivet	Cariboo Regional District
Vince	Robinson	Nuxalk Nation
Dale	Ross	Village of Burns Lake
Ranjit	Sall	Westernforest Products Inc.
Monica	Samuda	District of North Vancouver
Rob	Schibli	City of Terrace
Taryn	Scollard	City of Vancouver
Veronica	Seymour	Tkemlups te Secwepemc
Raphael	Shay	Sunshine Coast Regional District
Lisa	Siavashi	City of West Kelowna
Sharyn	Silverio	Village of McBride
Sharon	Smith	Village of Granisle
Roger	Smith	District of New Hazelton
Stacy	Smith	North Peace Regional Airport
Vance	Snow	Nuxalk Nation

First name	Last name	Company
Fred	Spears	District of Lantzville
Dwayne	Spies	City of Chilliwack
Meredith	Starkey	Village of Zeballos
Tammy	Strayer	Nicola Ranch
Susan	Swan	Village of Clinton
Chad	Taylor	City of Delta
Dennis	Taylor	City of Vernon
Lisa	Teggarty	Town of Smithers
David	Thompson	City of Nanaimo
Chris	Thompson	City of Courtenay
Austin	Tokarek	CVRD
Spencer	Touchie	Ucluelet First Nation
Andrew	U'Ren	City of Merritt
Scott	Unser	District of Lake Country
Khelen	Upadhyay	City of Delta
Cathy	Verge	SCRD
Ellen	Vickerson	City of Revelstoke
Jesse	Waldorf	Sechelt Indian Band
Travis	Wall	District of Mackenzie
Feron	Wallace	Lil'wat Nation
Oliver	Watson	Town of Qualicum Beach
Fred	Weisberg	Weisberg Law Corporation
Terry	Wilson	City of Coquitlam
Jamie	Wilson	Homalco Indian Band
Hon	Yee	City of Delta
Andrew	Young	District of Taylor

Street lighting services application feedback form (1701)

Intro BC Hydro owns and maintains over 90,000 street lights attached to our poles located across the province. Over the next two to three years, we'll be replacing these with energy-efficient LEDs to ensure compliance with new federal regulations that require all light ballasts containing Poly-Chlorinated Biphenyls (PCBs) be removed by the end of 2025.

While LEDs are more energy-efficient than our current street lights and require less maintenance, changing out street lights in hundreds of communities across the province to meet federal regulations is a big job, and comes with significant costs. Later this year, we plan to submit an application to the BC Utilities Commission to update the current Overhead street lighting rate (Rate Schedule 1701) to better reflect the costs and savings of this project.

In addition, this rate application will include our proposal to terminate the RS1755 Private Outdoor Lighting service and some Electric Tariff updates to better manage other unmetered street lighting and General Service rates.

As part of our application, we encourage you to provide your feedback, including any concerns or issue you might have, on this rate application. Your feedback is important and is considered as part of the application. It's important to note that your feedback, including the organization you are representing, will be used by BC Hydro and included in the application. It will become part of the public records resulting from the regulatory proceeding. Please do not identify third-party individuals or account specific information in your comments. Comments bearing references to identifiable individuals will not be included as part of the public records due to privacy concerns.

Any personal information you provide to BC Hydro on this form is collected and protected in accordance with the ***Freedom of Information and Protection of Privacy Act***. BC Hydro is collecting information with this for the purpose of rate design in accordance with BC Hydro's mandate under the ***Hydro and Power Authority Act***, the BC Hydro Electric Tariff, the Utilities Commission Act and related Regulations and Directions. If you have any questions about the collection or use of the personal information collected on this form please contact the BC Hydro Regulatory Group via email at: bchydroregulatorygroup@bchydro.com.

Q1 CONSENT TO USE PERSONAL INFORMATION

I consent to the use of my personal information by BC Hydro as provided in this feedback form. Personal information includes my comments and contact details. This information is collected and protected by BC Hydro in accordance with the Freedom of Information and Protection of Privacy Act. Personal information is not considered, in any way, to reflect the express or implied views of the company you represent. Comments submitted will be used to inform BC Hydro's customer service and rate design efforts for street lighting rate customers.

☐ I consent

☐ I do not consent

Q2 Your Contact Information:

Name: _____

Title: _____

Community or Organization _____

Representing (if different from Community or Organization): _____

Contact Email: _____

RS1701 Overhead street lighting rate design

Supplement charge

All existing street lights will be removed and replaced with LED street lights. Some of these existing lights are not at the end of their service life yet. BC Hydro must recover their undepreciated value (the Net Book Value, or NBV). We plan to propose a supplement charge to recover the NBV for the duration of the replacement project. The supplement charge will cease when all existing lights are removed and replace with LEDs (in two to three years).

Q3 Please indicate your preference with regards to **how** the supplemental charge is applied. I would prefer the supplemental charge be handled:

- ☐ As a per fixture, flat dollar charge. Under this approach, all customers pay the same charge per light fixture.
- ☐ As a percent of bill. Under this approach, the charge would be higher for customers with higher wattage lights, and lower for those with lower wattage lights.
- ☐ Other _____

Q4 Please indicate your preference with regards to **when** the supplemental charge will start to be applied.

- ☐ Earlier, when BC Hydro starts the installation in communities across the province (est. November 2020) so the incremental cost can be spread over a longer period including this fiscal year.
- ☐ Later, when the BC Utilities Commission makes a decision on the final RS1701 rates (est. April 2021) to limit incremental charges this fiscal year and allow time to include the incremental cost into the budget.
- ☐ Other _____

Early removal fee

BC Hydro recovers the installation costs of a new RS1701 street light through the flat monthly rates. When a street light is removed upon customer request prior to its full depreciation, the cost of stranded assets is absorbed by all customers. Currently, Special Condition 3 of RS1701 states that if a customer requests to replace a fixture (e.g. to a different wattage), they are required to pay to BC Hydro the original cost of the existing fixture, less any accumulated depreciation, and the cost of removing the existing fixture.

BC Hydro proposes to amend this Special Condition to include the cost recovery of early street light removals in addition to replacements. This amendment will protect BC Hydro customers from the cost of stranded assets which could arise if a customer chose to leave RS1701 service shortly after their fixtures are converted to LED.

Q5 Do you have any feedback regarding the early light removal fee?

Q6 Is there any other feedback that you would like BC Hydro to consider before we file our application for a new RS1701 Overhead Street Lighting rate?

RS1755 Private outdoor lighting service termination

BC Hydro provides outdoor lighting on private properties under RS1755. RS1755 has been closed since 1975. Due to the 2008 Federal PCB Regulation, BC Hydro must also remove all remaining RS1755 Private Outdoor Lights by December 31, 2025.

While most RS1755 lights are mounted on customer-owned poles on private property, a small number are mounted on BC Hydro distribution poles. BC Hydro proposes to migrate these customers to RS1701 as the costs to replace and maintain lights on BC Hydro distribution poles are similar to RS1701 street lights. BC Hydro also proposes to reopen this service to allow additional customers to utilize BC Hydro street lighting service, subject to local restrictions.

Continuing service for the remaining lights on private properties requires significant investments. Therefore, BC Hydro proposes to terminate RS1755 lights located on private property by the Federal Regulation deadline of 2025. Customers will be notified about this proposed service termination and the next steps.

- ☐ Skip this section
- ☐ Provide feedback for this section

Q7 Do you have feedback on the proposed termination of the RS1755 Private outdoor lighting service for BC Hydro lights located on private poles?

Q8 If you have RS1755 lights that are located on private properties, what support do you need from BC Hydro to help you prepare for the service termination?

Q9 Do you have feedback on the proposal to allow additional customers to utilize BC Hydro street lighting service where a light located on a BC Hydro pole can illuminate private property, subject to local restrictions?

Q10 Are you interested in a follow up webinar to discuss the RS1755 matters in further detail?

☐ Yes

☐ No

RS1702 Other unmetered services

Many customers also have street lighting service that they owned and maintained under RS1702 and/or traffic control equipment under RS1704. The vast majority of these services are billed on an unmetered flat rate basis. BC Hydro relies on customers to self-report light or equipment additions, removals or modifications to update our billing records. It has been observed that there usually is a delay, sometimes for years, in the consumption change self-declaration. The reporting delay can result in significant administrative effort in correcting billing. In addition, if a customer is found to have been under-billed as a result of delayed self-reporting, BC Hydro can only invoice customers for up to one year of additional revenue under Section 5.8 (Back-billing) of the Electric Tariff. This lost revenue increases costs to other customers. In contrast, if over-billing is identified, BC Hydro must refund the customer to the start of over-billing, with interest.

In addition to improving our processes on managing unmetered services, BC Hydro intends to propose language updates in its unmetered services such as RS1702, RS1703, RS1704, RS1300, RS1234, and Electric Tariff Terms and Conditions to more clearly specify customer responsibilities regarding self-reporting. This will include proposing that the one-year back billing limitation would not be applicable to customers that under-report unmetered services.

- ☐ Skip this section
- ☐ Provide feedback for this section

Q11 What do you think is an appropriate timeline for customers to report their RS1702 and RS1702 light changes?

- ☐ During the month of change
 - ☐ Two months
 - ☐ Three months
 - ☐ Other _____
-

Q12 Do you have feedback on the proposal to amend the Electric Tariff to remove the one-year back billing limitation on under-reported unmetered services?

Q13 Do you have suggestions on how BC Hydro can better manage accurate billing on unmetered services?

LED street light deployment

BC Hydro plans to start converting RS1701 street lights to LEDs in November 2020. Customers will receive communications from us very soon for next steps. LED street lights have different performance than the current HPS street lights; therefore customers will need to review and design their street lights based on their needs. BC Hydro will provide customers a detailed inventory list of their RS1701 street lights as well as a map file which displays the exact light locations. To make sure we provide the most up-to-date inventory data, these files will be provided to customers before we start deployment in their areas or upon customer request.

- ☐ Skip this section
- ☐ Provide feedback on this section
-

Q14 How much time do you require to review your RS1701 street lights and determine your LED street light needs?

- ☐ One month
- ☐ Two months
- ☐ Three months
- ☐ I want the information now
- ☐ Other _____
-

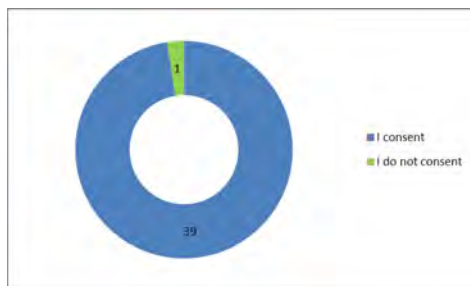
Q15 What support do you need from BC Hydro to be prepared for the LED street light conversion?

That's all for now - thank you for taking the time to complete the survey.

Survey Fielded: 12 – 26 August, 2020
Completed responses: 26
Total responses: 40

SURVEY QUESTIONS –

Q1 - CONSENT TO USE PERSONAL INFORMATION



Q2 – Customer information:

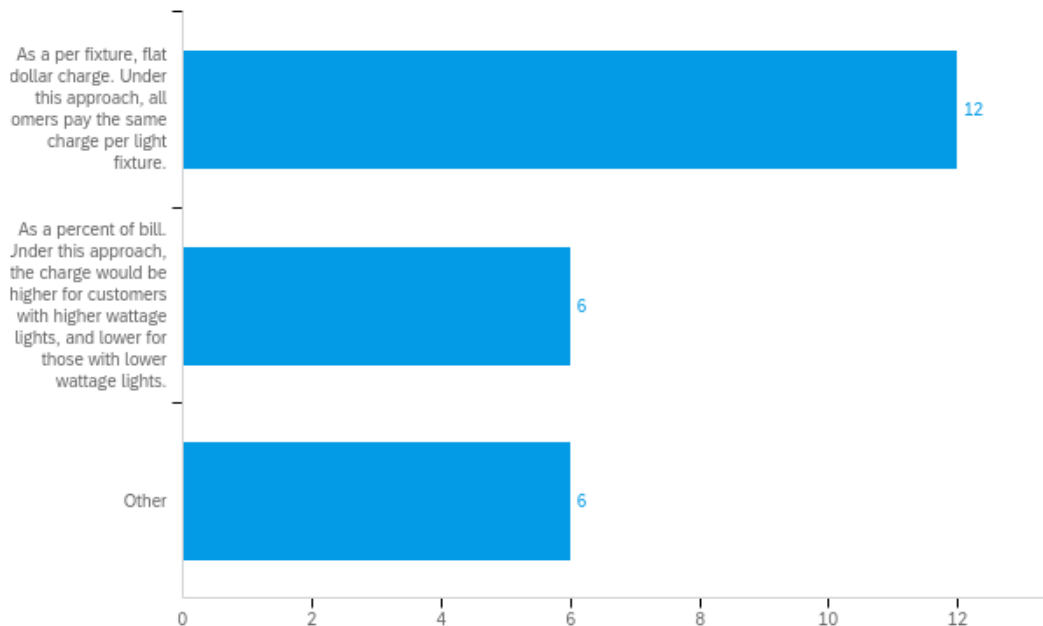
The following communities completed the feedback form:

City of Delta	City of Salmon Arm
BCSEA	Regional District of Fraser-Fort George
City of Coquitlam	City of Courtenay
Sunshine Coast Regional District	Town of View Royal
Town of Qualicum Beach	City Of Fort St John
City of Burnaby	Squamish-Lillooet Regional District
Nuxalk Nation	Ministry of Transportation
Village of Granisle	Indigenous Services Canada
City of Surrey	Town of Sidney
Resort Municipality of Whistler	Village of Telkwa
Regional District of North Okanagan	Village of Cumberland
North Cowichan	Tsawwassen First Nation

RS1701 Overhead street lighting rate design

Supplement charge

Q - Please indicate your preference with regards to how the supplemental charge is applied. I would prefer the supplemental charge be handled:

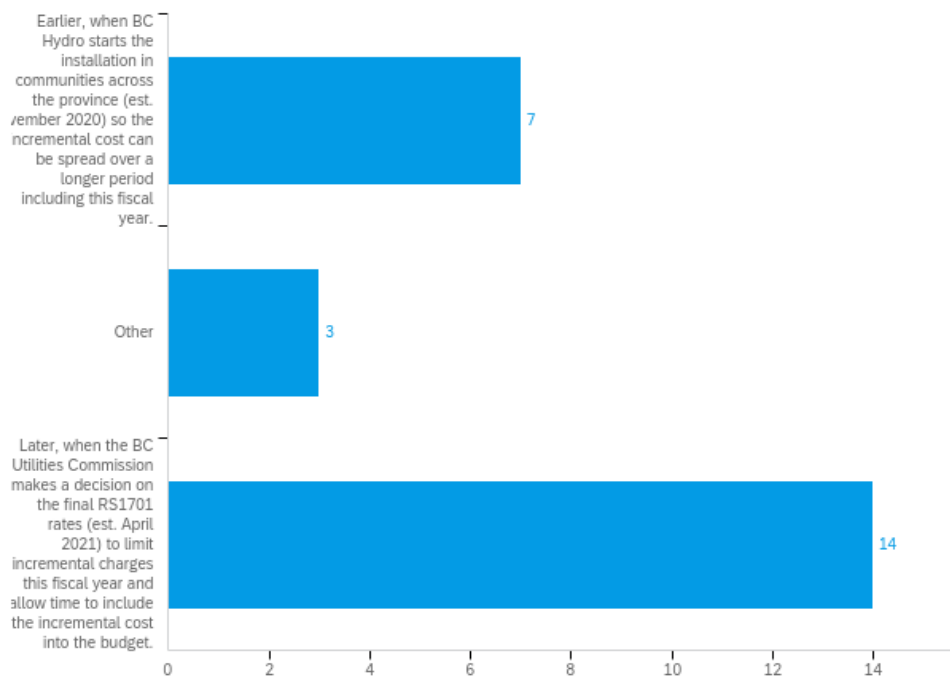


Other (verbatim):

- some communities lights have reached the end of their service where the communities involved haven't had great lighting --should not have to cover costs of undepreciated value.
- Calculate a specific flat dollar charge per fixture per service area. Many lights in the RDNO are very elderly and likely past their expected life (fully depreciated).
- We are having difficult time understanding the cost increase, from our own experience with conversion to LED the capital payback is generally quite low compared to the LED lifecycle which should result in cost savings
- Passing this supplement charge onto tax payers does not seem justified when BC Hydro is unable to identify the actual depreciated value of each light in each community. The age of the lights should be taken into consideration and the replacements should be scheduled by average age of infrastructure in each area allowing for lights to be in service for more of their originally amortized life.
- First Nations are billed directly so Indigenous Services Canada (ISC) aren't directly impacted. However, FN can apply to ISC for a funding contribution for street lighting so would want charge to be as less of a financial impact to FNs.

- We disagree that there is an NBV for many of the existing lights, if they have to be removed due to PCB's they are old enough to be fully depreciated.

Q - Please indicate your preference with regards to when the supplemental charge will start to be applied



Other (verbatim):

- After installation of the LED lights in the specific service area.
- For our regional district, the fiscal is January - December. If you implemented starting January 1st, that would hit our 2021 budget and give sufficient time to budget accordingly. If the charge occurs in 2020, we would not have sufficient funds in our streetlighting budgets to cover the increased costs.
- These changes have significant impacts to budgets that require pre-planning. Bc Hydro should take into consideration the budgeting cycle of Ministries and Municipalities in order to ensure there is planning time for budgeting. Aside from the budget pressures these changes also bring significant administrative workloads to the ministry where cost share agreements will be impacted.

Early removal fee

Q5 - Do you have any feedback regarding the early light removal fee?

- It would be great if customers know the approximate fee of the early removal (i.e. min or max)
- There should be no early removal fee because stranded assets can and should be reused by BC Hydro. If municipalities pay for stranded assets, then those assets should be given to the municipalities for reuse as it deems fit.
- We support the cost incurred from early removal to be incurred by the customer requesting the removal of the BC Hydro Light.
- No
- Can we be provided approximate costs and useful life information?
- Suggest adding a salvage value for any metal recycling.
- These costs need to be easily accessible to stakeholders. A significant upgrade to SLIM would be beneficial to all users. If the system could track the ages of lights and provide an estimated value when users submit an inquiry it would be very helpful for planning. A better GIS based system allowing BC Hydro customers to identify their lights and billing would be extremely helpful for your clients and increase the accuracy of the streetlighting inventories and billings.
- Defer to FNs
- Would there be a one-time charge? Please clarify how the fee is calculated and an estimate of what the fee would be? Our preference would be a one-time charge instead of stretching the payment over several months. The city has a frontage improvement program which could see 50-100 removals over the next 5 years.
- I understand the concept but from a municipal perspective, there are many examples where assets are replaced or have their useful life expectancy reduced when for example, BC Hydro make a cut into a new road surface. If BC Hydro want to take this approach, be prepared for the same rules to be applied.

Q6 - Is there any other feedback that you would like BC Hydro to consider before we file our application for a new RS1701 Overhead Street Lighting rate?

- Is there any other feedback that you would like BC Hydro to consider before we file our application for a new RS1701 Overhead Street Lighting rate?
- we are having a difficult time understanding how the conversion to LED's is costing additional. WE know that the Capital costs have to be covered but based on our experience with recent LED upgrades of our owned lights the payback is quite short and Hydro is likely getting a very good rate on new lights based on quantity.
- We are confused on why costs would go up to cover an expense to convert to LED lamps from traditional HPS or MV. We would like clarity on why though energy consumption would significantly go down billing costs would go up. It would be expected that BCHydro would also be saving money with realizing lower maintenance costs to maintain those new lights. Even including capital costs associated with the replacement program, projected ongoing costs should not have to increase. ROI for capital costs associated with Whistler's municipally owned street light conversion to LED in 2017 is less than 10 years.
- Was wondering if BC Hydro would consider dropping the charges associated with removal of some existing old HPS fixtures. The BC hydro old HPS lights on hydro poles are not required anymore with city putting in new led street lighting with 1702 rate.
- The presentation wasn't clear that following the LED conversion project where a supplemental charge will be applied during the deployment to cover the cost of the program, after that will the rates return to their current billing levels (e.g. no increases)? Or will there be a decrease due to savings on cost of energy and maintenance?
- Review the energy savings for the switch to LEDs as the savings presented is very low. I'd like to review the full calculation and assumptions made if possible
- It was requested that the calculation on how the rate is determined be shared. We hope this will happen prior to submittal so that more comments can be provided. Also, we would like to know how you are prioritizing the replacements. Will RDNO be last or somewhere in the middle, etc.
- If the cost of the asset is paid for by a jurisdiction does the asset get returned to the customer upon removal from hydro pole
- I would request the opportunity to review all details about how the rate was established including how the NBV was determined, and what assumption and figures were used in estimating the capital and maintenance costs. This will enable me to verify if the rate is reasonable.

RS1755 Private outdoor lighting service termination

Q7 - Do you have feedback on the proposed termination of the RS1755 Private outdoor lighting service for BC Hydro lights located on private poles?

- Do you have feedback on the proposed termination of the RS1755 Private outdoor lighting service for BC Hydro lights located on private poles?
- If RS1755 customer are migrating to RS1701, please ensure that they are distinct from existing RS1701 customers. For example, existing private RS1755 customers within Burnaby should be distinct from City of Burnaby RS1701 lights.
- No feedback
- would like a Pole count review before transfer as some poles have been removed with development in the SLRD area. Also, there are some bare-land strata street lights that are not owned / operating by the SLRD, please be aware that the strata corps will need to be contacted.

Q8 - If you have RS1755 lights that are located on private properties, what support do you need from BC Hydro to help you prepare for the service termination?

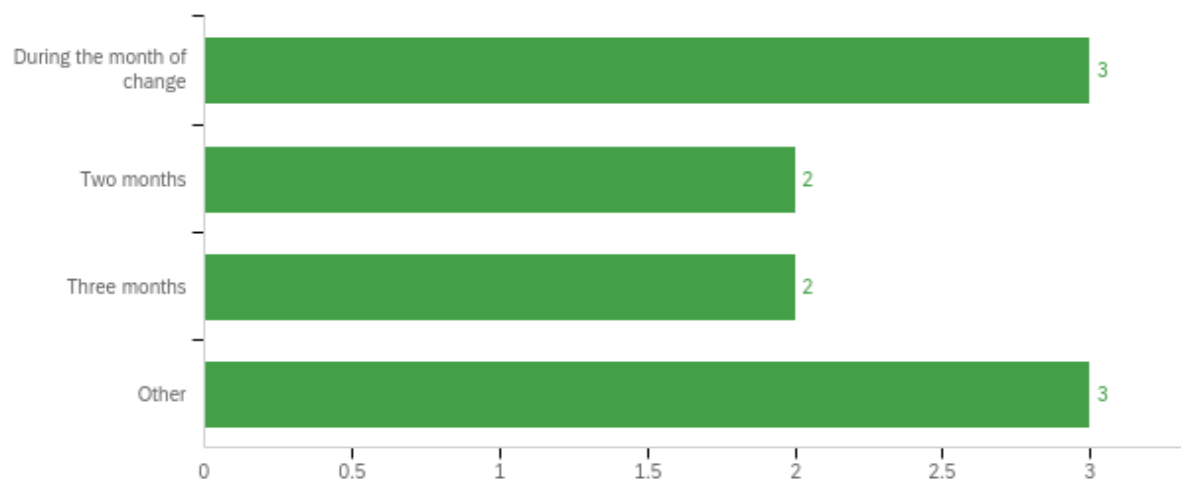
- If you have RS1755 lights that are located on private properties, what support do you need from BC Hydro to help you prepare for the service termination?
- Location details of existing RS1755 lights and details regarding next steps.
- These customers need to be contracted in advance.

Q9 - Do you have feedback on the proposal to allow additional customers to utilize BC Hydro street lighting service where a light located on a BC Hydro pole can illuminate private property, subject to local restrictions?

- I am concerned about the potential confusion regarding street lights installed on BC Hydro poles within City rights-of-way used to illuminate private property. These lights can be erroneously charged against the municipality and not the private property owners.
- This needs to be addressed case by case.

RS1702 Other unmetered services

Q - What do you think is an appropriate timeline for customers to report their RS1702 and RS1702 light changes?



Other (verbatim):

- As soon as possible but within 1 year. There can be delays beyond 3 months for reporting due to need to wait for completed as-builts by consultants/contractors.
- When a new development is approved by the local government. BC Hydro should be commenting on the referrals sent out and asking for the number of lights planned.
- A large amount of changes occur during our construction season and the administrative piece of updating Bc Hydro is not always possible to complete until the winter months. A six month period would likely allow for enough time for accurate updating.

Q12 - Do you have feedback on the proposal to amend the Electric Tariff to remove the one-year back billing limitation on under-reported unmetered services?

- I support the removal of the one year back billing limitation, but it should be acknowledged that due to the Statute of Limitations, back billing can only go back 6 years. This also applies for credits as well as debits.
- It seems practical to amend the one-year back billing to something that is more fair. To do this you should have in place first a process/procedure to report new and changed lights.
- That backup for the back billing be included, I.e. there must be information to support the charges.
- This proposal seems reasonable, but existing services should be grandfathered until BC Hydro and its customers have brought the existing inventory/billing to a point of accuracy. Reasonable to implement this billing limitation to any usage changes going forward but older items should be managed as they currently are until a mutually agreed upon point of current accuracy.
- I agree as long as the same rule applies to unmetered services that BC Hydro has been charging for that are no longer in existence

Q13 - Do you have suggestions on how BC Hydro can better manage accurate billing on unmetered services?

- SLIM website does not send notifications to customers to inform them that a change has been completed. This may result in customers not self report on time. It is suggested that customers be notified regarding a timeline/completion of a request.
- Yes, provide metered services. Hydro can update their service panels to meter them over time. If necessary, financial incentives can be provided to municipalities to help with the conversion program for new and existing service panels.
- Slim can be made user friendly
- If BC Hydro was involved in the development process they could be notified at time of approval and request number of ornamental lights, etc that are being added/deleted or changed. RDNO is changing 30 ornamental lights in Silver Star Mountain Resort to LED in September. We assume we would notify you in some way but I'm not sure how this is done. This needs to be a process/procedure local government can follow when this occurs instead of hunting down the department or person to notify. I imagine we could go through our local account manager, but confirmation would be good.
- Streetlight reporting is done through the SLIM online software. Please consider improving the SLIM technology so that it is more accessible for staff responsible for reporting.
- We report our changes in the SLIM program, but still these changes don't seem to be picked up by BC Hydro. I would like information on what processes need to be followed to update BC Hydro on lighting changes.
- The SLIM system needs a major overhaul/update. A better GIS based system allowing users to better manage their billing would significantly improve the ongoing accuracy. Being able to identify which items are attached to which meters and which accounts would give customers the ability to update accounts with accuracy. Ideally it would appear similar to google earth and a user could click on the streetlight and get the associated billing information. It is currently very difficult to identify where we have infrastructure on a meter that is being duplicated on an unmetered account. Searching for poles for SLIM requests is extremely frustrating as the intersection addresses are frequently not found in the system and lat/long is not searchable. Having to obtain pole ids in the field is often a reason for delay in updating billing information.
- A more detailed data base that unmetered service owners can review on a more frequent basis. The current GIS system is not useful at all.

August 27, 2020

<Customer Name>
<Mailing Address>
<City>, <Province> <Postal Code>

About your private outdoor lighting service

We're writing to you because our records indicate you have service under our Private Outdoor Lighting rate (Rate Schedule 1755) and we're preparing an application to the BC Utilities Commission (BCUC) to terminate the service. This rate is for BC Hydro owned and maintained lighting fixtures illuminating private property. Lighting fixtures can be attached to a BC Hydro distribution pole on public property (Group 2) or attached to poles on private property (Groups 1 and 3). The lights associated with your account, including which group and number of lights, are shown in the table below.

Account number	Service address	Service city	Group	Number of lights

Over the next few years, we'll be replacing BC Hydro-owned street lights located on public property across the province with LED lights. This is necessary because many of the lights remaining in service contain Poly-Chlorinated Biphenyls (PCBs) and need to be removed by December 31, 2025 to comply with federal PCB regulations.

BC Hydro's Private Outdoor Lighting service has been closed to new premises since 1975. Changing out lights containing PCBs in hundreds of communities across the province is a big job and comes with significant costs. These costs would need to be recovered through the rates we charge you, and could lead to a substantial rate increase. After an extensive review of the service and options, we've determined that we can no longer continue to provide Private Outdoor Lighting service on private properties in a practical manner.

Regulatory application to terminate the private outdoor lighting service

We are planning to submit an application to the BCUC later this year to terminate the service. In this application, we'll be proposing that we stop repairing existing lights and begin removing them in October 2022. This will ensure all remaining Group 1 and 3 lights are removed before the federal regulations deadline in 2025.

We'll also propose that customers with lights attached to a BC Hydro distribution pole on public property (Group 2) be provided the option to have the light replaced with a new LED fixture or have it removed. If replaced with a new LED fixture, this service would be continued under the Overhead Street Lighting rate (Rate Schedule 1701).

After a regulatory proceeding to review our application, the BCUC will make a decision. Customers are welcome to participate in this open and transparent regulatory proceeding. To learn more about how you can participate, visit bcuc.com/get-involved.

We want your feedback

To help customers with the proposed transition, we want your feedback on our service termination proposal and the support you may need from us during this time. To learn more and share your comments and ideas, visit bchydro.com/privatelighting. We encourage you to provide your feedback by Friday, September 11, 2020 so that it can be considered as part of our regulatory application.

Once we have submitted the application, we'll write to you again with more information, including how you can get involved and provide comments to the BCUC.

What if you no longer have or need the light?

If the lights listed above have been removed or no longer exist, it's important that you contact us so that we can review and update your account.

If you decide you no longer require our private outdoor lighting service, please contact us to cancel the service and request the lighting fixture be removed.

If you have any questions about the service, please email us at lightingsupport@bchydro.com or give us a call toll free at 1-833-828-2224. We're available Monday to Friday from 8 a.m. to 4 p.m.

Thanks.

Daren Sanders
Director, Contact Centre & Billing Operations

Feedback on Private Outdoor Lighting service termination (1755)

We want your feedback

As we prepare to submit an application to the BC Utilities Commission to terminate our private outdoor lighting service (Rate Schedule 1755), we're asking for your feedback, including any concerns or issues you might have with our proposals.

Please be aware that your feedback, including the organization you're representing, will be included in the application and be part of the public record for the regulatory proceeding. Due to privacy concerns, we ask that you do not identify third-party individuals or account specific information in your comments. Comments that reference identifiable individuals will not be included as part of the public record.

Any personal information you provide to BC Hydro on this form is collected and protected in accordance with the ***Freedom of Information and Protection of Privacy Act***. BC Hydro is collecting information with this for the purpose of rate design in accordance with BC Hydro's mandate under the ***Hydro and Power Authority Act***, the BC Hydro Electric Tariff, the Utilities Commission Act and related Regulations and Directions. If you have any questions about the collection or use of the personal information collected on this form please contact the BC Hydro Regulatory Group via [email](#).

Q1 CONSENT TO USE PERSONAL INFORMATION

I consent to the use of my personal information by BC Hydro as provided in this feedback form. Personal information includes my comments and contact details. This information is collected and protected by BC Hydro in accordance with the Freedom of Information and Protection of Privacy Act. Personal information is not considered, in any way, to reflect the express or implied views of the company you represent. Comments submitted will be used to inform BC Hydro's customer service and rate design efforts for private outdoor lighting rate customers.

☐ I consent

☐ I do not consent

Q2 Your Contact Information:

Name: _____

Community or Organization (if applicable): _____

Contact Email: (provide only if you would like a response to any of your questions or if you're interested in participating in the regulatory process):

RS1755 Private outdoor lighting service termination

BC Hydro provides outdoor lighting service on private properties under Rate Schedule (RS) 1755. This service has not been available to new premises since 1975. To ensure compliance with new federal regulations around lights containing Poly-Chlorinated Biphenyls (PCBs), BC Hydro must replace or remove all street lights we own and maintain by December 31, 2025. This includes lights serviced under RS1755.

Replacing all the lights under this service to meet federal regulations would come with significant costs, which could lead to a substantial rate increase for these customers. After an extensive review of the service and options, we've determined that we can no longer continue to provide this service in a practical manner.

As a result, we're planning to submit an application to the BC Utilities Commission (BCUC) this fall to terminate the service. Our application will include the following proposals based on whether a customer's light is attached to a pole on private or public property.

Lights attached to BC Hydro poles on public property:

Customers will be given the option have the light removed or replaced with a new LED fixture and continue their service under the Overhead Street Lighting Rate (Rate Schedule 1701). New customers will be eligible for this service, depending on their location.

Lights attached to poles on private property:

BC Hydro will stop repairing and start removing lights in October 2022. This will ensure all remaining lights attached to poles on private property are removed before the federal regulations deadline in 2025. Customers who still require outdoor lighting will need to purchase and install their own lights.

We'll keep you updated on the next steps of the proposed service termination and you're welcome to participate in this open and transparent regulatory process.

Q4 Is the location of your current BC Hydro light adjacent to your main BC Hydro service (e.g. your house or your business)?

- ☐ Yes
- ☐ No
- ☐ I'm not sure
-

Q5 What support do you need from BC Hydro to help you prepare for the service termination?

Q6 Is there any feedback specific to the **timing** of the removal of the lights that you would like BC Hydro to consider?

Q7 Is there any other feedback regarding our Private Outdoor Lighting Service that you would like BC Hydro to consider before we file our application for the termination of the rate?

Q8 Are you interested in participating in the regulatory process related to RS1755?

☐ Yes

☐ No

Q14 Please provide your email address:

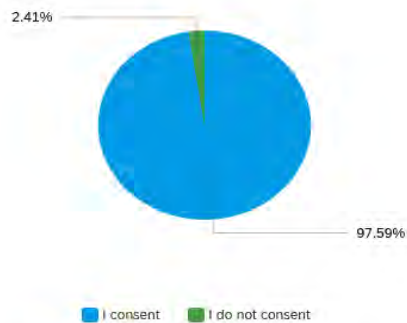
☐ Email

Thank you for taking the time to provide your feedback. If you decide you no longer require our private outdoor lighting service, please contact us to cancel the service and request the lighting fixture be removed. If you have any questions about the service, please [email](#) us at lightingsupport@bchydro.com or give us a [call](#) toll free at 1-833-828-2224. We're available Monday to Friday from 8 a.m. to 4 p.m.

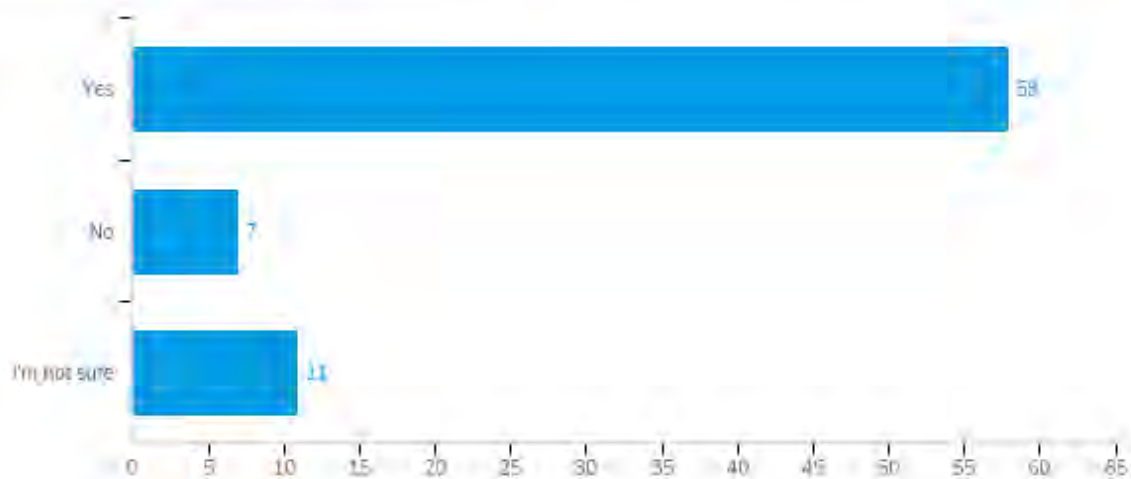
Survey Fielded: August 30, – September 16, 2020
Completed responses: 76
Total responses: 89

SURVEY QUESTIONS –

Q1 - CONSENT TO USE PERSONAL INFORMATION



Q4 - Is the location of your current BC Hydro light adjacent to your main BC Hydro service (e.g. your house or your business)?



Q5 - What support do you need from BC Hydro to help you prepare for the service termination?

I understand that because we are Group 2 that you will replace the current light with an LED. We support that move.

We have 2 power poles in our yard with a light on each one. We are seniors living in a rural area and require the lights for our safety. It would be difficult for us to put in yard lights. Would we be allowed to install our own lights on the existing hydro polls.

We possibly would be interested in replacing our light with a led light....but we first of all would need to have the cost of replacement and if BC Hydro would install the new led light. Could you please provide us with new costs for light replacement and installation. Thank you

replace with LED Light

Do not agree to service termination. Existing lights should be refurbished to comply with new regulations. Although on private property, this light serves the neighborhood as a street light. This streetlight guides motorists onto Stewart Road off highway 16 east at night. We have paid for this light for 27 years, I have witnessed the existing light to be low maintenance, and would be lower maintenance as LED and cheaper. BC Hydro needs to upgrade infrastructure instead of discontinuing service. Support would be financing for comparable alternative lighting.

I am a Group 1 service recipient. I would like the same option as Group 2 service recipients to have the existing light replaced with a new LED fixture. I have been paying a rental fee for the light that has grown to over \$10 per month and have been paying for over 20 years. Surely the rental fee accounts for capital replacement at the end of the light's service life. Although the service termination notice seems to imply that the rental fee has gone to BC Hydro general coffers on the basis that you advise continuing the lighting service is not a practical option.

we are interested in the setup for LED light fixtures on the two poles

all I can tell you is that I really like the light because it lights up my main entrance to my house and where I park my vehicle- it went out once and I really missed it-maybe you have an alternative suggestion on how to replace it-thanks

I need an outdoor light continued at this location. If, you are removing the existing light by 2025 I need to use the pole to attach my own light of choice. Why have lights with PCB's been allowed since 1975 for 50 years? Is LED lighting 'safe' for our eyes? What do 'independent' 'scientific' studies say? Is the EU using LED publicly? Is BC Hydro replacing old Toxic lighting with new Toxic lighting?

The notice of application to terminate private outdoor lighting service with a response required by Sept 11, 2020 was only received on Sept 4, 2020. I trust future communications will come with a lengthier time to respond. The light on our property has been in place since 1975 as public lighting was not available on the street when the house was built. The pole has been in place since then as a monthly service charge that we pay for. If it is removed there will need to be a light placed on the next suitable pole on the street as there is no light on the street in front of our property.

Our lights have been replaced in the last few years with the newest LED. We do not see what the reason is to having these lights removed. We understand that there will be new charges in place but our lights do not have to be tampered with. What are you saying or suggesting will happen with our lights that are currently in a residential area and are a much needed commodity for safety in the long winter days.

There are 6 BC Hydro Group-3 pole-lights located on our property, which is a 55+ manufactured home community with more than 65 rental units providing affordable housing to seniors on fixed incomes. Lighting is required throughout the mfg'd home park which has been provided by BC Hydro for over

40yrs, and we have only called Hydro twice in the last 5 years to change 2 light bulbs. The park is very old and most of the water-sewer-electric is grandfathered in, and removal of any poles may cause extensive damage to the property as there are too many unknown pipes in the ground (water/gas/sewer, etc). Repair costs resulting from the removal of poles would be added to the pad rent of the residents who are already on fixed incomes and struggling to pay food/medical bills each month. We would like to do our best to keep the lighting if possible, and wondering if BC Hydro would consider leaving the poles in place, and possibly enter into a liability agreement to avoid unnecessary costs?

Would like assurance that our Group 2 light will be replaced and that the new rates will not be excessive as this light is essential. Notification of the schedule for replacement, type of new light and cost to operate in advance of the replacement will be helpful.

I do not want the service terminated. I want you to provide a good explanation for your proposal. The last time my light needed replacing the serviceman told me it was the latest type now used. My house was built in 1975 and the service charges paid is in the thousands of dollars since then. If, as you say federal regulations require you to replace lights with pcb in them, I am sure the federal government would participate in the cost of the upgrade, along with the provincial government. You say it would be great cost to me but have you actually sought other means to protect us from these costs. I also think the amount of money paid for this service would have been calculated into the charges, with a view that these light would need replacing in the future. To remove the light or threaten me with great cost looks like a cash grab using bullying tactics. I will be submitting my views to BCUC. P.S. this is not the way to treat customers in any business. Thank you,

We would still like to have a light in our yard as our house is quite a distance from the main road and there is only 1 street light anywhere near us. We have lived here for 47 years and have paid our monthly rent and hydro fees for all this time. Because we are quite elderly and live in the area that we do, this yard light is very helpful for us in that it provides safety for us regarding visibility, wild animals, and break ins. I also question whether our light is one that contains PCB as it was changed approximately 10 years ago or so. Does this mean we are still under Group 1 and 3, or are we now Group 2.

I do not agree with the termination of the Private Outdoor Lighting Service. See "Feedback regarding Private Outdoor Lighting Service" section.

I need to be able to tell all owners of this strata what our choices are going forward. As I understand we are group 1 and have no recourse but to lose this light. Am I right? Even though my hydro for my trailer comes off the very same hydro pole. I feel that we should be given the option of a new LED fixture the same as group 2. As we are a cul de sac park, we are set back from the main road and do not receive light from the main road and we are in a high risk theft area, and I feel we definitely need this light. Please look into this option and get back to be at your convenience. Thank you for your time.

We would like to keep the private outdoor lighting service

Advisement and suggestions as to alternative lighting that protects the safety of animals and residents on a rural property.

I would like to know what my options are i will gladly pay for a led light and the new rate as we have had this light since the early 1960 and has become a security light for my neighbors as well as me. I look forward to your response. We were told when we got this light we would have it as long as we were alive or we sold our home.

I will need a yard light on my property.

remove light completely please

We require this lighting for the safe operation of some of the processes on our farm.

I need to know what the alternatives are to BC Hydros replacement of the light. This is a group 1 light and provides a lot of light since before 1975 to a large property in a suburban area and provides lighting to the adjoining properties and neighbourhood. BC hydro should assess suburban neighbourhoods that currently have the group 1 lights and determine if more public pole lighting is needed in the neighbourhood and assess if group 2 lighting is possible and/ or warranted. This should be provided before removal of group 1 lights.

Would the pole and wiring stay?

OMG We would certainly like to keep a fixed light on our property. Would the pole stay so we could purchase a LED light on it? Would the LED lights be available through B.C. Hydro? Do you have a list of Contractors available in our area that would be able to do this?

OMG would certainly like to keep a fixed light on our property. Would the pole stay and if so could we purchase a LED light to be installed on it? Contractors who do this type of work in our area? Would the monthly rate be the same for a BC Hydro LED light.

I'd like you to replace the old lighting to new LED lighting, and to keep continuing your service as is. It's not easy for us to get access to lighting as it's located almost the top of your pole. Absolutely we can not do the job of replacing the lighting bulb. Even we don't have any idea about what type of bulb is good for your fixture. Another point is your current lighting not bright enough and red base, I wish more bright and white or natural colour base, if possible.

I do not support BC Hydro removing my outdoor lighting. However I am fully in favour with BC Hydro replacing existing with new LED light and continuing with present agreement. We require this lighting for security and safety. You can not cancel a legal obligation to a customer who has always supported you and always pays for all hydro charges on time. Sincerely,

i personally would like to keep our light. we live at the end of a road and no street lights are on this road.

First of all, I don't want my security light removed. And I also don't like how you've set up this form as though their removal and lack of future maintenance is a forgone conclusion. My questions are; Why would replacing our existing private lights result in a rate increase? I would certainly be willing to pay a one time service fee to have the current light replaced with an LED, assuming the one I currently have contains the PCBs you mentioned. But LEDs consume less electricity than older ones, therefore changing them should result in a rate reduction (after the one time service fee), not increase. And if BC Hydro does discontinue the service, who else would be able to replace the light for me? What local contractors would provide this service? How much would it cost to replace the old light with an LED? Does my current light even use PCBs and need to be replaced at all? I've lived here for over 10 years, and I only vaguely recall one possible instance when someone from BC Hydro came to perform any maintenance on my security light. How is that so hard to provide in a "practical manner" as you put it?

I would like B.C. Hydro to donate or sell the existing streetlights to me and I will henceforth maintain them. I would also of course require a separate meter to pay for the power. The 4 existing streetlights illuminate the long driveway into our business and is quite essential. We would be prepared to sign any waivers regarding responsibility for taking ownership and maintenance. I am sure this would be much preferable to the time and costs of removal that both of us would incur.

I still would like a light. can hydro install a new light and put it so I can plug into it with an extension cord. the pole is mine so I would need hydro to instal the light and run a cord down the pole to where i could reach it.

I would like there to be an option for us. We live in a very rural area with no street lights. We have had a street light on this house for a very long time and it is a wonderful safety and security feature. Why are you not letting people with existing programs transition to the new lighting?

I believe that my outdoor light (hydro pole) also contains my hydro, and telephone landline to the house. It has been here longer than some people have lived. There once was a business here that people still remember.

You have only installed street lights on or around the reservations in the area. BC Hydro has no street lights in residential areas around here. I have a 20 acre parcel in downtown Anahim Lake. The only street lights in this area are the ones on my private poles. If you are going to remove my lights then I would sure hope you will install street lights on your service poles as there would be absolutely no lighting on this entire street. I do believe that paying for these rental lights since 1974 warrants that some action be taken by BC Hydro. Or has it just been a cash cow for Hydro? Account

I own a 2 acre piece of rental property on Horse Lake Rd 100 Mile House, BC. There are 7 people currently living there. When I purchased the property some 28 years ago there was and still is a hydro pole with a Mercury vapor light, 175W MV, that comes on at dusk. This has been a real blessing for the residents of this rural property to provide them with some security regarding who and what is on the property including people and bears which frequently pass through. Being very tall this light is able to illuminate the property end to end. I pay a monthly rental charge which is twice the cost of the usage. I have always paid this because I feel the residents are entitled have some kind of effective lighting for security purposes. I would not be able to provide this if the service is discontinued as there is no outside electricity available. To eliminate this lighting would put a financial burden on the residents to have to install and pay for their own security lighting and as the province of British Columbia always encourages affordable housing this decision removing the pole and lighting does not support that goal by adding extra costs to renters for their protection in a remote rural area. Not only that but 4 or 5 motion and security lights going off and on and shining across 2 acres would start to cause problems, the biggest issue is the expense to these folks. In addition, this property is approx. 7 minutes from the Village of 100 Mile House and is primarily rural comprised of heavily wooded acreages, little to no lighting is provided down Horse Lake Road. The property directly beside mine is 11 acres which is rarely occupied, the one building being used occasionally for target practice by the RCMP. I feel that it would be only fair to take a further look at what the cost to hydro has really been in maintaining the lights and pole on my property over the years and definitely consider replacing the old fixture with the LED light at a cost that is reasonable and that I can afford to maintain for the residents. I understand that LED lights are much cheaper to run than older fixtures. As you can see this is not a normal one home property and I would like Hydro to give consideration to my residents by retaining the pole and light to give them the security that is needed and not have them incur further expenses. Thank you,

Require BC Hydro to support the existing outdoor light, make required lamp change if required. We have had our outdoor light since 1974 and it remains on our private property. We would very much like to keep this outdoor light as it provides a reasonable amount of security and safety. We are seniors and would be very uncomfortable not having this light.

Costs related to the service change.

I need to have someone explain to me how to continue having service of the out door light on my property and the cost. The light is on a BChydro pole on our property.

Leave our light in place as long as possible.

We do not want the service terminated. We would like the option of keeping our lease light in our driveway. We would like to know what the cost of an led lease light would be.

Our case does not seem to fit the options available. Presently the outdoor light is located on a pole on the BC Hydro(BCH) right of way(BCH looks after the maintenance of our line from the street to the pole about 30m up our driveway with the transformer) We would prefer that we be given the option of Group 2, where the light is replaced with a new LED fixture.

Would like the light left or replaced by the CVRD to ensure community safety as this is the only street lighting on the entire block. Bears and cougars frequent the area and nighttime parties frequent the public-accessible beach. A closely placed street light deters some of the activity and provides lighting for cars and trucks turning around as well as safety for local foot traffic from residents.

We have many questions, such as, why are we group 3 and not group 2? The street lights close to our premises face the street, and we don't know which one is possibly eliminated. How are we going to replace the lighting needed for our elderly to be safe at our location? How can we not have any lights removed, but rather changed over to LED?

If we were to remove the light before BC hydro does would BC Hydro still dispose of the light fixture? Would we connect to same power outlet as the existing light?

None

I don't want the service terminated.

We are not thrilled to have our Hydro light removed. The current light is on our private property residence. it is the ONLY LIGHT ON THIS VERY LONG AND ENTIRE STREET and we are the only ones personally paying for this light since approximately 1969. Hydro has refused to put a streetlight on this street even though it has been requested. We were the original and only residents on this road in the beginning, but now there are several homes involved as Windermere has grown since 1969.

There are Hydro Public street lights on most of the streets in Windermere and we don't understand why this street has been ignored. We are now approaching our 80's and this light at night gives us the visibility for safety in so many ways. If BC were to place a public standardized street light on the top ridge of [road] we would not require this light in our yard. The night is so dark that it is dangerous with the deer and the bears along with other animals that move around at night and this light allows us to see them and aids ALL the drivers going down the road to see what is there..... for everyone's safety. For all the years we have paid "rent" on our light and not required many repairs. they are lost years if this light is to be removed from our personal property without another public light installed on this road ... say midway. We have no idea if we are eligible or what the cost (more or less would be) of the removal of the existing lights containing PCB's and installation of LED lighting. How much more would LED cost compared to what we currently pay?

The letter speaks to public property Hydro lights being exchanged and private lighting eliminated..... and what exactly would the cost be to have LED lighting installed when we are the only ones paying for this lighting to begin with. Why would the entire road not have a regular street light on it that all the residents would be contributing to for their safety? With this arrangement we would fall into Group 2 not us alone as a Group 1. Everyone who drives down this road gets the advantage of a good night visual, not just us alone. We cannot afford yet another added expense at our age - so this extremely worrisome in many ways for us. I hope that we can come to some common ground here with the lighting provided by BC Hydro.

I believe that there should be a grandfather clause to protect long time property owners. I am a senior on a limited budget, who requires the light for my health and safety. I have been charged rental charges for over 27 years, there has been no upgrades to the service therefore I believe BC Hydro has profited. The home was built in 1973 I'm pretty sure the previous owns would of been charged rental as well. So for 37 years BC Hydro has profited, now saying its to costly to maintain. Therefore the costs to upgrade should of already been recovered by means of rental charges, and should not be passed on to the home owner.

Also, please supply detailed information regarding specific information as what costs to purchase and install light.

Advice regarding an alternate light fixture. Thinking solar.

We would prefer to keep our private outdoor lighting; however would like more information as it comes available.

Our current light illuminates the parking area of the community building (hall). Since there are night time activities at the community hall there would be a safety issue if the light was removed.

Substitution options

I need BC Hydro to reconsider. It appears that to you we are simply numbers and data. Our outdoor light was here before we bought our house over 30 years ago. It keeps our yard well lit and allows us to see if we have wildlife (bear, deer and moose) in it. You haven't provided any options other than a vague reference to 'go get your own'. In over 30 years I think our light has been changed twice. I suggest in your proposal to the BCUC you get those of us with lights grandfathered in.

When we negotiated the right of way agreement with you in 2016 it included the removal of two poles and the installation of one new pole which you installed a new replacement light on. We understood you would continue to provide the lighting service to us as we are in a rural location and is very dark in the winter months. What do you recommend we do as we feel we need the lighting for our safety and piece of mind.

We want to have a yard light because there are no street lights in this area. If you remove the light from the pole what are our options? Is there any way to retain the light and change to the new LED bulb?

I would very much like to keep the outdoor light

I wish to keep the light and ask that you upgrade it as necessary

I wish the existing service to be maintained. If the light needs to be upgraded, then BC Hydro should update it.

I want to keep my lighting after termination of private outdoor lighting Please keep me informed.....

We do not want to terminate the service. The light lights up the church car park and it provides a safe environment to church users as well as the parents of our daycare especially during the winter months.

Will I be able to continue with a light in the same area as my current outdoor light? If so, what costs to me would be associated with this change?

Remove light and pole.

I don't want to terminate my service, I would like an led light.

I respectfully object to the termination of this service and BCHydro unilaterally changing a grandfathered agreement. This will cause significant hardships to a group of vulnerable seniors who will ultimately have to absorb the costs. I am asking for the BC Utilities Commission to consider this in their decision making process and reject B.C. Hydro's request.

I would like the light removed as soon as possible. I don't want to wait until 2022

We use this light for safety purposes, How much install an LED light on the pole, perhaps with a switch to turn it on or off?

Q6 - Is there any feedback specific to the timing of the removal of the lights that you would like BC Hydro to consider?

As a non profit society any added cost of operation at any time is difficult.

No

no limit on timing, but we would like an update when it is decided if we can have our light replaced and at what cost

Like to be informed of any changes

October 2022 it is too soon, especially if an comparable alternative has to be sought out

We would prefer the switch to LED light fixture, rather than the removal. From the letter it is not clear if Group 1- poles on private property have this as an option.

just some notice so I can rectify the loss of the light

6-12 months notice.

Not in bird nesting season. Replacement lighting would need to be installed on a nearby public distribution pole before the private light on our property is removed to enhance street lighting.

There is no such thing as good timing where this issue is concerned. Your generic letter that was sent out seems very vague and leaves lots of unanswered questions. Bottom line is, we need lighting and what are the options.

please see previous comments

This light is located in Whistler so replacement from late spring through early fall is best for safety reasons and perhaps for access (no snowbanks).

Remove and replace with no additional costs to me,if that is your decision. You seem to think you can break an agreement that has lasted for 45 years and have no regard for customers. I am disappointed you choose to be so small and mean spirited.

I think hydro should consider where the lights are and what they mean to the home owners that have them.

I do not agree with the termination of the Private Outdoor Lighting Service. See "Feedback regarding Private Outdoor Lighting Service" section.

Is there no option for Hydro to

Up to 2025 provides a broad period. More specific dates would allow a more definitive response.

Wait as long as posable but hope it will not be removed or when i die.

My gate to my property is locked when nobody is home.

at your convenience

Later for us is best. And can we have a replacement light installed in the same place?

If it must be removed i would like it removed as close to the end of the removal period as possible. Perhaps by then there will be some better alternatives than no light at all and nothing that BC hydro can offer. This will also allow BC Hydro to assess for lighting needs in the affected neighbourhood and possibly provide more public lighting.

Any time is OK if BC Hydro replaces it with a new LED ones.

You can change to new LED lighting soon as possible at BC hydro's expense.

No.

We would be ready at any time to take ownership and responsibility and to pay for the power via metering.

no

I would like you to consider not removing the light at all or providing an alternative that is reasonable.

2041

Install street lights or leave my rental lights alone

As I have just stated, I would like BC Hydro to reconsider the removal of our light , as this is not a normal one residential property and it affects multiple homes and people.

We do not want this light to be removed

Timing depends a lot upon costs, so this is hard to answer otherwise. We'd like to maintain lighting in the parking lot.

no

We hope that BC Hydro doesn't terminate such service

Our light has been in place for more than 40 years, with rental fee and usage consistently paid to BC Hydro. Ours is a rural property, forested, and miles beyond any public street lighting. Even when the Regional District of Kitimat Stikine established an organized low density residential subdivision beyond our property, street lighting was not provided. Our yard light provides us security and safety. It is helpful to any emergency services calling here. We are elderly retired seniors determined to live in this house for the duration of our lives. We would be concerned about negotiating our driveway safely, especially during long dark winter nights. If LED must replace the current light, perhaps BC Hydro could supply and place the LED for seniors and long term customers like us?

We do not want the service terminated. We want to keep our lease light on our pole in our driveway.

no

No

We would rather the lights not be removed at all

No

No

Timing is no problem - just replace with LED - I want to keep the light

If BC Hydro will put in a public streetlight on [road] in Windermere BC then we can certainly think about the next step.

Yes, I would like BC Hydro to consider the health and safety of private home owners. BC Hydro should absorb the cost for which there has been a long time profit received without upgrades.

When ever it is convenient, after I have decided on a suitable replacement.

Nothing at this time except for the potential costs of changing the bulbs in relation to our bill & the new rates.

No.

Yes. Grandfather us in and if/when we move or die remove the light then.

As late as possible so we can find an alternative.

no

We would like to keep it as long as possible , it is a big help to all of us here

This is an active farm. The light provides security and light for the 100 meter driveway (there are very limited street lights on the road). There are no houses on my side of the street for at least 500 meters. The existing program was established to provide lighting for rural areas - this need still exists - whether or not the "public" utility finds it "inconvenient".

No

No

Sooner the better😊

Not applicable

I would like the lighting removed as soon as possible, as I do not want it on my property, i just purchased the home 1 month ago and inherited the light.

we use this light all the time for safety purposes

Q7 - Is there any other feedback regarding our Private Outdoor Lighting Service that you would like BC Hydro to consider before we file our application for the termination of the rate?

Could we pay for the update to the LED bulbs up front to BC Hydro. Then continue on with BC Hydro service.

No

We would prefer no changes be made.

We would like more specific information on the cost of replacement of the light and installation cost

have used this light to let my family feel secure this lights up our front lawn and lights near by lane way

Your power poles on private property not covered by Sec 40 Road rules

I am not convinced that this service needs to be discontinued, I will contest this proposal.

I live in Metchosin and a densification of population in the surrounding communities has pushed local wildlife into my neighborhood. I have lost sheep to predators including a bear in past couple years. The light is between my barn (where I lock up my livestock at night) and my house. The illumination that it provides is a significant deterrent to predatory wildlife during the night. It also provides an immense safety factor in the event that I need to investigate predatory intrusions. For me, the light is not a convenience but it is a necessity for safety.

We have been on our property for 32 years, we have maybe had the light bulb changed four times in that time. We pay 436.32 a year for outdoor lights, probably having spent about \$12,000 during that time. Not sure how this is too costly a program to run.

none that I can think of

If you had provided options other than termination this would be a true feedback opportunity.

see previous comments

While the properties that benefit from this light would like to see it maintained, we do need more transparent information about the new rates. I looked at the rate table, but am not sure those rates will be applicable once the new light is in place. How does one know? Do you have an estimate as to what the costs will be for Group 2 replacements?

I would like you to consider your customers with respect. I live on two acres with poor street lighting, our light illuminates most of my property and four of my neighbors. The light in my yard also lights up the street in front of my house. I would like you to withdraw your application for termination. Also can you tell me where in the light the pcb is. Is my new light pcb free? Remember that you installed all these lights and pcb were known about at that time. You should not ask me to pay for your mistake.

I think my previous comments would also fit in this area of comments.

September 11, 2020 I am the owner of a property that is the home of multiple elderly, low-cost housing individuals. I recently received a letter from BC Hydro dated August 27, 2020 regarding my Private Outdoor Lighting Service. I disagree with the BC Hydro application to the BCUC to terminate the Private Outdoor Lighting Service, Group 1 (under Rate Schedule 1755) for reasons that include the following: 1. I have an existing account with BC Hydro under the Private Outdoor Lighting Service (Rate Schedule 1755) that was in effect January 1, 1975 and continuously thereafter. I do not agree with BC Hydro's

proposal to unilaterally terminate our agreement. I have had this service for many years and am happy with it. The arrangement is working well. 2. BC Hydro is planning on replacing street lights with LED and proposing to continue existing service on properties across the province anyways, so I do not see the distinction between public and private properties. 3. For customers with lights attached to poles on private property that, with BC Hydro's proposal, would not be offered the option to have lights replaced with new LED fixtures and service continue under the existing Rate Schedule (an option that customers with street lighting on poles on public property would be offered), no consideration is being given for the significant expense and complexity to install a meter base and new wiring in order to replace and operate the new street lights and maintenance of the same. 4. Being without street lights after BC Hydro removes existing lighting would be a safety issue for the elderly residents of the property. It would be fair and reasonable for the BC Hydro proposal to be amended to offer Private Outdoor Lighting Service, Group 1 (Rate Schedule 1755) customers (as will be offered to customers with street lights on public property) replacement, by BC Hydro, of street lights with new LED fixtures and maintenance of same, and the option that their Private Outdoor Service and Rate Schedule continue, with the Rate Schedule set at a fair rate that is determined by the BCUC. Respectfully, Property Owner

Is there no option for private property owners to get an upgrade to a LED lighting system? The only option is termination?

We would like the option to keep the outdoor lighting service

Knowing relative costs relating to LED replacement equipment and availability would be helpful in terms of a final decision.

In Rural BC we don't have any street lights near my home. Summer light usage is less but still required. Winters are longer and it is very dark during those winter months. Having the yard light is a big part of keeping my family and home safe. I want to continue to have my Private Outdoor Lighting available to my property.

Yes.... This lighting provides security for our farm and I am sure other customers in this situation.

This group 1 light has been excellent, both for the property and the neighbourhood for many years. I think that if possible, group 1 lights should be assessed for group 2 lighting possibilities.

OMG We have had this light for 46 years and would certainly miss it. We would certainly like to keep a fixed light on our property. This light provides security for us and our home. Is it possible to have B.C. Hydro install the LED lighting and would the rate be comparable to what we're paying now?

OMG! Would certainly like to keep

Again we can not do the replacing job by ourselves whatever it is replacing and/or changing the bulb (kind of maintenance) I don't know how much BC Hydro will charge for maintenance of lighting, I wish BC Hydro make the customer worry-free about maintenance.

I am in favour of new LED lighting with existing contract.

I don't want you to file for termination of the service, until we (your customers) know how much replacing our current lights with LEDs would cost, who else could provide the service if you do terminate the service, whether or not my specific light uses PCBs and needs to be replaced at all, and why those of us who want to keep our private lighting can't simply pay a one time service fee to have the lights replaced.

No..we understand the reasoning..we just wish to mitigate our costs by assuming responsibility.

no

Please don't do it. Since there is no street lights in rural areas why not have this as an option for people around their properties. If we go away we know the light always comes on. Yes there are private outdoor options but this sits at the top of the pole and covers a large are of our driveway and home. I really think just removing it is terrible and you should provide options for a service we think is very important

Payment options like a rent to own or at least let people know exactly how much they will be expected to pay to keep the outdoor light. Show all options and amounts before removing.

Install street lights on this unlit street or leave my private outdoor lighting alone

I strongly appose the termination of the private outdoor lighting on my property and request that it be converted to LED at a cost that is reasonable so that I can afford to continue to provide my tenants with the security that they need without them having to incur extra expense. They are all Seniors on limited funds, one fellow is on disability.

What are the options to be able to keep the outdoor light

From the letter and website information, it is not clear what the implications are for the transition options.

no

The outdoor lighting program is necessary for both our locations. We expect clear and timely guidance so we can replace with our fixture to ensure uninterrupted service.

Long term loyal customers have paid for your service. We would like to be "grandfathered" so that our safety and security will not be compromised. The increased financial burden to low fixed income senior citizens should be factored in to your determinations. We will appreciate your careful consideration of our situation.

We do not want the service terminated. We would like the option of keeping our lease light in our driveway. We would like to know what the cost of an LED lease light would be.

yes as mentioned we would like the option of having our light replaced with a new LED fixture

Please assist residents in keeping the current light, replace it with LED lighting or have the CVRD provide an up to standard replacement.

We are unclear as to which light you are proposing to remove. Could someone please clarify?

If new private lighting contracts have not been entered in to since 1975, I would be interested to know how many light contracts remain in existence in 2020, some 45 years later? What is the estimated cost to maintain BC Hydro lights on private property please.

Not as long as the service will continue to be available to us.

Please keep my light active - I will pay the hydro required to keep it going.

Unfortunately, we are victims of being early (and only) residents on this street and did what we thought best for safety of all. Now, because of new restrictions and guidelines we are forced to possibly be left "literally in the dark!" We would like to be considered for a new Public Hydro Light on this street for all to contribute to. The road is extremely dark at night. Because of the expense that you have outlined - we would have to pay ourselves if we kept the current arrangement. We are Senior Senior's and we just cannot afford it - safety or not! Due to the massive growth in Windermere of late years and the area becoming Calgary's playground...we have cars and trucks travelling at speeds so much more than they should be - when they reach our house they realize that they are going too fast for the downhill and

curves in the road and have to brake heavily. While it may be interesting to watch their panic.....it is not safe for walkers on the road.

As outlined I believe that there should be a grandfather clause to protect long time property owners. I am a senior on a limited budget, who requires the light for my health and safety. I have been charged rental charges for over 27 years, there has been no upgrades to the service therefore I believe BC Hydro has profited. The home was built in 1973 I'm pretty sure the previous owns would of been charged rental as well. So for 37 years BC Hydro has profited, now saying its to costly to maintain. Therefore the costs to upgrade should of already been recovered by means of rental charges, and should not be passed on to the home owner. I would like BC Hydro to consider the health and safety of private home owners. BC Hydro should absorb the cost for which there has been a long time profit received without upgrade.

We are in need of yard lighting, for security and safety. We have been very satisfied with the years of service and understand the need to upgrade the service.

We believe that this lighting protects our home/family as it lights up the street in front of our home as well as into the backyard.

Please consider that this light is on property operated by a non profit society that operates events and activities for the community. The light illuminates the parking area and is also a security feature.

I have had this light for 35 years and in this rural area it is invaluable, especially doing the dark winter months.

Please realize we are people not numbers. These lights provide feelings of security. We moved into this house when I was in my mid 20's. I'm now in my mid 50's. I can look out my windows at night and see my yard front and back. The cost has been built into our budget. If we ever need to call an ambulance we can say 'the house with the streetlight in the yard' as ours is the only one. Our neighbours can also use it as a reference point for emergency vehicles. 3500 people receive this service means about .0007% of BC's population. Grandfather us in or at the very least let the lights keep running until they quit. The government can and should bend in instances like these.

We feel the right away agreement protected the rate we pay.

We have enjoyed to light on our property because we are all seniors here and depend on the light, for all sorts of things. We have five houses and they would all like to keep the light. We are out of the city and it gets quite dark, we also have had bares and deer going through the property If you can let us keep the light , we would appreciate it very much Thank You

Please note that we would like to keep the light but have it updated.

I do not support this application. BC Hydro has a civic obligation, as a sole service provider to provide "public service" for areas where the local governments cannot in rural areas. By all means, upgrade the lights to LED (or whatever), do NOT eliminate a required service.

Make the light brighter. Have the light comes on earlier during the winter months. The car park is especially dark at 5pm and the daycare as well as the church is still operating.

None

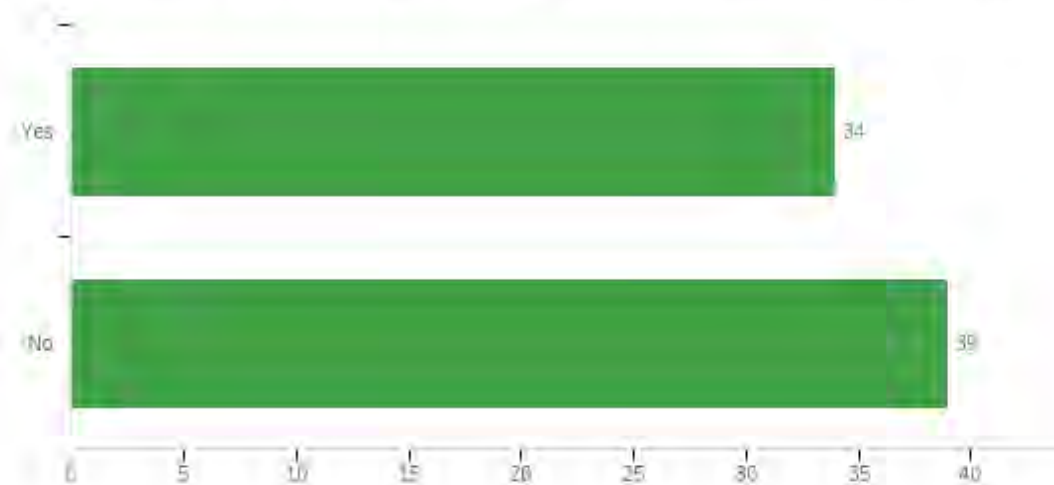
No

No please be compassionate to the most vulnerable senior citizens who do not need one more surprise lurking round the corner!

nope

We would like a quote on paying for the electricity cost for an updated LED

Q8 - Are you interested in participating in the regulatory process related to RS1755?



September 4, 2020

<Customer Name>
<Mailing Address>
<City>, <Province> <Postal Code>

About your unmetered services

We're writing to you because you have accounts for electricity use on an unmetered basis. BC Hydro relies on customers to self-report light or equipment additions, modifications or removals to update billing. In some cases, customers aren't reporting these changes in a timely or accurate manner, resulting in under or over-billing. Self-reporting delays can result in significant administration effort in correcting billing.

To clarify customers' obligations for self-reporting, we are planning to submit an application to the BC Utilities Commission (BCUC) to amend the Electric Tariff Terms and Conditions and Special Conditions for unmetered services associated to the following rate schedules:

- Rate Schedule 1702 – Public Area Ornamental Street Lighting
- Rate Schedule 1703 – Street Lighting Service
- Rate Schedule 1704 – Traffic Control Equipment
- Rate Schedule 1300 – Unmetered Small General Service
- Rate Schedule 1234 – Unmetered Small General Service – Zone II

Regulatory application for unmetered services

In this application, we'll be proposing the following changes to the Electric Tariff, Section 5.7 (Back-Billing) when changes aren't reported in a timely or accurate manner:

Specifically, BC Hydro will seek approval from the BCUC of the following amendments to apply in situations when under-billing or over-billing is caused by a customer's delayed or inaccurate notification of the addition, removal or alteration of unmetered street lights or equipment:

- Under-billing: allow under-billed amounts to be invoiced from the date of the change. We're currently restricted to invoicing for a maximum of six or twelve months, depending on the rate schedule.
- Under-billing: add the requirement to charge interest on the under-billed amount if self-reporting occurs more than a period of one to three months after the changes. We are seeking customer feedback on the appropriate duration.
- Over-billing: add a limit to the period that credits for over-billed amounts are provided prior to the date the changes are self-reported. We're currently obligated to apply credits, with interest, to when the over-billing first occurred. We are seeking customer feedback on the appropriate duration.

We'll also be proposing amendments to the Special Conditions within the rate schedules listed above to clarify customers' responsibilities for timely and accurate declarations of unmetered services.

After a regulatory proceeding to review our application, the BCUC will make a decision. Customers are welcome to participate in this open and transparent regulatory proceeding. To learn more about how you can participate, visit bcuc.com/get-involved.

We want your feedback

To learn more and share your comments about the proposals, visit **bchydro.com/unmetered**. It's important that we get your feedback on the proposals so that it can be considered as part of our regulatory application. We encourage you to provide your feedback by Thursday, September 17, 2020.

Once we have submitted the application, we'll write to you again with more information, including how you can get involved and provide comments to the BCUC.

If you have any questions about the service, please email us at **lightingsupport@bchydro.com** or give us a call toll free at 1-833-828-2224. We're available Monday to Friday from 8 a.m. to 4 p.m.

Thanks.

Daren Sanders
Director, Contact Centre & Billing Operations

Feedback on unmetered services

We want your feedback

As we prepare to submit an application to the BC Utilities Commission to update our street light rates and unmetered services, we're asking for your feedback, including any concerns or issues you might have with our proposals.

Please be aware that your feedback, including the organization you're representing, will be included in the application and be part of the public record for the regulatory proceeding. Due to privacy concerns, we ask that you do not identify third-party individuals or account specific information in your comments. Comments that reference identifiable individuals will not be included as part of the public record.

Any personal information you provide to BC Hydro on this form is collected and protected in accordance with the ***Freedom of Information and Protection of Privacy Act***. BC Hydro is collecting information with this for the purpose of tariff updates in accordance with BC Hydro's mandate under the ***Hydro and Power Authority Act***, the BC Hydro Electric Tariff, the Utilities Commission Act and related Regulations and Directions. If you have any questions about the collection or use of the personal information collected on this form please contact the BC Hydro Regulatory Group via [email](#).

Q1 CONSENT TO USE PERSONAL INFORMATION

I consent to the use of my personal information by BC Hydro as provided in this feedback form. Personal information includes my comments and contact details. This information is collected and protected by BC Hydro in accordance with the Freedom of Information and Protection of Privacy Act. Personal information is not considered, in any way, to reflect the express or implied views of the company you represent. Comments submitted will be used to inform BC Hydro's customer service and tariff updates for customers on unmetered rates.

☐ I consent

☐ I do not consent

Q2 Your Contact Information:

Name: _____

Community or Organization (if applicable): _____

Contact Email: _____

Q3 About your unmetered services

BC Hydro relies on customers to self-report light or equipment additions, modifications or removals to ensure its billing records stay up-to-date. In some cases, this is not done timely or accurately, resulting in us under or over-billing customers. This can also create administration challenges as we work to make these billing corrections.

To help clarify our self-reporting requirements for unmetered services customers, we're planning to submit an application to the BC Utilities Commission (BCUC) later this year to amend the Electric Tariff Terms and Conditions and Special Conditions for unmetered services associated to the following rate schedules:

Rate Schedule 1702 – Public Area Ornamental Street Lighting

Rate Schedule 1703 – Street Lighting Service

Rate Schedule 1704 – Traffic Control Equipment

Rate Schedule 1300 – Unmetered Small General Service

Rate Schedule 1234 – Unmetered Small General Service – Zone II

Q4 What rate schedule(s) apply to your accounts (check all that apply)

- ☐ Rate Schedule 1702 – Public Area Ornamental Street Lighting
 - ☐ Rate Schedule 1703 – Street Lighting Service
 - ☐ Rate Schedule 1704 – Traffic Control Equipment
 - ☐ Rate Schedule 1300 – Unmetered Small General Service
 - ☐ Rate Schedule 1234 – Unmetered Small General Service – Zone II
 - ☐ I'm not sure
-

Q5 How familiar are you with the self reporting process to notify BC Hydro regarding changes to your unmetered service?

- ☐ Extremely familiar
 - ☐ Very familiar
 - ☐ Moderately familiar
 - ☐ Slightly familiar
 - ☐ Not familiar at all
-

Regulatory application for unmetered services

In this application, we'll be proposing the following changes to the Electric Tariff, Section 5.7 (Back-Billing) when changes aren't reported in a timely or accurate manner:

Under-billing: allow under-billed amounts to be invoiced from the date of the change. We're currently restricted to invoicing for a maximum of six or twelve months, depending on the rate schedule.

Under-billing: add the requirement to charge interest on the under-billed amount if self-reporting occurs more than a period of one to three months (we are seeking customer feedback on the appropriate duration) after the changes.

Over-billing: add a limit to the period that credits for over-billed amounts are provided prior to the date the changes are self-reported. We're currently obligated to apply credits, with interest, to when the over-billing first occurred. We are seeking customer feedback on the appropriate duration.

We'll also be proposing amendments to the Special Conditions within the rate schedules listed above to clarify customers' responsibilities for timely and accurate declarations of unmetered services.

After a regulatory proceeding to review our application, the BCUC will make a decision. Customers are welcome to participate in this open and transparent regulatory proceeding.

Q6 How much time after an unmetered service has been changed, do you feel is reasonable to report the change to BC Hydro?

- ☐ During the month of the change
- ☐ Two months
- ☐ Three months
- ☐ Other _____

Q7 What feedback do you have related to the credit or charge time limits and applicable interest charges?

Q8 Is there any other feedback regarding our proposed tariff changes for unmetered service that you would like BC Hydro to consider before we file our application to the BCUC?

Q9 Are you interested in participating in the regulatory process related to this filing?

- ☐ Yes (1)
- ☐ No (2)

Q10 Please provide your email address:

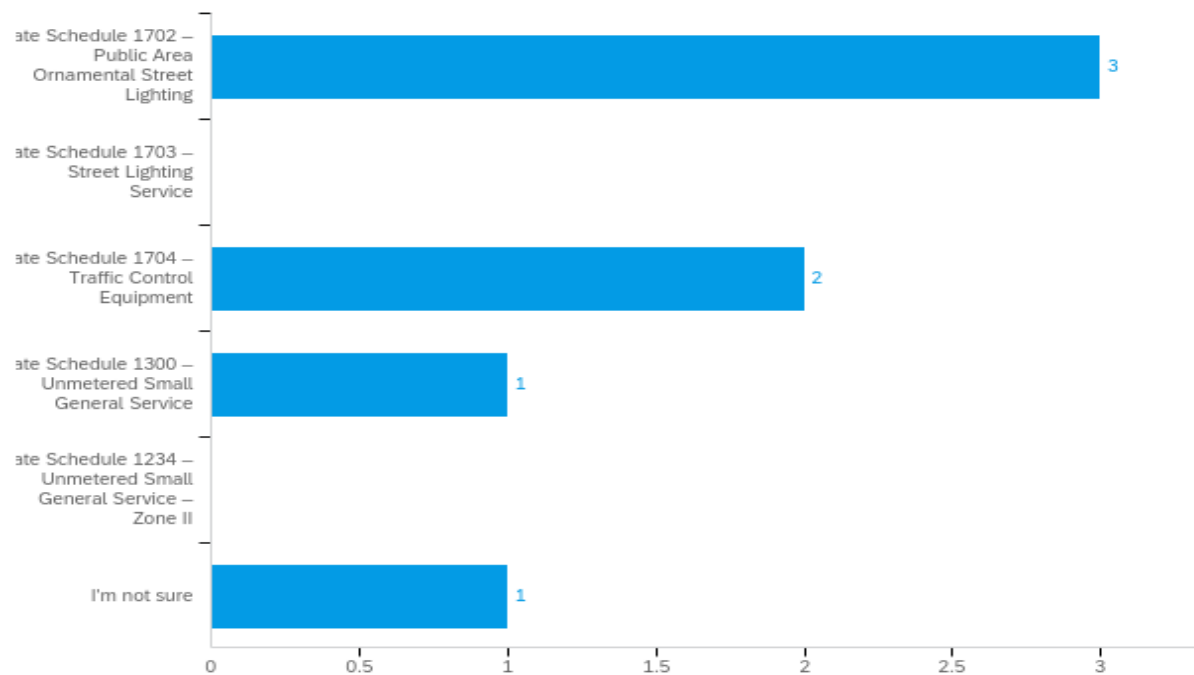
- ☐ Email (4) _____

Thank you for taking the time to provide your feedback.

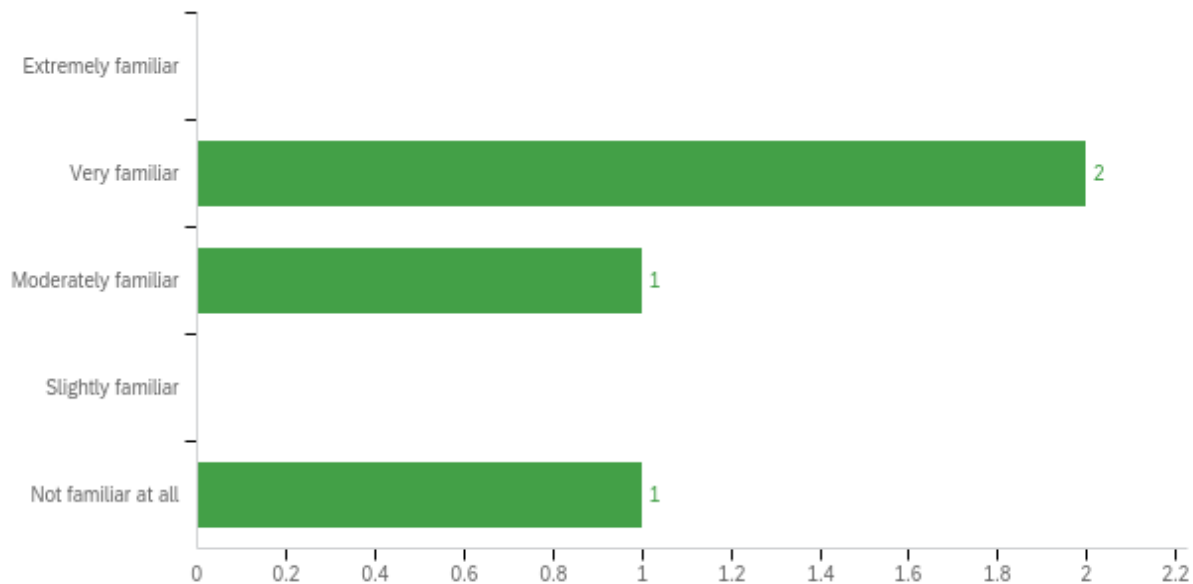
Survey Fielded: September 3-17, 2020
Customer completes: 7
Total responses: 9

SURVEY QUESTIONS –

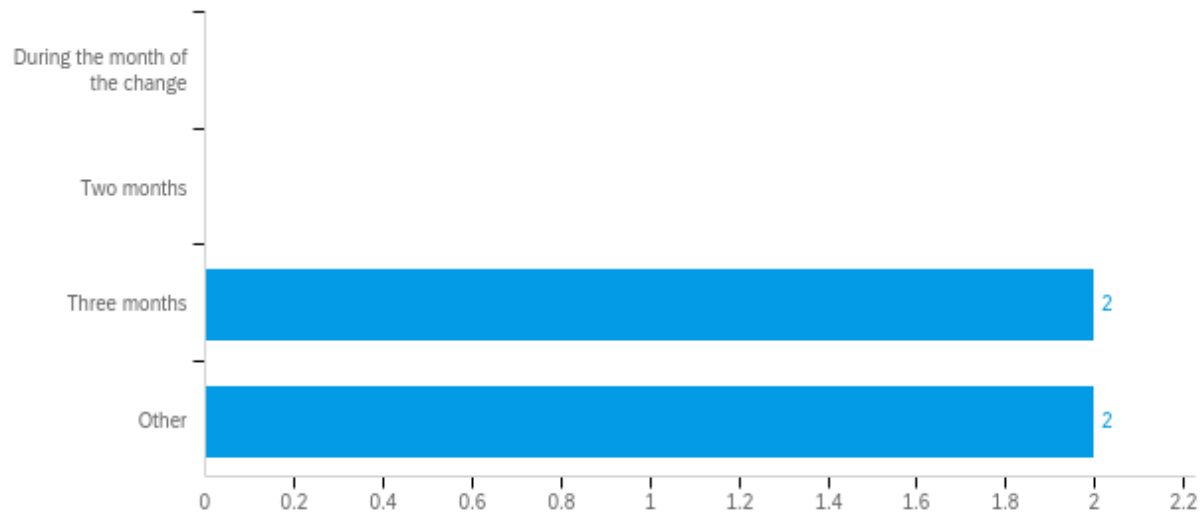
Q4 - What rate schedule(s) apply to your accounts (check all that apply)



Q5 - How familiar are you with the self reporting process to notify BC Hydro regarding changes to your unmetered service?



Q6 - How much time after an unmetered service has been changed, do you feel is reasonable to report the change to BC Hydro?



Other (verbatim):

- Six months
- One year

Q7 - What feedback do you have related to the credit or charge time limits and applicable interest charges?

I believe the credit and limit charges should apply evenly from hydro's perspective and the end users perspective. over billing and under billing time limits for all should be the same

We are confused on why costs would go up to cover an expense to convert to LED lamps from traditional HPS or MV. We would like clarity on why though energy consumption would significantly go down billing costs would go up. It would be expected that BCHydro would also be saving money with realizing lower maintenance costs to maintain those new lights.

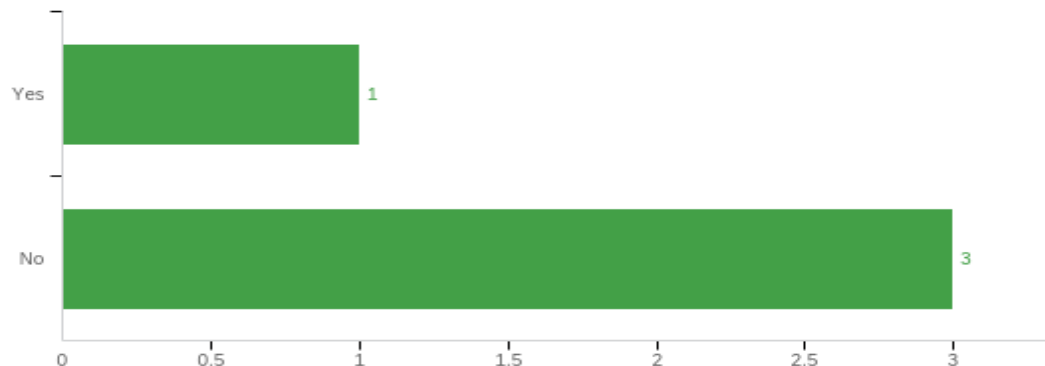
The majority of new street lights installed in Richmond are by Development. The City does not take over the light until the maintenance period is over, which is 1 year after the lights have been energized. Lights are reported to BC during the maintenance period and are backdated to when the lights were energized. Our City of Richmond Inspections Department requested a credit or charge time limits be 6 months for street light reporting on development projects.

There may be delays in excess of 3 months to report changes due to delays in receiving as-builts from contractors and updating our GIS records, which then triggers the update to BC Hydro. I have suggested up to one year for the reporting without interest.

Q8 - Is there any other feedback regarding our proposed tariff changes for unmetered service that you would like BC Hydro to consider before we file our application to the BCUC?

There should be limitations in terms of how far back one can be debited or credited. I believe this limit is 6 years based on the Statute of Limitations.

Q9 - Are you interested in participating in the regulatory process related to this filing?



BC Hydro 2020 Street Light Rates Application

Appendix F

LED Street Lighting Pilot Program

LED Street Lights

1.0 Introduction

BC Hydro is evaluating light emitting diode (LED) luminaires as an improvement upon high pressure sodium (HPS) luminaires for roadway lighting on distribution poles. In the last few years, several municipalities in B.C. have initiated pilot projects to assess this technology – see images below for a comparison. The City of Richmond has met with BC Hydro about conducting a pilot project to install LED luminaires on BC Hydro poles.

Distribution Standards will conduct a pilot project in the City of Richmond to evaluate the performance of LED luminaires based on metrics described in this plan. LED luminaires will be assessed according to the Specification for LED Roadway Luminaires (Spec. No. 440-0001).

Advanced controls that would be over and above what is currently used are not covered in this trial plan.



High pressure sodium streetlights (left) that have been replaced with light emitting diodes (right).

2.0 Ratings and Equipment Features

For information on ratings and equipment features, refer to Spec. No. 440-0001. Below is a list of the products selected for this trial:

Manufacturer	Model Number
American Electric Lighting	ATBS G MVOLT R2 P7 - 64W
American Electric Lighting	ATB2 60BLEDE70 MVOLT R2 NL SH P7 - 140W
American Electric Lighting	ATBS H MVOLT R2 P7 - 72W
GE Lighting Solutions	ERS10B3E1540Axxx - 60W
GE Lighting Solutions	ERS10C3E1140Axxx - 143W
GE Lighting Solutions	ERX10E1E2540Axxx - 97W
LED Roadway Lighting	NXT-24S-0-7-2ES-4-GY-3-UL-X-2H - 35W
LED Roadway Lighting	NXT-24S-0-7-2ES-7-GY-3-UL-X-2H - 54W
LED Roadway Lighting	NXT-36S-0-7-2ES-5-GY-3-UL-X-2H - 60W
LED Roadway Lighting	NXT-48S-0-7-2ES-6-GY-3-UL-X-2H - 92W
Philips Lighting Canada	SVM-60W32LED4 K-R-LE2 - 70W
Philips Lighting Canada	SVM-60W32LED4 K-R-LE2 - 70W
Philips Lighting Canada	SVM-90W48LED4 K-R-LE2 - 103W
Philips Lighting Canada	SVS-35W16LED4 K-T LE2 - 36W
Philips Lighting Canada	SVS-54W16LED4 K-T LE2 - 54W

3.0 Roles and Responsibilities

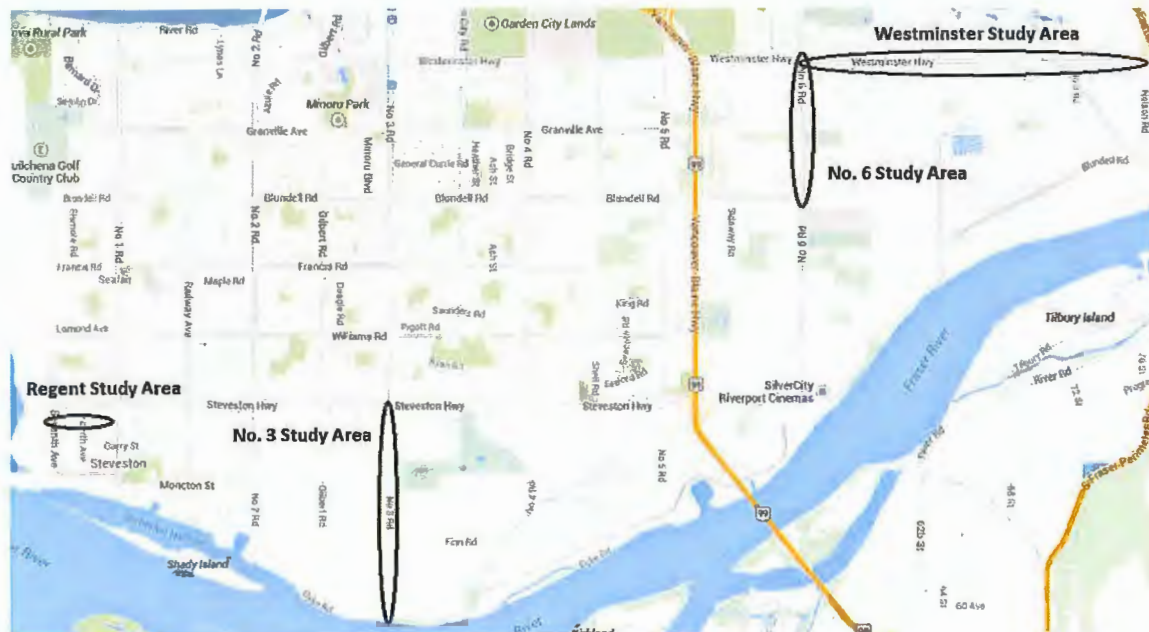
Several departments in BC Hydro are involved in the pilot project, with roles and responsibilities as follows:

- Asset Investment Management (AIM) – is the project sponsor. Responsible for pilot funding and for the potential roll out of LED street lights after the pilot if results are favourable and a new streetlight standard can be established.
- Distribution Project and Program Delivery (DPPD) – will provide a project manager and manage the work orders and charge codes used by project team including resources to implement the pilot. DPPD will report on monthly expenditures incurred by the project.
- Distribution Standards (DS) – will develop the technical requirements of the Field Trial Plan. Distribution Standards will also develop new standards for LED streetlight luminaires and photocells if the pilot is deemed to be successful. Distribution Standards will select the units to install for the pilot with advice from Power Smart Engineering.
- Field Operations – is responsible for equipment installation and removal, and updating the streetlight asset data in SAM. LED unit outages reported by the City of Richmond will be addressed by Field Operations staff exclusively.
- Key Accounts Management – will lead discussions with the City of Richmond in achieving consensus on locations where LED streetlights will be installed and an agreement to share information from the pilot.

- Power Smart Engineering (PSE) – provides technical input for the LED products being proposed for the test. They will also provide advice on industry LED trends and standards and the specifications developed for the provincial Corporate Supply Arrangement (CSA).
- Procurement – will procure the street light units based on the makes, models and qualities specified by Distribution Standards.

4.0 Trial Locations & Applications

The proposed locations for LED field trials at BC Hydro are as follows:



Location 1: No. 3 Road from Steveston Highway to Dyke Road

Location 2: No. 6 Road from Westminister Highway to Blundell Road

Location 3: Westminister Highway from No.6 Road to Nelson Road

Location 4: Regent Street from 7th Avenue to 3rd Avenue

The list of distribution poles at Locations 1, 2, 3, and 4 are provided in Appendix A.

5.0 Procedure for Field Trial of LED Street Lights

5.1 Pre-Installation

Prior to installation, the preparations that team members must make are as follows:

- Distribution Standards will evaluate and conditionally approve LED luminaires.
- Distribution Design will create the designs and work orders for Field Operations.
- DPPD will provide a project manager and oversee work orders and charge codes for the materials and the expected labour to implement the pilot work. All outages and repairs shall be addressed using specific charge codes to this project.

- DS, with the assistance of Power Smart Engineering, will specify the makes, models, and quantities of the units to be purchased.
- Key Accounts will liaise with the City of Richmond and ensure agreement on the proposed locations is achieved in advance of the start of the pilot.
- Power Smart Engineering will provide technical input and support for selection of LEDs and during the evaluation.
- Procurement will communicate with vendors and order the LED units as specified by DS.

5.2 Installation

Field Operations will perform the installation on site, as follows:

1. Disconnect HPS luminaires from the power source.
2. Remove the HPS luminaires and scrap them. Keep the photocell from the HPS and reuse it on the LED luminaire.
3. Install the LED luminaire on the same mounting arm (subject to change during evaluation, depending on the arm length on the pole).
4. Complete the power supply wiring.
5. Update the arm length, unit wattage and street light type (LED) in Spatial Asset Management at each LED street light location.

6.0 Expected Outcomes

In order for the LED luminaires to become an approved product, Distribution Standards will be evaluating the expected outcomes of the trial installations based on:

- 1) Meeting the requirements set by the Specification for LED Roadway Luminaires (Spec. No. 440-0001).
- 2) LED performance compared to HPS luminaires.
- 3) Performance compared to other LED luminaire products.
- 4) Field measurements to evaluate light quality of LED and HPS luminaires, specifically:
 - a. illumination level
 - b. light uniformity
 - c. colour temperature
 - d. flicker
 - e. glare
 - f. light trespass.
- 5) Laboratory measurements, specifically:
 - a. Power quality of LED luminaires including harmonics
 - b. Power consumption of LED luminaires.
- 6) Crew feedback regarding:

- a. Ease of installation
- b. Ease of cleaning the luminaire and replacing the components
- c. Build-up of dirt/debris on the luminaire.

7) The number of luminaires that break, burn out, or fail.

Field measurements will be conducted for HPS luminaires before replacement, and LED luminaires after installation and after six months in service. Lighting measurements will be conducted using equipment provided by Power Smart Engineering. Power quality and consumption measurements will be conducted using equipment provided by Distribution Standards' Power Quality group.

Field measurements will be conducted where safe and practical. For locations where field measurements are not safe and practical, the light quality characteristics described above will be measured in a laboratory environment.

After a full year of operation, the LED luminaires that were installed may remain in service or be taken down. This will be a decision made at that time by the project team.

7.0 Definition of Success

Success of this field trial will be seen through successful achievement of the expected outcomes. In particular, the project team would find that:

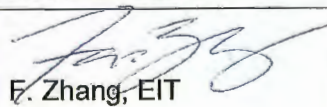
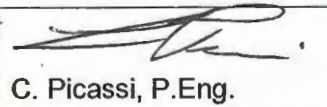

- LED street lights show an improved performance as compared to HPS based on field and laboratory measurements and crew feedback,
- LED street light products are approved for use on the distribution system.

For those items that were not successful, they will be assessed as to how they might be modified in order to be fit for use, or whether another means to achieve the same result.

8.0 Distribution Standards Contact

Name:	Madeleine Schaefer	Email:	madeleine.schaefer@bchydro.com
Phone #:	778-452-6852	Cell #:	604-323-6651

9.0 Approval

Recommended	Reviewed	Approved
 F. Zhang, EIT	 C. Picassi, P.Eng.	 F. Dennert, P.Eng. MBA
Date: <u>Sept 29/14</u>	Date: <u>Sept 29/14</u>	Date: <u>29 Sept 14</u>

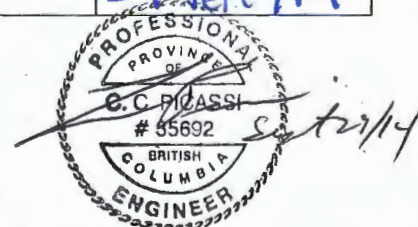
10.0 Collaborators

Ed Mah

Cristian Suvagau

Asset Management

Power Smart Engineering



Jason Zhang	Power Smart Engineering
Rick Truong	Key Account Management
Alison Wilson	Key Account Management
Tina Micholuk	Distribution Project & Program Delivery

Appendix A: Trial Pole Locations

Location 1 pole information:

Pole ID	Pole XY	HPS Wattage (New Design)	Arm Length	Secondary? Neutral?	Vendor and model #
STEVESTON HWY					
2423681	n.a	100W	1.2m	neutral	AEL - ATBS G MVOLT R2 P7 - 64W
188602	047 607	100W	1.2m	secondary and neutral	AEL - ATBS G MVOLT R2 P7 - 64W
2083061		100W	1.2m	neutral	AEL - ATBS G MVOLT R2 P7 - 64W
2446377	n.a	100W	1.2m	neutral	AEL - ATBS G MVOLT R2 P7 - 64W
2078538	150 942	100W	1.2m	secondary and neutral	AEL - ATBS G MVOLT R2 P7 - 64W
2078539	148 881	100W	1.2m	secondary and neutral	AEL - ATBS G MVOLT R2 P7 - 64W
2078540	148 824	100W	1.2m	secondary and neutral	AEL - ATBS G MVOLT R2 P7 - 64W
188608	048 531	100W	1.2m	secondary and neutral	AEL - ATBS G MVOLT R2 P7 - 64W
2127474	147 724	100W	1.2m	secondary and neutral	AEL - ATBS G MVOLT R2 P7 - 64W
2078542	147 688	100W	1.2m	secondary and neutral	AEL - ATBS G MVOLT R2 P7 - 64W
2466421	n.a	100W	1.2m	secondary and neutral	AEL - ATBS G MVOLT R2 P7 - 64W
2462826	n.a	100W	1.2m	secondary and neutral	AEL - ATBS G MVOLT R2 P7 - 64W
2078544	151 568	100W	1.2m	secondary and neutral	AEL - ATBS G MVOLT R2 P7 - 64W
188616	049 451	100W	1.2m	neutral	AEL - ATBS G MVOLT R2 P7 - 64W
188615	049 438	100W	1.2m	neutral	AEL - ATBS G MVOLT R2 P7 - 64W
2407428	n.a	100W	1.2m	secondary and neutral	AEL - ATBS G MVOLT R2 P7 - 64W
2254250	n.a	100W	1.2m	neutral	GE - ERS10B3E1540Axxx - 60W
2229426	142 349	100W	1.2m	secondary and neutral	GE - ERS10B3E1540Axxx - 60W
2127456	141 307	100W	1.2m	secondary and neutral	GE - ERS10B3E1540Axxx - 60W
2385865	n.a	100W	1.2m	secondary and neutral	GE - ERS10B3E1540Axxx - 60W
2062143	141 228	100W	1.2m	secondary and neutral	GE - ERS10B3E1540Axxx - 60W
2127471	140 188	100W	1.2m	secondary and neutral	GE - ERS10B3E1540Axxx - 60W
188621	050 310	100W	1.2m	secondary and neutral	GE - ERS10B3E1540Axxx - 60W

188620	050 294	100W	1.2m	secondary and neutral	GE - ERS10B3E1540Axxx - 60W
188619	050 278	100W	1.2m	secondary and neutral	GE - ERS10B3E1540Axxx - 60W
2127483	139 016	100W	1.2m	secondary and neutral	GE - ERS10B3E1540Axxx - 60W
2127469	138 971	100W	1.2m	secondary and neutral	GE - ERS10B3E1540Axxx - 60W
2127495	138 926	100W	1.2m	secondary and neutral	GE - ERS10B3E1540Axxx - 60W
2127375	137 881	100W	1.2m	secondary and neutral	GE - ERS10B3E1540Axxx - 60W
2372745	n.a	100W	1.2m	secondary and neutral	GE - ERS10B3E1540Axxx - 60W
2127538	137 808	100W	1.2m	neutral	GE - ERS10B3E1540Axxx - 60W
2127467	136 770	100W	1.2m	secondary and neutral	LRL-NXT-24S-0-7-2ES-7-GY-3-UL-X-2H - 54W
188624	051 170	100W	1.2m	secondary and neutral	LRL-NXT-24S-0-7-2ES-7-GY-3-UL-X-2H - 54W
1208235	136 692	100W	1.2m	secondary and neutral	LRL-NXT-24S-0-7-2ES-7-GY-3-UL-X-2H - 54W
2081967	135 653	100W	1.2m	secondary and neutral	LRL-NXT-24S-0-7-2ES-7-GY-3-UL-X-2H - 54W
2127367	134 610	100W	1.2m	neutral	LRL-NXT-24S-0-7-2ES-7-GY-3-UL-X-2H - 54W
2127372	134 568	100W	1.2m	secondary and neutral	LRL-NXT-24S-0-7-2ES-7-GY-3-UL-X-2H - 54W
188634	052 102	100W	1.2m	secondary and neutral	LRL-NXT-24S-0-7-2ES-7-GY-3-UL-X-2H - 54W
2126591	134 481	100W	1.2m	secondary and neutral	LRL-NXT-24S-0-7-2ES-7-GY-3-UL-X-2H - 54W
2127491	n.a	100W	1.2m	secondary and neutral	LRL-NXT-24S-0-7-2ES-7-GY-3-UL-X-2H - 54W
188631	052 059	100W	1.2m	secondary and neutral	LRL-NXT-24S-0-7-2ES-7-GY-3-UL-X-2H - 54W
2518031	n.a	100W	1.2m	secondary and neutral	LRL-NXT-24S-0-7-2ES-7-GY-3-UL-X-2H - 54W
2547824	n.a	100W	1.2m	secondary and neutral	LRL-NXT-24S-0-7-2ES-7-GY-3-UL-X-2H - 54W
2555084	n.a	100W	1.2m	secondary and neutral	LRL-NXT-24S-0-7-2ES-7-GY-3-UL-X-2H - 54W
2185470	129 257	100W	1.2m	secondary and neutral	LRL-NXT-24S-0-7-2ES-7-GY-3-UL-X-2H - 54W
2062144	135 219	100W	1.2m	neutral	LRL-NXT-24S-0-7-2ES-7-GY-3-UL-X-2H - 54W
2464689	n.a	100W	1.2m	neutral	Philips-SVS-54W16LED4 K-T LE2 - 54W
2547778	n.a	100W	1.2m	secondary and neutral	Philips-SVS-54W16LED4 K-T LE2 - 54W
2078537	131 098	100W	1.2m	secondary and neutral	Philips-SVS-54W16LED4 K-T LE2 - 54W

188567	052 538	100W	1.2m	secondary and neutral	Philips-SVS-54W16LED4 K-T LE2 - 54W
2552158	n.a	100W	1.2m	secondary and neutral	Philips-SVS-54W16LED4 K-T LE2 - 54W
188565	052 512	100W	1.2m	secondary and neutral	Philips-SVS-54W16LED4 K-T LE2 - 54W
188564	052 499	100W	1.2m	neutral	Philips-SVS-54W16LED4 K-T LE2 - 54W
188563	052 484	100W	1.2m	neutral	Philips-SVS-54W16LED4 K-T LE2 - 54W
2384850	n.a	100W	1.2m	secondary and neutral	Philips-SVS-54W16LED4 K-T LE2 - 54W
188561	052 460	100W	1.2m	neutral	Philips-SVS-54W16LED4 K-T LE2 - 54W
188560	052 447	100W	1.2m	neutral	Philips-SVS-54W16LED4 K-T LE2 - 54W
2078536	126 721	100W	1.2m	neutral	Philips-SVS-54W16LED4 K-T LE2 - 54W
2466594	n.a	100W	1.2m	neutral	Philips-SVS-54W16LED4 K-T LE2 - 54W
1181367	116 636	100W	1.2m	secondary and neutral	Philips-SVS-54W16LED4 K-T LE2 - 54W
188568	053 396	100W	1.2m	secondary and neutral	Philips-SVS-54W16LED4 K-T LE2 - 54W
DYKE ROAD					

Location 2 pole information:

Pole ID	Pole XY	Existing wattage and arm length	Secondary? Neutral?	Vendor and model #
WESTMINSTER HWY				
2389783	n.a	4.8m, 150W	secondary and neutral	AEL-ATBS H MVOLT R2 P7 - 72W
2105393	075 050	4.8m, 150W	secondary and neutral	AEL-ATBS H MVOLT R2 P7 - 72W
2116461	076 934	4.8m, 150W	secondary and neutral	AEL-ATBS H MVOLT R2 P7 - 72W
2518047	n.a	4.8m, 150W	secondary and neutral	AEL-ATBS H MVOLT R2 P7 - 72W
2542563	n.a	4.8m, 150W	secondary and neutral	AEL-ATBS H MVOLT R2 P7 - 72W
2116504	077 781	4.8m, 150W	secondary and neutral	GE-ERX10E1E2540Axxx - 97W
2116463	077 727	4.8m, 150W	secondary and neutral	GE-ERX10E1E2540Axxx - 97W
2105390	078 672	4.8m, 150W	secondary and neutral	GE-ERX10E1E2540Axxx - 97W
2116434	078 601	4.8m, 150W	secondary and neutral	GE-ERX10E1E2540Axxx - 97W
2116521	078 552	4.8m, 150W	secondary and neutral	GE-ERX10E1E2540Axxx - 97W
157483	024 508	4.8m, 150W	secondary and neutral	LRL-NXT-36S-0-7-2ES-5-GY-3-UL-X-2H - 60W
2116437	078 493	4.8m, 100W	secondary and neutral	LRL-NXT-36S-0-7-2ES-5-GY-3-UL-X-2H - 60W
2076932	079 440	4.8m, 150W	secondary and neutral	LRL-NXT-36S-0-7-2ES-5-GY-3-UL-X-2H - 60W
2027796	079 386	4.8m, 150W	secondary and neutral	LRL-NXT-36S-0-7-2ES-5-GY-3-UL-X-2H - 60W
157447	012 445	1.2m, 150W	secondary and neutral	LRL-NXT-36S-0-7-2ES-5-GY-3-UL-X-2H - 60W
1158607	093 277	2.4m, 100W	secondary and neutral	Philips - SVM-60W32LED4 K-R-LE2 - 70W
2116435	097 258	4.8m, 150W	secondary and neutral	Philips - SVM-60W32LED4 K-R-LE2 - 70W
2116433	100 215	4.8m, 150W	secondary and neutral	Philips - SVM-60W32LED4 K-R-LE2 - 70W
2116464	100 166	4.8m, 100W	secondary and neutral	Philips - SVM-60W32LED4 K-R-LE2 - 70W
2028700	085 113	4.8m, 150W	secondary and neutral	Philips - SVM-60W32LED4 K-R-LE2 - 70W
BLUNDELL				

Location 3 pole information:

Pole ID	Pole XY	HPS Wattage (New Design)	Arm length	Secondary? Neutral?	Vendor and model #
NO 6 ROAD					
2491859	n.a.	150W	1.2m	secondary and neutral	AEL-ATB2 60BLEDE70 MVOLT R2 NL SH P7 - 140W
2389993	n.a.	150W	1.2m	secondary and neutral	AEL-ATB2 60BLEDE70 MVOLT R2 NL SH P7 - 140W
157536	008 137	150W	1.2m	secondary and neutral	AEL-ATB2 60BLEDE70 MVOLT R2 NL SH P7 - 140W
2497124	n.a.	150W	1.2m	secondary and neutral	AEL-ATB2 60BLEDE70 MVOLT R2 NL SH P7 - 140W
149870	381 137	150W	1.2m	secondary and neutral	AEL-ATB2 60BLEDE70 MVOLT R2 NL SH P7 - 140W
2443595	364 137	150W	1.2m	secondary and neutral	AEL-ATB2 60BLEDE70 MVOLT R2 NL SH P7 - 140W
149866	350 138	150W	1.2m	secondary and neutral	AEL-ATB2 60BLEDE70 MVOLT R2 NL SH P7 - 140W
149864	333 138	150W	1.2m	secondary and neutral	AEL-ATB2 60BLEDE70 MVOLT R2 NL SH P7 - 140W
2292099	n.a.	150W	1.2m	secondary and neutral	AEL-ATB2 60BLEDE70 MVOLT R2 NL SH P7 - 140W
149861	303 138	150W	1.2m	secondary and neutral	AEL-ATB2 60BLEDE70 MVOLT R2 NL SH P7 - 140W
2349066	n.a.	150W	1.2m	secondary and neutral	AEL-ATB2 60BLEDE70 MVOLT R2 NL SH P7 - 140W
149855	272 139	150W	1.2m	secondary and neutral	AEL-ATB2 60BLEDE70 MVOLT R2 NL SH P7 - 140W
149854	259 139	150W	1.2m	secondary and neutral	AEL-ATB2 60BLEDE70 MVOLT R2 NL SH P7 - 140W
2337899	n.a.	150W	1.2m	secondary and neutral	AEL-ATB2 60BLEDE70 MVOLT R2 NL SH P7 - 140W
1205126	748 156	150W	1.2m	secondary and neutral	AEL-ATB2 60BLEDE70 MVOLT R2 NL SH P7 - 140W
2337041	n.a.	150W	1.2m	secondary and neutral	AEL-ATB2 60BLEDE70 MVOLT R2 NL SH P7 - 140W
2254442	n.a.	150W	1.2m	secondary and neutral	AEL-ATB2 60BLEDE70 MVOLT R2 NL SH P7 - 140W
2254624	n.a.	150W	1.2m	secondary and neutral	AEL-ATB2 60BLEDE70 MVOLT R2 NL SH P7 - 140W
2193443	n.a.	150W	1.2m	none	AEL-ATB2 60BLEDE70 MVOLT R2 NL SH P7 - 140W
149839	158 140	150W	1.2m	secondary and neutral	GE - ERS10C3E1140Axxx - 143W
2469836	n.a.	150W	1.2m	secondary and neutral	GE - ERS10C3E1140Axxx - 143W
2308865	n.a.	150W	1.2m	secondary and neutral	GE - ERS10C3E1140Axxx - 143W
2270790	n.a.	150W	1.2m	secondary and neutral	GE - ERS10C3E1140Axxx - 143W

2271323	n.a.	150W	1.2m	secondary and neutral	GE - ERS10C3E1140Axxx - 143W
1209338	205 155	150W	1.2m	secondary and neutral	GE - ERS10C3E1140Axxx - 143W
2320354	n.a.	150W	1.2m	secondary and neutral	GE - ERS10C3E1140Axxx - 143W
149827	049 142	150W	1.2m	neutral	GE - ERS10C3E1140Axxx - 143W
149826	020 142	150W	1.2m	secondary and neutral	GE - ERS10C3E1140Axxx - 143W
2255701	n.a.	150W	1.2m	secondary and neutral	GE - ERS10C3E1140Axxx - 143W
2502773	n.a.	150W	1.2m	secondary and neutral	GE - ERS10C3E1140Axxx - 143W
144105	344 143	150W	1.2m	secondary and neutral	GE - ERS10C3E1140Axxx - 143W
2478669	n.a.	150W	1.2m	secondary and neutral	GE - ERS10C3E1140Axxx - 143W
2361362	n.a.	150W	1.2m	secondary and neutral	GE - ERS10C3E1140Axxx - 143W
NO 7 ROAD					
2119069	710 154	150W	1.2m	secondary and neutral	GE - ERS10C3E1140Axxx - 143W
9088962	763 153	150W	1.2m	secondary and neutral	GE - ERS10C3E1140Axxx - 143W
144061	264 139	150W	1.2m	secondary and neutral	GE - ERS10C3E1140Axxx - 143W
2183411	881 153	150W	1.2m	secondary and neutral	GE - ERS10C3E1140Axxx - 143W
1186013	930 154	150W	1.2m	secondary and neutral	GE - ERS10C3E1140Axxx - 143W
144052	207 140	150W	1.2m	secondary and neutral	LRL-NXT-48S-0-7-2ES-6-GY-3-UL-X-2H - 92W
144050	183 140	150W	1.2m	secondary and neutral	LRL-NXT-48S-0-7-2ES-6-GY-3-UL-X-2H - 92W
1185643	087 153	150W	1.2m	none	LRL-NXT-48S-0-7-2ES-6-GY-3-UL-X-2H - 92W
144045	141 141	150W	1.2m	none	LRL-NXT-48S-0-7-2ES-6-GY-3-UL-X-2H - 92W
2221325	215 154	150W	1.2m	none	LRL-NXT-48S-0-7-2ES-6-GY-3-UL-X-2H - 92W
2397169	n.a.	150W	1.2m	secondary and neutral	LRL-NXT-48S-0-7-2ES-6-GY-3-UL-X-2H - 92W
2402545	n.a.	150W	1.2m	secondary and neutral	LRL-NXT-48S-0-7-2ES-6-GY-3-UL-X-2H - 92W
240765	n.a.	150W	1.2m	secondary and neutral	LRL-NXT-48S-0-7-2ES-6-GY-3-UL-X-2H - 92W
2295153	n.a.	150W	1.2m	secondary and neutral	LRL-NXT-48S-0-7-2ES-6-GY-3-UL-X-2H - 92W
2300590	n.a.	150W	1.2m	secondary and neutral	LRL-NXT-48S-0-7-2ES-6-GY-3-UL-X-2H - 92W
2350614	n.a.	150W	1.2m	secondary and	LRL-NXT-48S-0-7-2ES-6-GY-3-

				neutral	UL-X-2H - 92W
138622	372 143	150W	1.2m	secondary and neutral	LRL-NXT-48S-0-7-2ES-6-GY-3-UL-X-2H - 92W
1247550	666 154	150W	1.2m	secondary and neutral	LRL-NXT-48S-0-7-2ES-6-GY-3-UL-X-2H - 92W
138616	343 143	150W	1.2m	secondary and neutral	LRL-NXT-48S-0-7-2ES-6-GY-3-UL-X-2H - 92W
1245152	752 155	150W	1.2m	secondary and neutral	LRL-NXT-48S-0-7-2ES-6-GY-3-UL-X-2H - 92W
138610	312 143	150W	1.2m	secondary and neutral	LRL-NXT-48S-0-7-2ES-6-GY-3-UL-X-2H - 92W
138607	295 144	150W	1.2m	secondary and neutral	LRL-NXT-48S-0-7-2ES-6-GY-3-UL-X-2H - 92W
138600	273 143	150W	1.2m	secondary and neutral	LRL-NXT-48S-0-7-2ES-6-GY-3-UL-X-2H - 92W
2402544	n.a.	150W	1.2m	none	LRL-NXT-48S-0-7-2ES-6-GY-3-UL-X-2H - 92W
2413478	n.a.	150W	1.2m	secondary and neutral	Philips - SVM-90W48LED4 K-R-LE2 - 103W
2340903	n.a.	150W	1.2m	secondary and neutral	Philips - SVM-90W48LED4 K-R-LE2 - 103W
138590	197 144	150W	1.2m	secondary and neutral	Philips - SVM-90W48LED4 K-R-LE2 - 103W
2360207	n.a.	150W	1.2m	secondary and neutral	Philips - SVM-90W48LED4 K-R-LE2 - 103W
2413559	n.a.	150W	1.2m	secondary and neutral	Philips - SVM-90W48LED4 K-R-LE2 - 103W
138579	157 149	150W	1.2m	secondary and neutral	Philips - SVM-90W48LED4 K-R-LE2 - 103W
NO 8 ROAD					
138551	133 142	150W	1.2m	secondary and neutral	Philips - SVM-90W48LED4 K-R-LE2 - 103W
2024031	373 175	150W	1.2m	none	Philips - SVM-90W48LED4 K-R-LE2 - 103W
2394651	n.a.	150W	1.2m	none	Philips - SVM-90W48LED4 K-R-LE2 - 103W
2415583	n.a.	150W	1.2m	none	Philips - SVM-90W48LED4 K-R-LE2 - 103W
2106486	n.a.	150W	1.2m	none	Philips - SVM-90W48LED4 K-R-LE2 - 103W
2106482	606 169	150W	1.2m	secondary and neutral	Philips - SVM-90W48LED4 K-R-LE2 - 103W
2423389	n.a.	150W	1.2m	secondary and neutral	Philips - SVM-90W48LED4 K-R-LE2 - 103W
2459409	n.a.	150W	1.2m	none	Philips - SVM-90W48LED4 K-R-LE2 - 103W
134369	363 143	150W	1.2m	none	Philips - SVM-90W48LED4 K-R-LE2 - 103W
134368	345 144	150W	1.2m	none	Philips - SVM-90W48LED4 K-R-LE2 - 103W
2384437	n.a.	150W	1.2m	none	Philips - SVM-90W48LED4 K-R-LE2 - 103W

134366	313 143	150W	1.2m	none	Philips - SVM-90W48LED4 K-R-LE2 - 103W
134365	298 144	150W	1.2m	secondary and neutral	Philips - SVM-90W48LED4 K-R-LE2 - 103W
2410217	n.a.	150W	1.2m	secondary and neutral	Philips - SVM-90W48LED4 K-R-LE2 - 103W
NELSON ROAD					

Location 4 pole information:

Pole ID	Pole XY (if applicable)	Existing Lights (arm length, wattage)	Secondary? Neutral?	Vendor and model #
7th AVE				
2104109	162 958	2.4m, 100W	secondary and neutral	LRL-NXT-24S-0-7-2ES-4-GY-3-UL-X-2H - 35W
2385153	n.a.	4.8m, 100W	secondary and neutral	LRL-NXT-24S-0-7-2ES-4-GY-3-UL-X-2H - 35W
2466447	n.a.	4.8m, 100W	secondary and neutral	LRL-NXT-24S-0-7-2ES-4-GY-3-UL-X-2H - 35W
2193085	315 958	2.4m, 150W	secondary and neutral	LRL-NXT-24S-0-7-2ES-4-GY-3-UL-X-2H - 35W
1184437	359 958	4.8m, 100W	secondary and neutral	LRL-NXT-24S-0-7-2ES-4-GY-3-UL-X-2H - 35W
207376	080 568	4.8m, 100W	secondary and neutral	Philips -SVS-35W16LED4 K-T LE2- 36W
2188629	428 957	4.8m, 100W	secondary and neutral	Philips -SVS-35W16LED4 K-T LE2- 36W
207335	047 568	4.8m, 100W	secondary and neutral	Philips -SVS-35W16LED4 K-T LE2- 36W
2183974	535 956	4.8m, 100W	secondary and neutral	Philips -SVS-35W16LED4 K-T LE2- 36W
2466688	n.a.	4.8m, 100W	secondary and neutral	Philips -SVS-35W16LED4 K-T LE2- 36W
3rd AVE				

LED Street Lights in Haida Gwaii

1.0 Introduction

BC Hydro is evaluating light emitting diode (LED) luminaires as an improvement upon high pressure sodium (HPS) luminaires for roadway lighting on distribution poles. In the last few years, several municipalities in B.C. have initiated pilot projects to assess this technology – see images below for a comparison. The local governments of Haida Gwaii have met with BC Hydro about conducting a pilot project to install LED luminaires on BC Hydro poles.

Distribution Standards will conduct a pilot project in Haida Gwaii to evaluate the performance of LED luminaires based on metrics described in this plan. This work will supplement the results of Field Trial 2014-004 R0. LED luminaires will be assessed according to 440-0001 Specification for LED Roadway Luminaires.



High pressure sodium streetlights (left) that have been replaced with light emitting diodes (right).

2.0 Ratings and Equipment Features

For information on ratings and equipment features, refer to 440-0001 Specification for LED Roadway Luminaires. Manufacturers' products will be selected from the pre-approved list provided by the provincial Corporate Supply Arrangement (CSA). The wattage shall be determined based on the current road classification and the existing

wattage of the HPS luminaire. Luminaires with colour temperatures of 3000K and 4000K will be tested in this trial.

3.0 Roles and Responsibilities

Several departments in BC Hydro are involved in the pilot project, with roles and responsibilities as follows:

- Customer Service is the project sponsor, and responsible for pilot funding.
- Asset Investment Management is responsible for the potential roll out of LED street lights after the pilot if results are favourable and a new streetlight standard can be established.
- Program and Contract Management (PCM) will manage the work orders and charge codes used by project team including resources to implement the pilot.
- Distribution Design will create the DAD drawings and issue the work orders for the installation of the luminaires. Distribution Design will update the streetlight asset data in DAD, including the wattage and luminaire type.
- Distribution Standards (DS) will develop the technical requirements of the Field Trial Plan. Distribution Standards will also develop new standards for LED streetlight luminaires and photocells if the pilot is deemed to be successful. Distribution Standards will select the units to install for the pilot in consultation with Conservation Energy Management Engineering.
- Field Operations is responsible for equipment installation. LED unit outages reported through the Street Light Information Management (SLIM) system by the municipalities will be addressed by Field Operations.
- Key Accounts Management will lead discussions with the local governments of Haida Gwaii in achieving consensus on locations where LED streetlights will be installed and an agreement to share information from the pilot.
- Conservation Energy Management Engineering (CEME) will provide technical input for the LED products being proposed for the test. They will also provide advice on industry LED trends and standards and the specifications developed for the provincial Corporate Supply Arrangement (CSA).
- Procurement will purchase the street light units based on the makes, models and qualities specified by Distribution Standards.

4.0 Trial Locations & Applications

The proposed locations for LED field trials at BC Hydro are as follows:

Location	Pole ID	HPS Wattage	Lens Type	Arm Length	Road Classification
Port Clements					
Par Street - by Entrance to school	0826578	100W	unknown	2.4m	high traffic area
Bayview Drive – by May Avenue	2432120	150W	unknown	4.8m	low lying area of town
Dyson – by corner to highway	2295558	100W	unknown	2.4m	low light area
Cedar Ave E & Grouse	2464643	100W	drop	2.4m	near highway
Adams Ave	0826416	100W	unknown	2.4m	across highway
Tingley Street near Bayview Market	2011933	100W	unknown	2.4m	high traffic area
254 Bayview	0826713	100W	unknown	4.8m	unknown
Queen Charlotte City					
11th Street & 2nd Ave	0825647	100W	unknown	2.4m	unknown
7th Street & Oceanview Drive	1180674	100W	drop	1.2m	unknown
4th Street & 2nd Ave	0825318	100W	unknown	2.4m	unknown
2nd Ave By Clinic/Hydro Building	9000275	100W	unknown	2.4m	unknown
Ball Field/Bay Street	2509782	100W	unknown	1.2m	unknown
Boat Launch	2403143	100W	unknown	unknown	unknown
Village of Masset					
2143 Collison Ave @ Tahayhen	2508684	150W	unknown	2.4m	unknown
Hwy 16 @ Causeway	0826051	150W	unknown	2.4m	unknown
1960 Widgeon Blvd	0826119	100W	drop	2.4m	unknown
Trumpeter Dr	0826089	100W	unknown	2.4m	unknown
1180 Burgess Ave @ Hwy 16	2030854	100W	unknown	2.4m	unknown
2016 Hemlock Cres	0826274	100W	unknown	2.4m	unknown
Skidegate					
Road across from Skaadga Naay	2413454	100W	unknown	2.4m	unknown
Road across from Skidegate Daycare	2094235	100W	unknown	2.4m	unknown
Skidegate Heights Hill	2074226	100W	unknown	2.4m	unknown
Skidegate Heights Hill (close to stop sign)	2081946	100W	unknown	2.4m	unknown
Highway 16 across from Gwaii Co-op	075 131	100W	unknown	4.8m	unknown
Skidegate Community Hall	2189349	100W	unknown	2.4m	unknown
Across from George Brown Rec Centre	2236257	100W	unknown	1.2m	unknown

5.0 Procedure for Field Trial of LED Street Lights

5.1 Pre-Installation

Prior to installation, the preparations that team members must make are as follows:

- Distribution Standards and Conservation Energy Management Engineering will evaluate and select LED luminaires for installation.

- Distribution Design will create the designs and work orders for Field Operations.
- PCM will oversee work orders and charge codes for the materials and the expected labour to implement the pilot work. All outages and repairs shall be addressed using specific charge codes to this project.
- Key Accounts Management will liaise with Haida Gwaii and ensure agreement on the proposed locations is achieved in advance of the start of the pilot.
- Conservation Energy Management Engineering will provide technical input and support for selection of LEDs and during the evaluation.
- Procurement will communicate with vendors and order the LED units as specified by DS.

5.2 Installation

Field Operations will perform the installation on site, as follows:

1. Disconnect HPS luminaires from the power source.
2. Remove the HPS luminaires and scrap them. Keep the photocell from the HPS and reuse it on the LED luminaire.
3. Install the LED luminaire on the same mounting arm (subject to change during evaluation, depending on the arm length on the pole).
4. Complete the power supply wiring.
5. Update the arm length, unit wattage and street light type (LED) in Spatial Asset Management at each LED street light location.

6.0 Expected Outcomes

In order for the LED luminaires to become an approved product, Distribution Standards will be evaluating the expected outcomes of the trial installations based on:

- 1) Meeting the requirements set by the Specification for LED Roadway Luminaires (Spec. No. 440-0001).
- 2) LED performance compared to HPS luminaires.
- 3) Field measurements to evaluate light quality of LED and HPS luminaires, specifically:
 - a. illumination level
 - b. light uniformity
 - c. colour temperature (3000K and 4000K)
 - d. visibility under foggy/ rain weather with different color temperature (3000K and 4000K)
 - e. flicker
 - f. glare
 - g. light trespass.
- 4) Laboratory measurements, specifically:

- a. Power quality impacts of LED luminaires including harmonics
- b. Power consumption of LED luminaires
- 5) Crew feedback regarding:
 - a. Ease of installation
 - b. Ease of cleaning the luminaire and replacing the components
 - c. Build-up of dirt/debris and corrosion on the luminaire
- 6) Feedback from local communities.
- 7) The number of luminaires that break, burn out, or fail.

The measurements from the Haida Gwaii field trial will supplement data from Field Trial 2014-004 R0, and field or laboratory measurements will not be duplicated.

Lighting measurements will be conducted using equipment provided by Conservation Energy Management Engineering. Power quality and consumption measurements will be conducted using equipment provided by Distribution Standards' Power Quality group.

Field measurements will be conducted where safe, practical and if required to supplement information from other field trials. For locations where field measurements are not safe and practical, the light quality characteristics described above will be measured in a laboratory environment.

After a full year of operation, the LED luminaires that were installed may remain in service or be taken down. This will be a decision made at that time by the project team.

7.0 Definition of Success

Success of this field trial will be seen through successful achievement of the expected outcomes. In particular, the project team would find that:

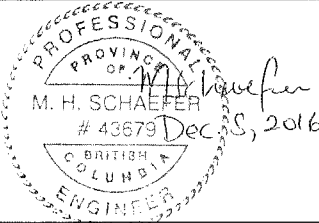


- LED street lights show an improved performance as compared to HPS based on field and laboratory measurements and crew feedback,
- LED street light products are approved for use on the distribution system.

For those items that were not successful, they will be assessed as to how they might be modified in order to be fit for use, or whether another means to achieve the same result.

8.0 Distribution Standards Contact

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9.0 Approval

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Table of Contents

Disclaimer	3
1.0 Executive Summary	4
2.0 Scope	4
3.0 Issue Definition	4
3.1 Background and Context.....	4
3.2 Opportunity	4
4.0 Basic Considerations	5
4.1 HPS Luminaires in use at BC Hydro.....	5
4.2 Hazardous Substances	5
4.3 Light Distribution	6
4.4 Energy Efficiency	7
4.5 Correlated Colour Temperature.....	7
4.6 Glare	9
4.7 Uniformity.....	10
4.8 Light Pollution and Light Trespass	10
4.9 Drive Current.....	11
4.10 Electromagnetic Compatibility.....	11
4.11 Surge Protection	12
4.12 Street Light Controls	12
4.13 Maintenance	13
4.14 Lessons Learned from North American Utilities and Municipalities	14
4.15 Safety by Design	14
5.0 Field Trial Data	14
5.1 Trial Locations.....	14
5.2 Trial Luminaires	15
5.3 Lighting Measurements	16
5.4 Lighting Simulations	17

5.5	Power Quality Measurements	18
5.6	Energy Consumption.....	20
5.7	Starting Current.....	22
5.8	Thermal Management	23
5.9	Crew Feedback	24
5.10	Customer Feedback	26
5.11	Luminaire Failures	29
5.12	Field Trial Conclusion	29
6.0	Recommendations.....	30
7.0	Approval	30
8.0	Works Cited.....	31
	Annex A: Adaptive Street Lighting Controls Evaluation	32

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1.0 Executive Summary

BC Hydro owns and maintains approximately 90,000 streetlights. The majority of streetlights use high pressure sodium (HPS) technology, though there are some older mercury vapour luminaires still in service. The rate for service of these streetlights is covered by Rate Schedule 1701.

Over the past decade, light emitting diode (LED) luminaires for street lighting have become more cost competitive with the traditional technology. Several BC municipalities have begun to transition their streetlights to LED luminaires under Rate Schedule 1702 (customer owned streetlights). Municipalities are increasingly interested in implementing LED streetlights because of the projected energy savings and reduced maintenance.

To evaluate this technology for implementation at BC Hydro, LED luminaires were installed as a one year field trial and in service April 2016 in the City of Richmond. The results of the field trial were favourable and the evaluation offered improvements to the product specification for LED luminaires and photocontrols.

2.0 Scope

This report presents factors for consideration for the implementation of LED streetlights at BC Hydro; the results of the pilot project; alternatives for street lighting, and recommendations for the implementation of LED streetlights.

This report briefly discusses adaptive controls for streetlights. A field trial of adaptive control technologies was run in parallel with the LED luminaire field trial. The results of the adaptive controls field trial are attached in Annex A.

3.0 Issue Definition

3.1 Background and Context

Various wattages for HPS streetlights are provided at the request of the customer (for example, a municipality). The customer may also prescribe a flat glass lens or drop refractor that determines the lighting pattern. To support the conversion to LED streetlights, BC Hydro must provide LED options that meet or exceed the performance of the current HPS luminaires and accommodate the necessary lighting scenarios.

Lighting design requirements are provided in IES RP-8-14 *Roadway Lighting*. The design standard provides luminance and uniformity requirements. These requirements are determined by the roadway classification and the pedestrian traffic level. Historically, the overhead distribution system has been designed to deliver only electrical energy and not provide structures for roadway lighting. As a result, luminaires on BC Hydro owned and joint use distribution poles may not provide ideal roadway lighting characteristics due to unfavorable pole spacing or luminaire mounting heights. BC Hydro does not guarantee that IES RP-8-14 requirements are met.

3.2 Opportunity

Implementation of LED luminaires is expected to provide the following benefits:

1. Reduce operations, maintenance, and administration (OMA) costs as LED luminaires do not need to be replaced as frequently as HPS luminaires.
2. Contribute to energy conservation as LED luminaires use less energy than HPS luminaires.
3. Improve the lighting options available to municipalities to support public safety.
4. Improve the lighting design to reduce light pollution and light trespass.

4.0 Basic Considerations

There are a number of factors to be considered for successful implementation of LED streetlights.

4.1 HPS Luminaires in use at BC Hydro

BC Hydro stocks the following HPS luminaires.

Table 1: HPS Luminaires in Use at BC Hydro

Cat. ID	Spec. Wattage	Lumens	Refractor	Lateral Distribution	Transverse Distribution	Cutoff
440-0390	100	9500	Drop polycarbonate	Medium	Type II	Semi-cutoff
440-0391	150	16000	Drop polycarbonate	Medium	Type II	Semi-cutoff
440-0393	200	21000	Drop glass	Medium	Type III	Semi-cutoff
440-0388	100	9500	Flat glass	Medium	Type II	Cutoff
440-0387	150	16000	Flat glass	Medium	Type II	Cutoff
440-0389	200	21000	Flat glass	Medium	Type III	Cutoff
440-0396	100	9500	Acrylic, open-bottom, prismatic	Medium	Type V	Not specified
440-0397	150	16000	Acrylic, open-bottom, prismatic	Medium	Type V	Not specified

The Type V HPS luminaires are not included in the ES43 standards, and are not used for new installations.

4.2 Hazardous Substances

Earlier generations of HPS luminaires contain PCB-contaminated oil. These luminaires shall be replaced as per the federal PCB regulation deadline.

HPS lamps contain mercury, a restricted substance. As the lamps contain low levels of mercury, the only requirement is that they be marked “mercury contained in manufactured articles”. HPS lamps are not considered hazardous waste when they reach end of life.

LED luminaires do not contain restricted substances and shall be RoHS compliant.

4.3 Light Distribution

BC Hydro currently uses the light distribution classifications from IES RP-8 Annex E for HPS luminaires. This classification includes three characteristics:

1. Lateral light distribution
 - The lateral light distribution can be classified as short, medium or long. These define the typical maximum luminaire spacing as a factor of the mounting height.
2. Transverse light distribution
 - The transverse light distribution is broken down into five categories. Type I and Type V are when the luminaire is near the centre of the light distribution area. Type II, Type III and Type IV are when the luminaire is near the side of the light distribution area.
3. Light distribution above the horizontal for glare control
 - Luminaires may be classified as full cutoff, cutoff, semi-cutoff, or non-cutoff.
 - Full cutoff luminaires have no upward light.
 - Cutoff luminaires direct 0% to 20% of lumens upwards.
 - Semi-cutoff luminaires direct 0% to 40% of lumens upwards.
 - Non-cutoff luminaires have no limitation on upward lumens.

In 2011, the IES replaced these categories with the Luminaire Classification System defined in IES TM-15. This change was due to increased concern among municipalities regarding nuisance light. The new system provides more comprehensive data to evaluate the light distribution of a luminaire.

The Luminaire Classification System defines the distribution of light within three primary angles as shown in Figure 1.

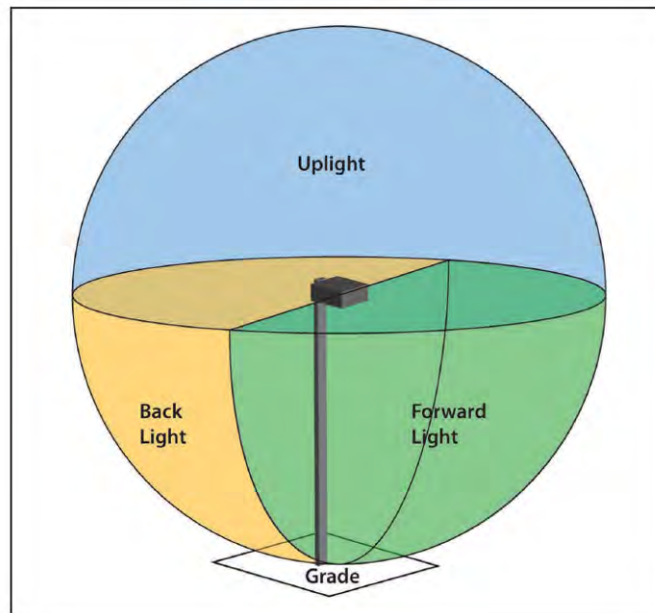


Figure 1: Primary Angles of Light Distribution (IES RP-8)

Under the new classification, the lighting distribution is given by Backlight, Uplight and Glare (BUG) ratings. The rating scheme provides maximum lumen thresholds for secondary angles within the primary angles (back, up or forward light).

The Luminaire Classification System replaces the cutoff classification, and is used with the lateral light distribution classification (short, medium, long) and transverse light distribution classification (Types I, II, III, IV and V).

4.4 Energy Efficiency

LED luminaires have the potential to significantly reduce energy consumption for streetlights. The specified wattage of LED luminaires can be 43% to 73% less than the existing HPS luminaire, based on the results of the field trial.

LED luminaires can be dimmed to achieve lower light levels. By implementing adaptive controls, LED luminaires can be programmed to dim during hours when pedestrian traffic is low.

4.5 Correlated Colour Temperature

The correlated colour temperature (CCT) is a metric for the colour appearance of the light emitted from a luminaire. Lower CCT luminaires appear warmer, such as an HPS luminaire with a CCT of 1900K to 2100K. Higher CCT luminaires appear cooler. LED luminaires are commonly available with a CCT of 3000K to 5000K.

4.5.1 CCT Impact on Humans and the Environment

Luminaires with a higher correlated colour temperature produce a broad spectrum of light characterized by the white colour. HPS luminaires give off a narrower spectrum of light that is characterized by the orange colour. Organisms vary in their sensitivity to different light spectrums. Therefore, a narrower light spectrum is likely to have a lesser impact (Gaston, Davies, Bennie & Hookins, 2012).

Daylight can be characterized by a high content of blue and ultraviolet light. Many organisms are particularly sensitive to blue light as day length is used to regulate the circadian rhythm and trigger seasonal changes (Gaston, Davies, Bennie & Hookins, 2012).

The American Medical Association released a report in June 2016 and adopted a policy consisting of the following statements:

- The AMA supports the proper conversion to community-based LED lighting, which reduces energy consumption and decreased the use of fossil fuels.
- The AMA encourages minimizing and controlling blue-rich environmental lighting by using the lowest emission of blue light possible to reduce glare.
- The AMA encourages the use of 3000K or lower lighting for outdoor installations such as roadways. All LED lighting should be properly shielded to minimize glare and detrimental human and environmental effects, and consideration should be given to utilize the ability of LED lighting to be dimmed for off-peak time periods.

It is recommended that BC Hydro offer LED luminaire s with a correlated colour temperature of 3000K and 4000K with the final selection to be determined by the municipal customer.

4.5.2 CCT Impact on Colour Rendering

The colour rendering index indicates how effective a light source is at rendering the colour of an object compared to a reference light source. A higher colour rendering index improves visibility and improves people's ability to distinguish objects. Research has shown that a light source with a higher CCT will improve the colour rendering index (Jin, Jin, Chen, Cen & Yuan, 2015).

4.5.3 CCT Impact on Light Transmission

The wavelength of light determines how the light will scatter as it travels through fog and air pollution. Rayleigh scattering describes the scattering of light as it travels through gases which contain particles that are smaller than the wavelength of the light. This occurs when light travels through fog. Rayleigh scattering is inversely proportional to the fourth power of the light wavelength, so luminaires with a higher CCT will scatter light more than luminaires with a lower CCT.

Mie scattering describes the scattering of light due to particles that are larger than the wavelength of light and is inversely proportional to the light wavelength. Mie scattering occurs when light travels through heavy air pollution.

Atmospheric conditions impact light transmission. Rayleigh and Mie scattering reduce the amount of light illuminating the roadway, as light is reflected off particles in the air. Rayleigh and Mie scattering also increase sky glow (Jin, Jin, Chen, Cen & Yuan, 2015).

A recent study (Pacific Northwest National Laboratory, 2017) determined the impact of several factors on sky glow, including light output, light distribution (percent uplight), atmospheric conditions, and correlated colour temperature. Eliminating uplight and reducing the light output have a significant impact on reducing sky glow. When compared to an HPS base scenario, all LED luminaires reduced sky glow to the distant observer (40 km from city limits), and LED luminaires 3000K and under reduce sky glow to the near observer (at city limits) when considering scotopic light (visible to humans).

When considering the full light spectrum, all LED luminaires considered reduce sky glows to the near observer.

4.5.4 CCT Impact on Efficiency

To achieve different correlated colour temperatures from an LED, a phosphor coating is applied (CEATI, 2010). The coating reduces the light output of the LED; therefore, LED luminaires with a higher CCT are more efficient. For early LED luminaires, a change from 4000K to 3000K would result in a 25% reduction in efficiency (Pacific Northwest National Laboratory, 2017). Initially, manufacturers produced LED luminaires with higher CCTs to maximize the energy efficiency; however, demand has increased for lower CCT products. Efficiency of lower CCT products has increased due to improved phosphor materials and alternative methods for controlling the CCT output. A change from 4000K to 3000K in current products would result in a 0% to 8% reduction in efficiency.

4.6 Glare

Glare is categorized into discomfort glare and disability glare by IES RP-8. Disability glare results in reduced visibility. Discomfort glare results in annoyance or pain due to high contrast of light in the field of view. Though efforts can be made to minimize glare, the impacts of glare are often subjective. Furthermore, sensitivity to glare varies, particularly with age. Typically, higher colour temperatures result in a higher perception of discomfort glare.

Vertical illuminance measured at the eye from the glare source increases discomfort glare (Lin, Liu, Sun, Zhu, Lai & Heyndericks, 2014). The vertical illuminance is affected by the viewing angle. By limiting the light distribution of a luminaire above a certain angle, the vertical illuminance can be reduced. The Luminaire Classification System defined in IES TM-15 provides an evaluation for glare by defining the amount of forward high angle light (60° to 80° from vertical) and forward very high angle light (80° to 90° from vertical).

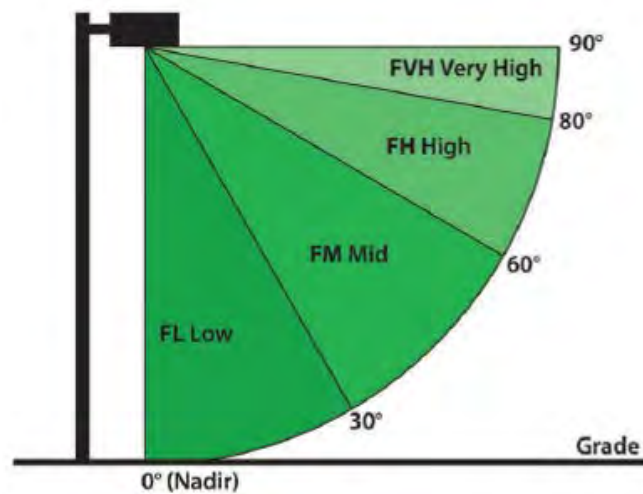


Figure 2: Secondary Angles of Forward Light (IES RP-8)

It should be noted that reducing the amount of light in the forward high and forward very high angles limits the lighting pattern on the street. To achieve IES RP-8 lighting requirements, shorter pole spacing may be required.

4.7 Uniformity

Uniformity is determined by a ratio of the average illumination value of an area to the minimum illumination value. IES RP-8 provides maximum uniformity ratios for lighting installations.

Generally, LED luminaires provide a more even lighting distribution than HPS luminaires, which results in a lower uniformity ratio. However, the lighting distribution of an LED luminaire has a sharp cut off, whereas HPS luminaires display a more gradual cut off. LED luminaires may have a noticeable pattern of light and dark between fixtures when the pole spacing exceeds the range of the luminaire.

4.8 Light Pollution and Light Trespass

Light pollution impacts the public and the environment. The lighting design shall limit excess light and prevent light trespass to reduce the negative impacts of street lighting.

Lighting trespass from streetlights into private homes can be an annoyance to the public. Typical lighting scenarios do not require any backlight; however, in some instances the streetlight pole may be installed between the sidewalk and the roadway, and some backlight is required as determined by the municipality. BC Hydro shall offer luminaires with limited backlight when required, and minimize backlight if not required. It is important to consider light trespass in order to reduce customer complaints.

Research suggests that many other organisms are more sensitive to artificial lights than humans. Light is important to organisms as an energy source and an information source (Gaston, Davies, Bennie & Hookins, 2012). Patterns of light and dark are used to regulate the circadian rhythm of animals, control animal behavior and determine day length (and thus trigger seasonal events). Light also provides a means of navigation.

The impact of artificial light on these factors is dependent on the light wavelength and the intensity of the light. The impact to different organisms varies widely, due to the mobility of the organism and the sensitivity of the organism.

The most effective method for limiting the impact to the environment is to maintain natural unlit areas; however, this competes with objectives for public safety. Furthermore, illumination from sky glow is still an issue even tens of kilometers from urban light sources. Impacts to the environment can be managed by reducing light trespass. These factors have led to the establishment of International Dark Sky Places. However, there are many areas that are protected for ecological conservation, but are still affected by light pollution. A recent study has shown that typical conversions from HPS to LED luminaires will reduce sky glow in the surrounding area of the light source (Pacific Northwest National Laboratory, 2017).

Selection of LED luminaires shall consider these factors:

- Only luminaires that demonstrate an up light rating of 0% shall be approved;
- Luminaires shall limit back light;
- Luminaires shall be compatible with shielding devices for sensitive areas, and
- Luminaires shall be selected which meet the average illumination and uniformity requirements of IES RP-8, and limit maximum illumination.

4.9 Drive Current

The efficacy of LED luminaires decreases as temperature rises due to energy lost through heat. The efficacy is defined by the ratio of the light output (lumens) to the energy consumption (watts). The heat losses are determined by I^2R and can be limited by reducing the drive current for the LED circuit. Increasing the operating temperature also increases the rate of light loss of the luminaire (CEATI, 2010).

Manufacturers can maximize the dollar per light output by increasing the drive current of the luminaire. However, this reduces the efficacy of the luminaire and degrades the performance of the luminaire over time.

The drive current value shall be considered through the trial as an indication of efficacy and design life of the luminaire.

4.10 Electromagnetic Compatibility

CSA has adopted IEC electromagnetic compatibility standards. These standards provide requirements for equipment immunity to disturbances on the power system and emission limits for equipment. All LED luminaires shall meet CSA immunity requirements to ensure the expected lifetime.

Currently, CSA standards do not provide emission limits for harmonic currents injected into the public power system. However, BC Hydro can specify limits based on IEC 61000-3-2 *Limits for Harmonic Current Emissions (Equipment Input Current ≤ 16 A per Phase)*. LED luminaires are expected to produce current harmonics as a result of the non-linear load of the driver. Due to the high penetration of LED luminaires expected on the distribution system, current harmonics produced by LED luminaires shall be evaluated during the field trial.

4.11 Surge Protection

LED luminaires shall include surge protection. BC Hydro Specification 440-0001 R1 requires that luminaires be able to withstand Category C High as per ANSI/IEEE C62.41.2.

Overvoltage is caused by lighting, switching, system conditions (such as ferroresonance, voltage unbalance, or voltage regulation), or faults. Surge arresters are selected based on the operating voltage, expected overvoltage magnitude and duration, and insulation of equipment to be protected.

4.12 Street Light Controls

Currently, BC Hydro installs a photocontrol on each luminaire. The photocontrol triggers the operation of the streetlight by turning the luminaire on and off at dusk and dawn. BC Hydro uses a fail-on photocontrol; if the control fails it becomes a short circuit and the luminaire will remain on.

The current photocontrol uses three pins as defined in ANSI C136.10 *Standard for Roadway and Area Lighting Equipment – Locking-Type Photocontrol Devices and Mating Receptacles – Physical and Electrical Interchangeability and Testing*. Five-pin controls allow for dimming of the light output. Seven-pin controls allow for connection of other devices such as motion sensors or a camera. To enable future applications of controls, it is recommended that BC Hydro purchase LED luminaires with seven pin receptacles. No cost difference is expected between a three-pin receptacle and a seven-pin receptacle, based on the pricing provided for the British Columbia Corporate Supply Arrangement.

Adaptive controls are a growing trend for streetlights. Controls use a photo sensor to trigger operation of the luminaire and a timer may be used to dim the luminaire. More advanced control systems may use a photocontrol as a node on the luminaire, a gateway device in a local area for communication, and a central management system as a software interface. These systems will have greater capabilities. For example, dimming can be used for the following applications:

- The luminaire may be dimmed during hours of low pedestrian traffic when high lighting levels are not required. This reduces energy consumption.
- Dimming can be used to reduce the number of catalogue items required. For example, a utility would buy luminaires of the highest wattage required and reduce the light output to the level required for each location.
- Dimming can provide a more consistent light level over the lifetime of the luminaire. For example, the luminaire can be initially set to 80% of its light output. As the light level depreciates, the luminaire can be increased to 100% of its light output. As dimming reduces the drive current to the light array, it is expected that this could increase the life expectancy of the installation.

Adaptive controls that use communications have additional benefits for asset management and operations. Controls can monitor for failed streetlights to support maintenance operations. Currently, BC Hydro relies on a customer to notify us of a failed luminaire.

Adaptive controls can monitor energy consumption to support billing. Controls can monitor power characteristics to support the operation of the distribution system. BC

Hydro Smart Metering Infrastructure and Operations is investigating photocontrols with a range extender to support the smart metering mesh network. Added sensors can be used to support traffic engineering for municipalities.

BC Hydro conducted a pilot project of five advanced street lighting control systems. The report entitled “Adaptive Street Lighting Control Evaluation” is provided in Annex A. The project investigated:

- Functionality and limitations of the central management systems;
- Accuracy of the metering;
- Interoperability between control nodes and luminaires of different vendors, and
- Process and requirements for hardware installation.

Available systems are not acceptable for revenue metering by Measurement Canada, however, revenue energy monitoring using adaptive controls is currently under evaluation. All systems use proprietary communication protocols, and implementation with existing BC Hydro systems would require significant resources. To support potential future implementation of advanced street light control systems, BC Hydro shall require seven-pin receptacles on all LED luminaires.

4.13 Maintenance

LED luminaires do not abruptly “burn out” like HPS luminaires. If an LED luminaire is allowed to burn out, it is likely that the luminaire has not provided adequate lighting levels in the time before failure. The luminaire should be replaced once the light output has depreciated below design requirements.

Specification 440-0001 R1 requires that LED luminaires have a minimum useful life of 88,000 hours (20 years at 4400 hours per year). Currently in the specification, the useful life is defined as the amount of operating time over which the LED light array will maintain 85% of its initial light output. To validate product performance, manufacturers submit test data as per IES LM-80 *Approved Method for Measuring Lumen Maintenance of LED Light Sources* and calculations as per IES TM-21 *Projecting Long Term Lumen Maintenance of LED Light Sources*.

IES LM-80 validates the performance of the light array in the luminaire; however, other components will affect the overall performance, including the housing and driver. Specification 440-0001 R1 requires that the manufacturer submits test reports for 1000 hours of salt fog testing to ASTM B117, to demonstrate the performance of the housing. A requirement for a minimum mean time between failures shall be added to demonstrate performance of the power supply.

HPS luminaires have a decal indicating their wattage under the luminaire, so the wattage can be identified by a worker from the roadway. This allows the worker to complete a like-for-like replacement of the luminaire. However, LED luminaires have a wider range of wattages that meet the same performance characteristics. Specification 440-0001 R1 requires that the manufacturer include a decal with the last four digits of the BC Hydro catalogue ID to enable like-for-like replacements.

The light output of streetlights is affected by the accumulation of dirt on the refractor or lens. The effects of dirt on lumen depreciation may be more pronounced for LED luminaires as the luminaire is in service for a longer duration without any maintenance.

4.14 Lessons Learned from North American Utilities and Municipalities

The City of Davis, California began installing 4800K LED streetlights in May 2014. Residents complained about the light trespass and brightness, so in October 2013, Davis began replacing the 4800K LED luminaires with 2700K LED luminaires. Several other municipalities, including Seattle, Washington have encountered a similar reception from residents when using luminaires with a higher correlated colour temperature. In general, 3000K LED luminaires have been better received by the public. Furthermore, 3000K LED luminaires have become more widely available from manufacturers because of increased demand.

HPS luminaires typically fail when the lamp burns out. The housing and ballast of an HPS luminaire exceed the lifetime of the lamp. However, the light array of a LED luminaire has a longer life expectancy, and the housing and driver must be designed to meet the longer life requirements. This difference has exposed a gap in industry standards for validating the performance of the driver and other components which affect the luminaire. Some utilities addressed this issue by stocking spare drivers for replacement. However, as LED luminaire and driver technology changed rapidly, the spare parts were soon obsolete. Also, manufacturers do not support interchangeability of components, and stocking spares was not practical. Manufacturers offer product warranties to address concerns of life expectancy.

4.15 Safety by Design

LED streetlights last longer than HPS streetlights and result in fewer outages. Reducing the number of outages improves public safety for pedestrians and drivers.

LED streetlights have a more controlled lighting pattern than HPS streetlights. Selecting an effective lighting pattern can reduce light trespass and reduce the amount of light that spills into private residences. This can improve sleep quality for the public.

There is a perception that effective street lighting reduces crime; however, research on this topic is not conclusive. There is also a perception among police departments that LED luminaires improve the accuracy and detail of witness reports as the colour rendering is better than compared to HPS luminaires (Scigliano, 2013).

BC Hydro provides street lights to municipalities where there are existing distribution poles. The distribution system is designed to deliver electrical energy only, and may not provide ideal roadway lighting characteristics due to unfavorable pole spacing. The municipality is responsible for conducting the lighting design and specifying the luminaire to be installed.

5.0 Field Trial Data

5.1 Trial Locations

The City of Richmond and BC Hydro determined four areas for the installation of LED streetlights. All locations had one lane traveling in each direction. None of the locations had a median. Streetlights were installed on one side of the roadway. The City of Richmond provided the roadway classification and pedestrian activity level. BC Hydro estimated the road width, sidewalk, average pole offset and average pole spacing.

Table 2: Field Trial Locations

Location	Roadway Class	Pedestrian Activity Level	Road Width	Sidewalk	Average Pole Offset	Average Pole Spacing	Mounting Height
No. 3 Rd from Steveston Hwy to Dyke Rd	Collector	Low	6.6 m	One side, 1.5 m wide no offset from road	1.0 m	45 m	9.5 m
No. 6 Rd from Westminster Hwy to Blundell Rd	Collector	Low	9.0 m	None	3.0 m	55 m	9.5 m
Westminster Hwy from No. 6 Rd to Nelson Rd	Major	Low	7.8 m	One side, 3.3 m wide, 2.3 m offset from the road	1.25 m	55 m	9.5 m
Regent St from 7 th Ave to 3 rd Ave	Local	Low	5.0 m	None	3.0 m	46 m	9.5 m

5.2 Trial Luminaires

BC Hydro provided the location information, required lighting level and existing HPS luminaires to the LED luminaire manufacturers approved under the British Columbia Corporate Supply Arrangement. The manufacturers conducted lighting simulations and recommended LED luminaire model numbers.

The luminaires installed as part of the field trial shall not be granted product approval. Subsequent iterations of the product models shall be evaluated for approval against 440-0001 R1 *Specification for LED Roadway Luminaires*. However, the performance of the luminaires was acceptable and the luminaires are to remain in service.

The following tables describe the LED luminaires used to replace HPS luminaires.

Table 3: LED Luminaires for Replacement of a 100 W HPS Luminaire

Manu.	Model Number	Spec. Wattage	Lumens	B-U-G	Lateral Distribution	Transverse Distribution
1	B	65	6100	N/A	N/A	Type II
2	A	70	7000	B2-U0-G1	Medium	Type II
3	A	35	4070	B1-U0-G1	N/A	Type II
3	B	54	5750	B2-U0-G1	N/A	Type II
4	C	35	3955	B1-U0-G1	Medium	Type II

Table 4: LED Luminaires for Replacement of a 150 W HPS Luminaire

Manu.	Model Number	Spec. Wattage	Lumens	B-U-G	Lateral Distribution	Transverse Distribution
1	C	75	7100	N/A	N/A	Type II
2	B	91	8800	B2-U0-G1	Medium	Type II

3	C	60	6720	B2-U0-G2	N/A	Type II
4	B	72	8140	B2-U0-G2	Medium	Type II

Table 5: LED Luminaires for Replacement of a 200 W HPS Luminaire

Manu.	Model Number	Spec. Wattage	Lumens	B-U-G	Lateral Distribution	Transverse Distribution
1	A	138	15685	N/A	N/A	Type II
2	C	143	14000	B3-U0-G2	Medium	Type II
3	D	92	10620	B2-U0-G2	N/A	Type II
4	A	108	10914	B2-U0-G2	Medium	Type II

5.3 Lighting Measurements

Lighting measurements were conducted at two locations: on Regent Street between pole 047 568 and pole 2183974, and on No. 6 Road between pole 2518047 and pole 2116461. The measurements were conducted for the existing HPS luminaires, and then repeated after installation of the LED luminaires. Measurements of the horizontal illuminance along the roadways were recorded from a Gigahertz-Optic P-9710 Optometer.

At Regent Street, a grid of two rows and eleven columns was used. Rows were spaced 3 m apart, and columns were spaced 4 m apart. At No. 6 Road, a grid of four rows by eleven columns was used. The rows in the southbound lane were spaced by 1.9 m, and the rows in the northbound lane were spaced by 1.8 m. The columns were spaced 5 m apart.

Table 6: Regent Street, Pole 047 568 to Pole 2183974

	HPS Luminaire Measurements	LED Luminaire Measurements	IES RP-8-14 Requirements
	100W HPS luminaire, drop refractor	35W LED luminaire, Manufacturer 4 Model C	Local, low pedestrian conflict
Minimum Illuminance (lux)	5.2	3.3	--
Maximum Illuminance (lux)	30.1	12.9	--
Average Illuminance (lux)	11.7	7.2	4.0 min
Maximum Uniformity (max/min)	5.8	3.9	10.0 max
Average Uniformity (average/min)	2.2	2.2	6.0 max

Table 7: No. 6 Road, Pole 2518047 to Pole 2116461

	HPS Luminaire Measurements	LED Luminaire Measurements	IES RP-8-14 Requirements
	150W HPS luminaire, drop refractor	72W LED luminaire, Manufacturer 4 Model B	Collector, low pedestrian conflict

Minimum Illuminance (lux)	2.0	3.8	--
Maximum Illuminance (lux)	35.0	26.8	--
Average Illuminance (lux)	13.4	8.7	4.0 min
Maximum Uniformity (max/min)	17.5	6.8	8.0 max
Average Uniformity (average/min)	6.7	3.0	4.0 max

At Regent Street, the LED and HPS luminaires met the requirements of IES RP-8. At No. 6 Road, the LED luminaires also met the requirements of IES RP-8, but the HPS luminaires exceeded the maximum allowable uniformity ratio. The measurements also demonstrated that the LED luminaires have a lower maximum illuminance.

5.4 Lighting Simulations

Site measurements were taken at the Regent Street location and the No. 6 Road location.

Table 8: Actual Construction Spacing and Details

Location	Pole Number	Pole Offset	Mounting Height	Arm Length	Separation Distance
Regent St.	047 568	5.8 m	10.7 m	4.8 m	40 m
	2183974	5.7 m	10.2 m		
No. 6 Rd.	2116461	7.4 m	8.8 m	4.8 m	50 m
	2518047	7.1 m	9.7 m	4.8 m	

The actual mounting height of the luminaires is lower than the estimated mounting height that was provided to the manufacturers to specify the luminaires (9.5 m). The actual pole spacing also deviates from what was provided to the manufacturers (45 m).

Simulations were conducted with the Acuity Visual Roadway Tool using the photometric files provided by the manufacturer. As the software tool requires that the luminaires have the same mounting details, the pole offset and mounting height were averaged.

Lighting simulations were validated by comparing to the recorded lighting measurements.

Table 9: Comparison of Measurements and Simulations at Regent Street

	Simulations	Measurements	IES RP-8-14 Requirements
	35W LED luminaire, Manufacturer 4 Model C		Local, low pedestrian conflict
Minimum Illuminance (lux)	4.2	3.3	--
Maximum Illuminance (lux)	8.9	12.9	--
Average Illuminance (lux)	6.0	7.2	4.5 min

Maximum Uniformity (max/min)	2.1	3.9	10.0 max
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Table 10: Comparison of Measurements and Simulations at No. 6 Road

	Simulation	Measurements	IES RP-8-14 Requirements
	72W LED luminaire, Manufacturer 4 Model B		Collector, low pedestrian conflict
Minimum Illuminance (lux)	5.6	3.8	--
Maximum Illuminance (lux)	24.9	26.8	--
Average Illuminance (lux)	8.1	8.7	6.0 min
Maximum Uniformity (max/min)	4.1	6.8	8.0 max
Average Uniformity (average/min)	2	3.0	4.0 max

The comparison showed that the measured values were more conservative than the simulated values. It is concluded that the simulation is an effective means for determining a lighting design.

5.5 Power Quality Measurements

Power quality data was collected using a Candura PQ Pro three-phase power quality analyzer (serial number PQPRO-00012). Each luminaire was connected to a 120VAC outlet for approximately 30 minutes.

Table 11: Power Quality Measurements

Manu.	Model	Spec Power (W)	Max Power (W)	Min Power (W)	Min Power Factor	Max Current (A)	Current THD
1	A	138	144.7	139.5	-99.92%	1.31	5.51%
1	B	65	63.27	62.28	-99.71%	0.57	6.78%
1	C	75	81.55	79.12	-99.78%	0.74	6.52%
2	A	70	66.9	65.65	99.96%	0.60	6.67%
2	B	91	92.89	89.52	99.90%	0.85	5.32%
2	C	143	139.14	136.86	-99.98%	1.26	3.58%
3	A	35	37.718	37.076	-99.19%	0.34	6.40%
3	B	54	56.32	55.17	99.54%	0.51	6.97%
3	C	60	Measurements were not conducted for this model.				
3	D	92	Measurements were not conducted for this model.				
4	A	108	107.44	106.666	99.80%	0.97	6.51%
4	B	72	74.6	71.97	99.96%	0.67	5.09%

4	C	35	37.594	36.66	99.95%	0.34	4.29%
Existing 100 W HPS		130	135.59	120.51	88.63%	1.24	16.48%
Existing 150 W HPS		1880	171.70	150.41	96.60%	1.60	14.40%

The 100W HPS luminaire is lower than the required power factor of 90%.

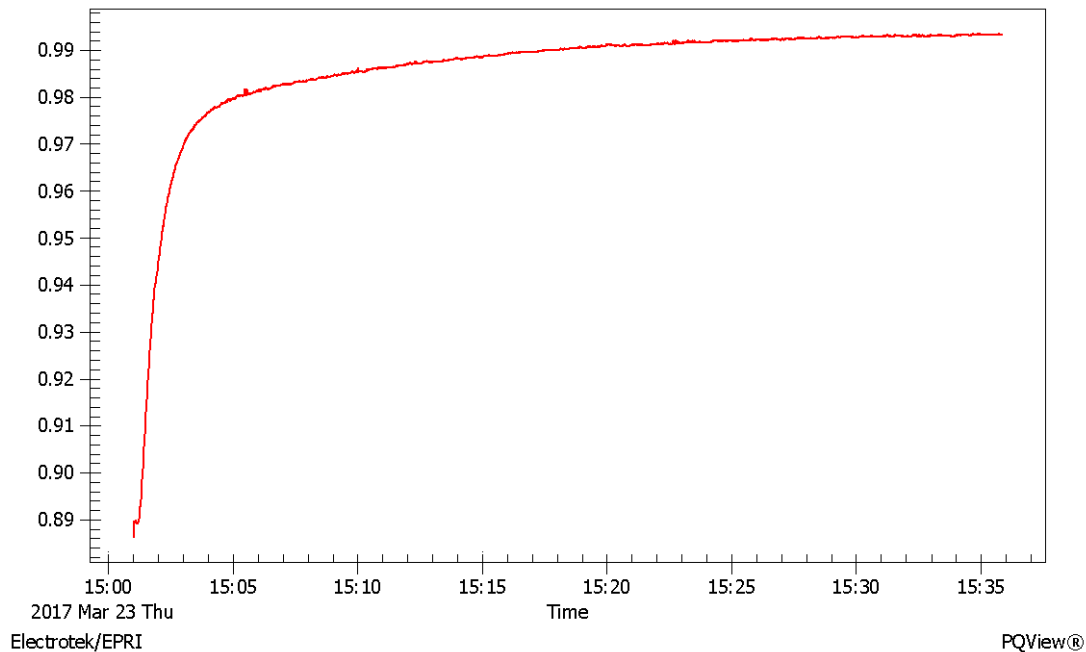


Figure 3: Recorded Power Factor for 100W HPS Luminaire

The following table compares the current harmonic content of the luminaires to the emission limits presented in IEC 61000-3-2. Note that the harmonic current as a percent of the fundamental current does not sum to the total harmonic distortion, as the moment of maximum harmonic current as a percentage of the fundamental current does not happen simultaneously. The value shown is the peak harmonic current as a percentage of the fundamental current over the full duration of measurement.

Table 12: Harmonic Current Measurements

Manu.	Model Number	Current THD	Harmonic Current as a Percent of the Fundamental Current					
			H2	H3	H5	H7	H9	Odd H11 - H39
1	A	5.51%	0.12%	3.08%	2.95%	2.50%	1.76%	1.48%
1	B	6.78%	0.16%	2.98%	3.71%	3.23%	2.32%	2.02%
1	C	6.52%	0.10%	2.24%	4.10%	3.32%	2.35%	1.75%
2	A	6.67%	0.12%	5.07%	3.45%	1.72%	1.00%	0.80%

2	B	5.32%	0.11%	2.77%	2.88%	1.72%	1.32%	0.01%
2	C	3.58%	0.14%	1.82%	2.19%	1.28%	0.85%	0.85%
3	A	6.40%	0.13%	4.57%	0.52%	0.56%	1.06%	2.33%
3	B	6.97%	1.08%	4.89%	2.62%	2.06%	1.84%	2.02%
4	A	6.51%	0.15%	1.57%	4.53%	3.10%	2.12%	1.66%
4	B	5.09%	0.14%	0.90%	3.37%	2.55%	1.79%	1.37%
4	C	4.29%	0.13%	2.52%	2.58%	1.38%	0.90%	0.77%
Existing 100 W HPS		16.48%	0.15%	16.3%	2.17%	1.10%	0.72%	0.32%
Existing 150 W HPS		14.40%	0.14%	14.3%	1.28%	1.76%	0.58%	0.41%
Maximum permissible			2.00%	27.0%	10.0%	7.00%	5.00%	3.00%

Though all luminaires meet the requirements of IEC 61000-3-2, the HPS luminaires inject significantly higher third harmonic currents into the system than the LED luminaires. This can result in higher currents circulating on the system neutral.

5.6 Energy Consumption

HPS luminaires are specified based on the lamp wattage: 100W, 150W or 200W. However, the actual consumption is approximately 130W, 188W and 240W due to losses in the ballast.

To specify the model of streetlights used in the trial, manufacturers were provided with the average pole spacing for each roadway, the standard mounting height and the overhang of the luminaire. The manufacturers used this information to simulate the lighting scenario and recommend a luminaire that met the requirements of IES RP-8, based on the roadway classification provided by the City of Richmond. The manufacturers provided a range of wattages for LED luminaires. In all cases, the specified power of the LED luminaires was significantly lower than the specified wattage of the HPS luminaires.

Along No. 6 Road, 150 W HPS luminaires were replaced with the following:

Table 13: Approximate Energy Savings at No. 6 Road

Manufacturer	Model	Spec. Wattage	Energy Savings
1	C	75	60%
2	B	91	52%
3	C	60	68%
4	B	72	62%

Along Regent Street, 100 W HPS luminaires were replaced with the following:

Table 14: Approximate Energy Savings at Regent Street

Manufacturer	Model	Spec. Wattage	Energy Savings
3	A	35	73%

4	C	35	73%
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The field trial installed new luminaires along No. 3 Road. The LED luminaires were specified to replace a 100 W HPS luminaire.

Table 15: Approximate Energy Savings at No. 3 Road

Manufacturer	Model	Spec. Wattage	Energy Savings
1	B	65	50%
2	A	70	46%
3	B	54	58%
4	C	35	73%

The field trial installed new luminaires along Westminster Highway. The LED luminaires were specified to replace a 200 W HPS luminaire.

Table 16: Approximate Energy Savings at Westminster Highway

Manufacturer	Model	Spec. Wattage	Energy Savings
1	A	138	43%
GE	C	143	40%
3	D	92	62%
4	A	108	55%

Energy savings range from 40% to 73% based on the replacement LED luminaire. The following table provides conservative estimates for expected energy savings. It is assumed that luminaires operate for 4000 hours per year (billing hours per year).

Table 17: Estimated Energy Savings

HPS Lamp Wattage	Number of Fixtures	Minimum % Reduction in Power	Energy Savings per year (MWh)
100	51,572	46%	12,300
150	36,053	52%	14,100
200	2,568	40%	1000

By converting all existing HPS luminaires to LED luminaires, it is estimated that BC Hydro would conserve 27,400 MWh of energy annually. Furthermore, implementing LED streetlights will impact the system peak load, which historically has occurred during winter evenings, by approximately 6.9 MW. The 10 year peak load was 10,194 MW and occurred on January 3, 2017 between 5pm and 6pm.

Instantaneous power measurements were recorded for the LED luminaires and HPS luminaires to validate the expected energy savings. The following table presents the specified power, the actual power recorded for the luminaire and the percentage variance.

Table 18: Percent Variance of the Specified to Actual Power for Luminaires

Manufacturer	Model	Specified Power	Actual Power	% Variance
1	A	138	139.55	1.12%
1	B	65	62.29	-4.17%

1	C	75	79.13	5.51%
2	A	70	65.57	-6.33%
2	B	91	89.52	-1.63%
2	C	143	136.92	-4.25%
3	A	35	37.08	5.93%
3	B	54	55.17	2.17%
4	A	108	106.67	-1.23%
4	B	72	71.98	-0.03%
4	C	35	36.67	4.77%
Existing 100 W HPS		130	135.59	4.30%
Existing 150 W HPS		188	171.70	-8.67%

The variance of the LED luminaire actual power from the specified power should be minimized to support the development of the new rate for LED luminaires under Schedule 1701. A tolerance for $\pm 5\%$ from the specified power should be investigated and added to the product specification, if feasible.

5.7 Starting Current

Specification 440-0390 for HPS Luminaires requires that the ballast of the luminaire provides a starting current that does not exceed the normal operating current. The following graph shows the current delivered to the 150W HPS luminaire tested.

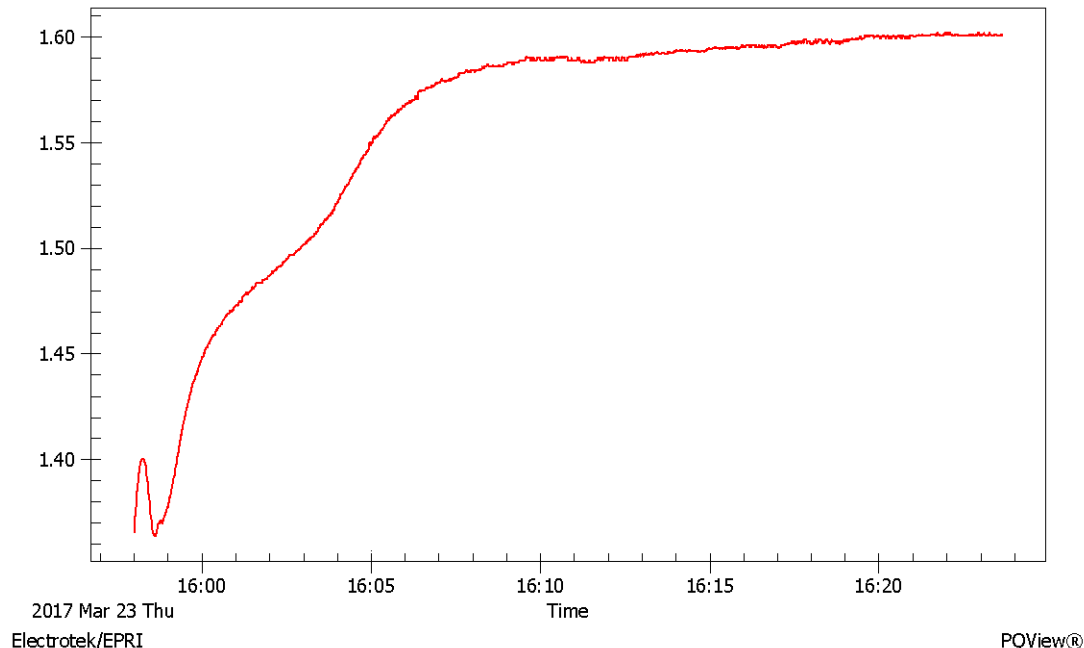


Figure 4: Current to 150W HPS Luminaire (A)

The following graph illustrates the current delivered to the 138W LED luminaire (Manufacturer 1 Model A). The decaying trend in this graph is consistent with the results from the other LED luminaires tested.

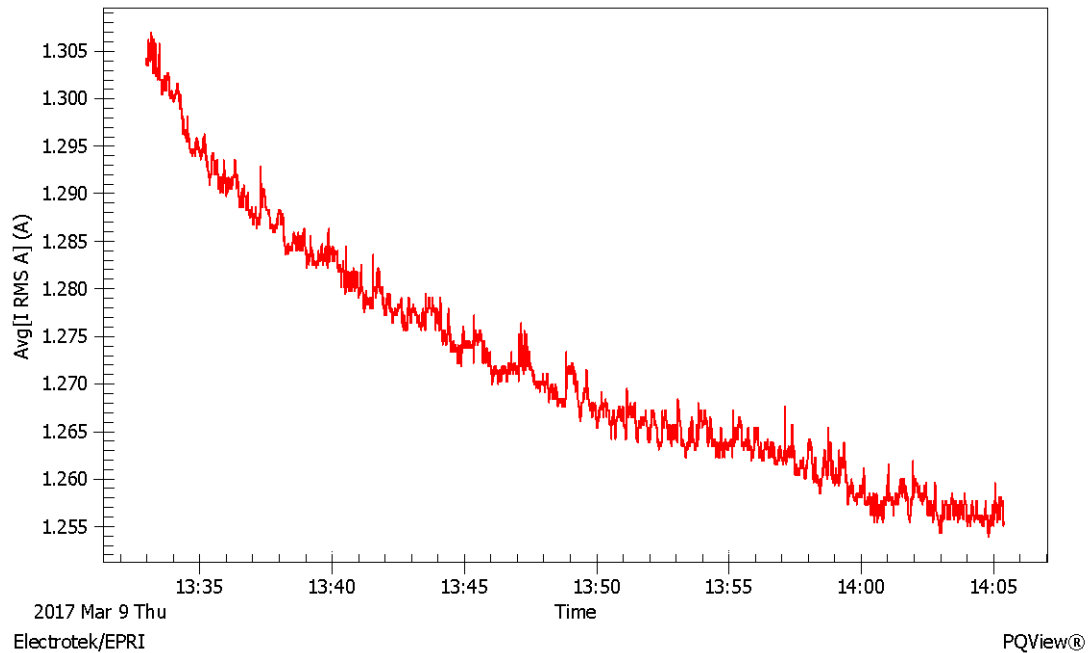


Figure 5: Current to 138W LED Luminaire (A)

The requirement for the ballast to provide a starting current that is less than the steady state current cannot be applied to LED luminaires.

5.8 Thermal Management

All manufacturers incorporated heat fins into the housing design.



Figure 6: Manufacturer 1 Heat Fin Design



Figure 7: Manufacturer 2 Heat Fin Design



Figure 8: Manufacturer 3 Heat Fin Design



Figure 9: Manufacturer 4 Heat Fin Design

During the power quality measurements, the luminaires were running for approximately 30 minutes. Once the power was disconnected, a 3M Scotchtrak heat tracer was used to measure the surface temperature of the luminaires. For all luminaires, the highest measurement was recorded on the light array. The light array was covered by a sheet of cardboard to reduce the light shining into the workshop. It is expected that this may have increased the temperature measurement.

The Manufacturer 2 luminaires operated at a higher temperature than the other manufacturers' luminaires. The heat fin design of Manufacturer 2 has a lower surface area which may contribute to the higher temperature reading.

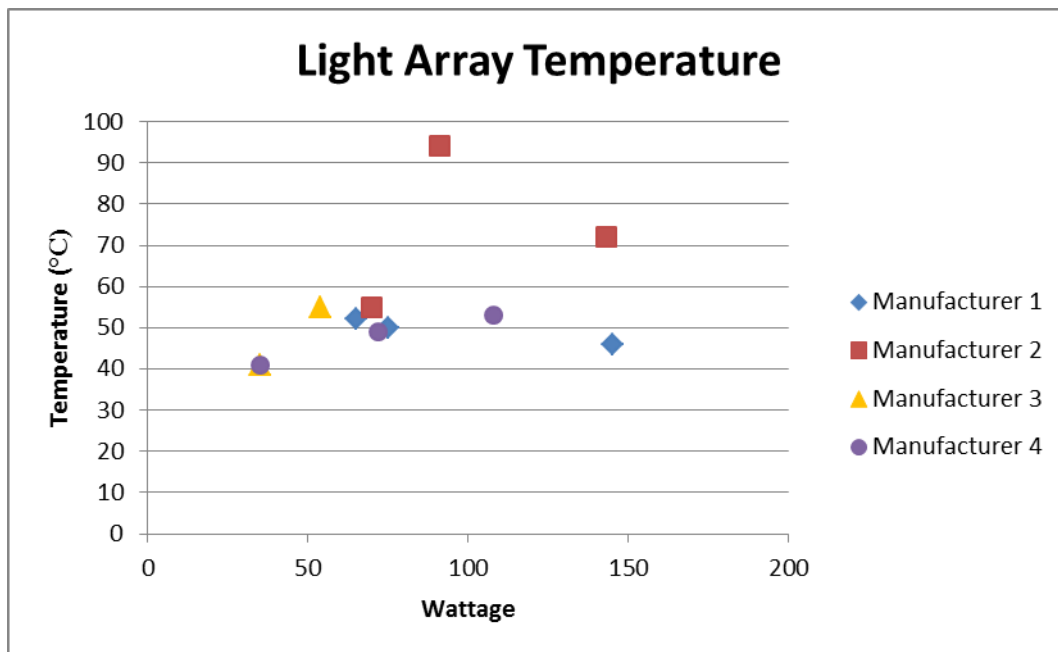


Figure 10: Temperature Recorded on the Light Array

5.9 Crew Feedback

The line contractor which performed the installation provided the following feedback:

- All luminaire housings are designed for tool-less entry and use captive hardware. However, the wing nut on one Manufacturer 1 housing came loose.

- For some models, the door could be removed from the housing. Specification 440-0001 R1 requires that the door be captive, to eliminate the hazard of the door falling to the ground while the luminaire is worked on.
- Some luminaires were supplied with shorting caps. This caused confusion in the field regarding which control to install. Future product approvals should ensure that the luminaire is supplied without any controller.
- Some luminaires were supplied with a two-pole, three-wire 120 V plug connected to the wire terminals. This is not required, and future product approvals should ensure that the luminaire is only supplied with a terminal block with screw connectors.
- Manufacturer 1 terminal blocks were provided with a black plastic cover. The cover restricted access to the terminal block. Manufacturer 1 responded that this cover is required by CSA C22.2 No. 250.0. All other manufacturers achieve the CSA designation by using a recessed set screw.



Terminal Block Cover

Figure 11: 1 Terminal Block with Cover

A representative from one of BC Hydro's street lighting contractors reviewed four of the LED luminaires (one luminaire from each manufacturer included in the trial) and offered the following comments:

- The terminal block for Manufacturer 1 luminaires is congested with nearby wiring. The cover over the terminal block makes access difficult for loosening and tightening the set screw to connect wiring.
- Manufacturer 2 does not have a captive door. The loose door could fall if knocked by a worker or swayed by wind.

- The Manufacturer 1 design uses a knockout wildlife guard. The standard streetlight arm has a 2" diameter; however, older arms have a 1" or 1-¼" diameter. The Manufacturer 1 design does not accommodate the 1-¼" arm.
- The Manufacturer 4 luminaire has long terminal bolts. This makes installation easier. The terminal bolts for the Manufacturer 1 unit are not very long.
- The Manufacturer 1 and Manufacturer 4 housing design has recesses that may provide an opportunity for insects to nest, including wasps. A flat surface under the luminaire, such as a flat lens, prevents insects from nesting.



Figure 12: Manu. 1 Recessed Housing Design



Figure 13: Manu. 4 Recessed Housing Design

- The leveling tool on the Manufacturer 1 and Manufacturer 4 luminaires is an added useful feature, though not required.
- The latch on the Manufacturer 3 or Manufacturer 4 luminaires is preferred. The bolt used to secure the door on the Manufacturer 1 or Manufacturer 2 luminaires may seize and prevent later maintenance or removal. Manufacturers using a bolt to secure the luminaire should apply an anti-seize compound.

5.10 Customer Feedback

While the BC Hydro Engineer was on site during the installation of LED luminaires at Regent Street, a local resident approached the crew and stated that he prefers the LED luminaires to the HPS luminaires. At that point, a portion of the LED luminaires had been installed along Regent Street and the crew was on site to complete the installation.

While conducting lighting measurements on Regent Street, a local resident approached the BC Hydro Engineer and voiced his support of the LED luminaires, stating that the "old lights are too bright and the new ones are much better". This interaction occurred approximately nine months after the LED luminaires were installed. The surrounding neighbourhood has HPS luminaires installed.

After the LED luminaires were installed, a complaint was received from a customer. Their complaint stated "it is extremely bright and lights up our whole house and into our bedroom." The streetlight contractor adjusted the angle of the street light to make it more level with the roadway, and no further complaints were received. The house is set back from the road by at least 8 m and has a row of tall shrubs along the front of the yard. The

lighting level along Westminster Highway was increased at the request of the City of Richmond. At this location, the 150 W HPS luminaire was replaced with a 138 W LED luminaire. This likely contributed to the noticeable change in light by the customer. Along Westminster Highway, the sidewalk is located behind the pole, so the design accommodated some backlight.

5.10.1 Survey of Municipal Customers

BC Hydro Customer Service Operations conducted a survey of municipal customers regarding LED streetlights.

Municipal customers were asked “what colour temperature do you have installed or plan to install?” Figure 14 details the responses

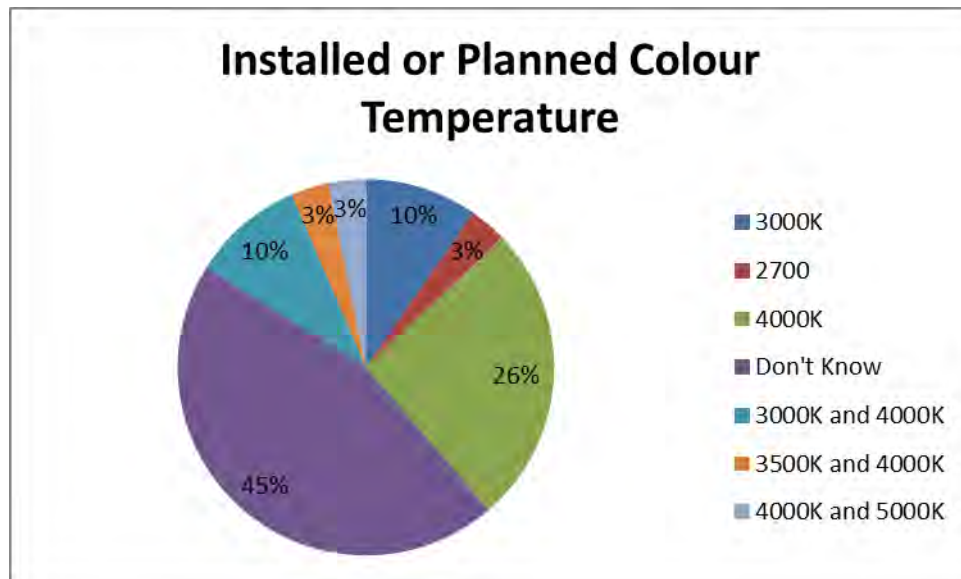


Figure14: Installed or Planned Colour Temperature (All Survey Responses)

Customers were also asked what correlated colour temperature they prefer. Figure 15 details the responses.

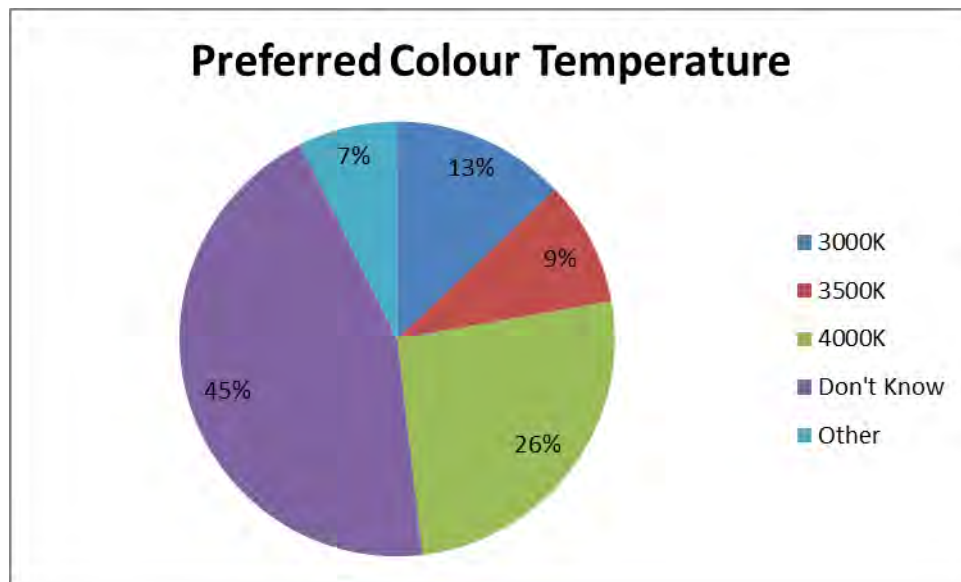


Figure 156: Preferred Colour Temperature (All Survey Responses)

Based on BC Hydro's review of available products, the most widely available colour temperatures for LED luminaires are 3000K and 4000K. To align with the industry, it is recommended that BC Hydro only consider those options. Four responses were received that were categorized as "other". These responses were:

- 2700K, and
- 3500K or 4000K.

Figure 16 describes the municipal customers' response to "do you currently have engineering staff or consultants you work with who have specific expertise related to LED streetlights?"

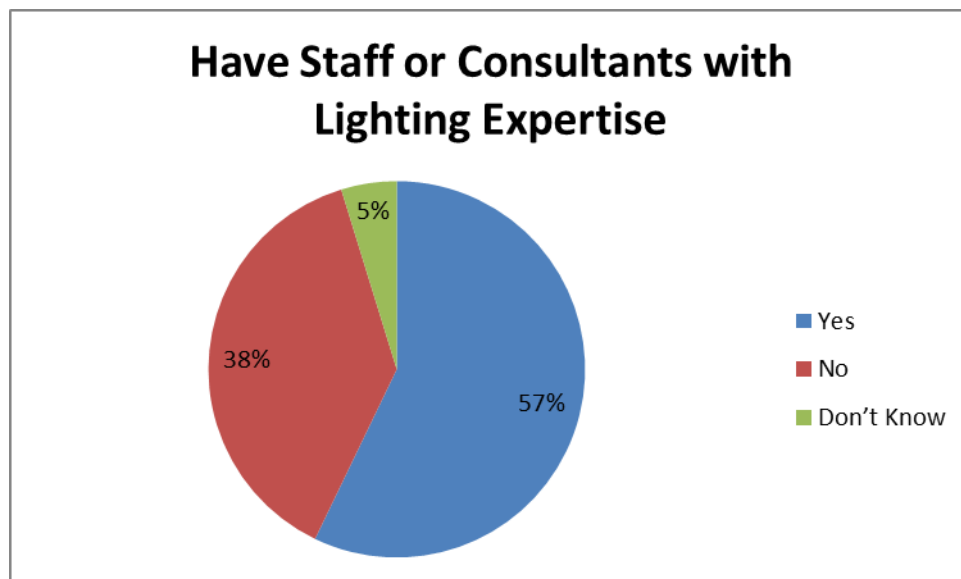


Figure 16: Do you have staff or consultants with expertise related to LED streetlights?

Based on the responses provided, 38% of municipalities do not have staff or consultants with expertise related to LED street lighting, and 5% of responders do not know if they have these staff or consultants. These municipalities may not currently have the resources to support a transition to LED streetlights. To support the conversion, BC Hydro may be expected to provide some guidance to municipalities throughout the conversion. BC Hydro may provide the following:

- Contacts for local lighting consultants;
- Typical information required to complete a lighting design, and
- Information regarding BC Hydro's previous HPS and future LED lighting options.

5.11 Luminaire Failures

During the trial, one outage of an LED luminaire was reported. A 92W luminaire failed. It was replaced with a 108W LED luminaire as BC Hydro had a spare of this model available. The failed luminaire was inspected by a street lighting contractor once removed and the connection to the light array was found to be loose. This was re-connected and the luminaire worked. The connection is shown below.

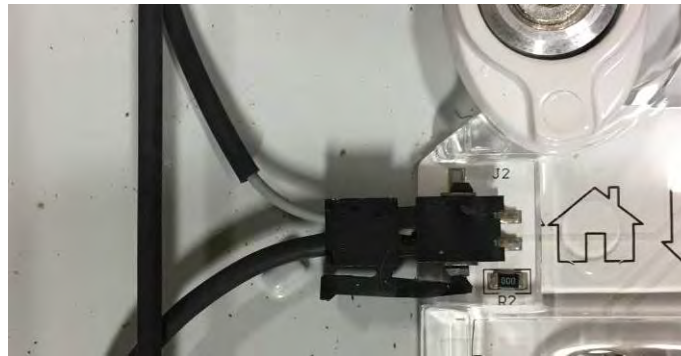


Figure 17: Connection to Light Array

The manufacturer was notified of the loose connection. The cause of the loose connection was not determined. Standard practice is to confirm that the luminaire works at installation. It is not known if the check was conducted for this luminaire. At this time, it is not expected that there is a design defect associated with the failed luminaire that would prevent product approval.

5.12 Field Trial Conclusion

Based on the lighting measurements, the LED luminaires exceed the performance of the HPS luminaires by reducing the maximum illuminance while still meeting average illuminance requirements, and improving uniformity. It is clear from other LED installations in the Lower Mainland that LED luminaires have a stark light cut off, whereas HPS luminaires have a fading light cut off. This can create a noticeable pattern of light and dark where the pole spacing is not optimal for LED luminaires.

LED luminaires demonstrated improved power quality characteristics. LED luminaires greatly exceed minimum power factor requirements (above 99%), and are below maximum harmonic current emission limits. The 100W HPS luminaire was below the minimum power factor of 90% during start up but eventually leveled off above 99%. HPS

luminaires are within maximum harmonic current emission limits; however, HPS luminaires produce significantly higher third harmonic currents than LED luminaires.

LED luminaires use 29% to 65% less energy than HPS luminaires, based on the power specified by the manufacturer. Actual power measurements demonstrated that the energy savings may be higher. Though this range will likely narrow once the catalogue ID requirements are defined, the broad range of power specifications requires that the energy cost must be included when evaluating bid prices from LED luminaire distributors.

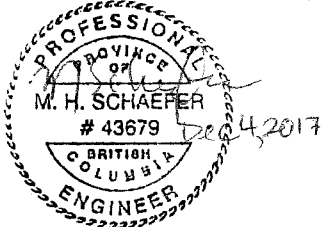


6.0 Recommendations

It is recommended that BC Hydro proceed with replacement of existing street lights with LED luminaires. The following requirements shall be included in the BC Hydro specification for LED luminaires.

- Provide options for 3000K and 4000K luminaires;
- Include electromagnetic compatibility requirements as per CSA 61000 series standards (as applicable);
- Require a minimum ten year warranty on the LED luminaire;
- Luminaires shall be within $\pm 5\%$ of the specified wattage;
- Review the definition of useful life at 70% of original light output (revise to 85%);
- Consider a marker or decal to enable like-for-like replacements similar to the wattage decal for HPS luminaires;
- Require that the luminaire door be permanently attached to the housing, and
- Include a net present value calculation to consider the unit price and energy cost for procurement.

The BC Hydro specification for photo electric lighting controllers shall include a requirement for extended service life.

7.0 Approval

Recommended		Reviewed		Approved	
					
M. SCHAEFER, P. Eng.		C. PICASSI, P. Eng.		F. DENNERT, P. Eng.	
Date:		Date:	Dec 4/17	Date:	4 Dec/17

8.0 Works Cited

- CEATI. (2010). *LED Street Light Best Practice Guidelines for High Performance and Long Life Expectancy*.
- Gaston, K. J., Davies, T. W., Bennie, J., & Hookins, J. (2012). *Reducing the ecological consequences of nighttime light pollution: options and developments*. British Ecological Society.
- Jin, H., Jin, S., Chen, L., Cen, S., & Yuan, K. (2015). *Research on the Lighting Performance of LED Street Lights With Different Colour Temperatures*. IEEE Photonics Journal.
- Lin, Y., Liu, Y., Sun, Y., Zhu, X., Lai, J., & Heyndericks, I. (2014). *Model predicting discomfort glare caused by LED road lights*. Optical Society of America.
- Pacific Northwest National Laboratory. (2017). *An Investigation of LED Street Lighting's Impact on Sky Glow*. Richland, Washington: U.S. Department of Energy.
- Scigliano, E. (2013, March 18). *Seattle's New LED-Lit Streets: Blinded by the Lights*. Retrieved March 23, 2017, from crosscut.com:
<http://crosscut.com/2013/03/streetlights-seattle-led/>

**Annex A:
Adaptive Street Lighting
Controls Evaluation**

Adaptive Street Lighting Controls Evaluation

Disclaimer

This report was prepared by BC Hydro solely for the purposes described in this report, and is based on information available to BC Hydro as of the date of this report. Accordingly, this report is suitable only for such purposes, and is subject to any changes arising after the date of this report.

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Approval

Date of Issue:	24/11/2017	
Recommended:	J. Zhang	 
Reviewed:	C. Suvagau	
Approved:	C. Suvagau	
Professional of Record: C. Suvagau	  24/11/2017	

1. Project Background

Adaptive street lighting controls (ASLC) are a growing trend in the market because it helps end users manage LED streetlights efficiently as assets and manage energy usage. However, not all components of the ASLC system benefit from open standards and communication protocols with many vendors having a proprietary approach. It is thus important to explore and understand the behaviour, advantages and limitations of ASLC systems from different leading vendors.

Loaned equipment from five control vendors was tested in conjunction with the LED street lighting pilot in Richmond. Manufacturers 1 to 4 also manufacture LED luminaires that were

tested within the controls pilot. Manufacturer 5 is only a lighting control vendor. All five systems have been tested in-lab (at PowerTech Labs) and in-situ (LED Richmond pilot).

The lighting control experiment has collected information for a period of several months in 2016 targeting the following four categories:

- functionalities and the limitation of the central management system (CMS);
- accuracy of the metering;
- interchangeability between the nodes and the LED streetlights from different vendors, and
- process and requirements of the hardware installation.

2. About Adaptive Street Lighting Control (ASLC) Systems

2.1. The major components of an ASLC system

- **Light Point Controllers (LPC):** Light Point Controllers (also known as Nodes) are terminal devices (installed on the luminaire) that direct the function of the luminaire (e.g. turn on-off, dim light), collect data (e.g. logging power and energy measurement, functionality feed-back) and communicate data. These devices could be internally mounted to the luminaire or (in most cases) externally mounted by connecting to a 5 or 7 pin ANSI C136.41-2013 compliant socket. At minimum 5 pins allow for dimming the light output. However, 7 pins will allow connection to other enabling equipment (such as motion sensors or cameras) that expand the functionalities of the ASLC system and capitalize on non-energy benefits.
- **Gateway:** It is a processor that acts as a communication bridge between the nodes to outside networks. It can send the comments to control nodes and receive/store the status of the streetlights from the nodes.
- **Central Management System (CMS):** provides the software interface system. The communication network between the CMS and the gateway could be wired or wireless. Wireless communication is more common. This requires a modem, which is built into the same enclosure with the gateway for most vendors.



2.2. The major functions of the ASLC systems

- Control LED streetlights on/off by built-in photocell, and dim the lights by pre-set schedules.
- Provide the operation status of LED streetlights so maintenance crews can be dispatched.
- Provide the energy consumption report for the whole network or selected lights.
- Added sensors can be considered to detect and measure vehicle speed and volumes, motion or presence of pedestrians, temperature, precipitation, ground faults, ambient lighting levels, etc. This information can be used to adjust lighting levels to suit actual conditions.

2.3. Advantages of using ASLC systems and current market trends

The dynamic dimming controls can enable BC Hydro and municipalities to drive energy savings and extend LED street light product life.

There is potential for using the control network to monitor energy consumption and improve billing accuracy compared to the present method of an unmetered, flat-rate. Presently, there is an ongoing initiative at Measurement Canada, led by the Canadian Electrical Association (CEA) and Canadian Standards Association (CSA), to exempt street lighting nodes from the existing revenue metering law. If approved, this strategy could positively impact billing both for BC Hydro and for the municipalities by enabling the efficient use of dimming for operational cost savings (municipalities) and demand management (BC Hydro).

Other non-quantifiable benefits include:

- improved customer satisfaction with reduced response time to street light outages (without customers reporting outages);
- reduced light pollution;
- data collection to support distribution feeder voltage management and power quality;
- data collection to support response to and restoration of power outages;
- improved signal strength and communication mesh coverage to enhance the existing smart metering network. This requires compatibility with existing BC Hydro smart metering infrastructure characteristics.

A growing number of large-scale networked street light systems have demonstrated that additional lighting controls beyond simple photocells are providing significant energy savings and non-energy benefits such as safety and maintenance savings. Several large-scale pilot projects have been deployed in different locations such as the City of Los Angeles, Seattle, and Mississauga. These networked street light systems can trigger precise outage notification to enable condition-based maintenance, remote dynamic dimming controls for safety and security, and power consumption monitoring and measurement.

3. Lab Testing Scope of Work

Powertech Labs conducted the following tests. Two luminaires per control vendor were tested. The detailed test results can be found in the Appendix A.

1. Evaluate the systems' functionalities:
 - a) multi-level dimming, grouped luminaire control
 - b) scheduled-based control via command provided to the CMS
 - c) photocell functionality and operation
 - d) fixture status reporting
 - e) CMS fault detection capabilities (nodes, gateway failures)
 - f) ability of individual nodes to continue normal operation in the event of communication breakdown
2. Verify power metering accuracy with dimming controls
3. Document ease of use of the CMS

4. Field Testing Scope of Work

BC Hydro conducted the following tests. On average, five nodes per ASLC vendor were tested along No. 3 Road in Richmond. Detailed test results can be found in Appendix A.

- 1) Survey the installation crew and collect feedback
- 2) Test and use the software to set up the schedule, run the energy report, set up the dimming profile, and other available functions.
- 3) Install smart meters for each group of controls and collect the power consumption data.

4. Conclusion

4.1. Hardware Installation

- In general, the installation for all vendors' systems was easy. One vendor separates the gateway and modem into two separate enclosures, which caused extra labour time at install. One vendor does not use a discrete gateway or modem. The gateway functions are built into the control nodes, allowing for a much easier installation.
- Regarding on-site commissioning, some vendors' products are "plug and play". Other vendors' products required a barcode be scanned to register the node into the system. This incurred additional labour.
- Control systems should have a "status check" function to confirm proper installation on site (i.e. turn the lights on/off manually). Currently, most of the tested systems have this function, but not all (see Appendix A).

4.2. CMS Functions

- All the tested CMS can dim the LED luminaires. However, the power reduction is not proportional to the light level reduction. Therefore, additional information is required from the LED luminaire manufacturer to enable the user to correlate the dimming level to the power level. One LED luminaire manufacturer mentioned they can provide charts to show the relationship between the power wattage and the dimming level.
- No manufacturer can report a detailed description of malfunctions. The system will send an alert note by email if the system does not run as usual. It is required to pre-set the malfunction alert notification with some criteria. Some vendors' CMS will allow the end user to set the alerts, but some of them need to be done through the vendors' support team. Example alerts are "low power" or "lost communication"; however, a detailed diagnosis of the issue is not available.
- In general, setting up the operation schedule is logical and easy. However, some systems were less intuitive and would require more training.

4.3. Energy Report

- All tested ASLC can provide energy consumption reports, but at different levels. Some ASLC can provide the burning hours for each fixture. One ASLC report could only provide the raw data, which needs to be summarized manually, which would take significant time and effort. This concern was raised with the vendor. We were told it could be done by custom design, but at a cost.
- Lab measurements (see Appendix A) show discrepancies between revenue meter recordings and the vendors' software readings. For two products, these discrepancies are between +/- 1% to +/- 4%. The other two manufacturers' products had discrepancies as high as 8% and 11% as lights dim from 100% to 50% (see Fig.1). Please note that the values represent instantaneous W peak discrepancy. Averaged over longer periods the resulting discrepancy between the kWh measurements is much smaller. The kWh measurement is more meaningful as it relates to billing.

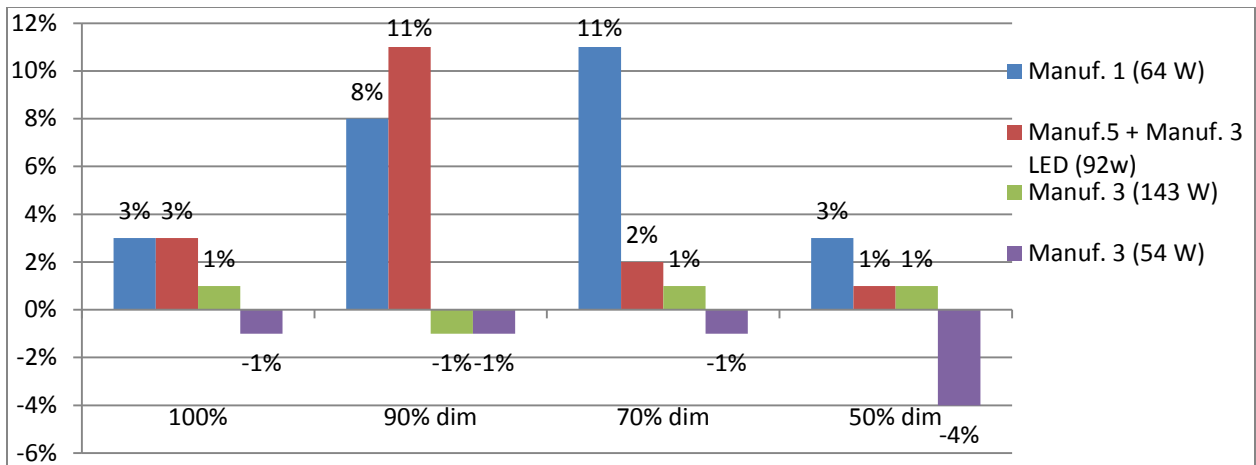


Fig.1. Wattage discrepancy measured in the lab (Revenue Meter - Software)

- In the field trial the accuracy of the energy consumption from all vendors' software is small, 1-2% discrepancy compared with the smart meter data (see Fig. 2). However, no vendor includes the power consumption for the gateway (typically around 6-8W running 24/7, but there is one gateway for few hundred nodes). The 1-2% discrepancy was calculated after the calibration considering the power consumption of the gateway. For a large scale project, the power consumption of the gateways could be a small impact.

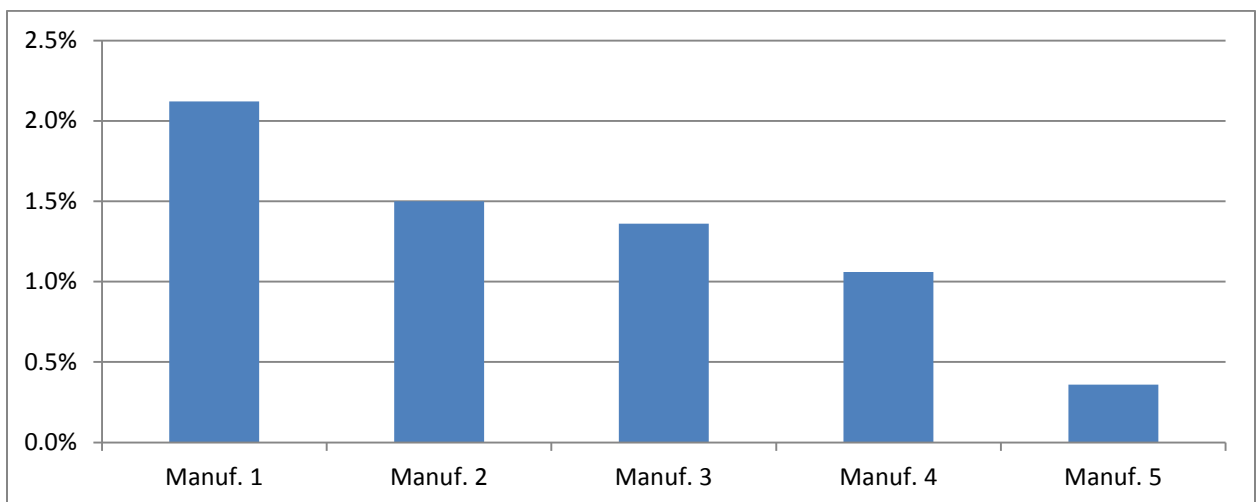


Fig 2. kWh discrepancy measured in the field (Revenue Meter - Software)

5. Recommendations and Next Steps

While the above mentioned benefits of increased public safety and reduced operation costs due to improved asset management and energy conservation (for both BC Hydro and the municipalities) are significant when using ASLC controls, the logistics of applying it to luminaires under BC Hydro's 1701 rate schedule bring significant limitations:

- At present, each vendor has its own communication network protocol from the nodes/ gateway to CMS and this further complicates the logistics of adopting ASLC for BC Hydro lease lights across so many municipalities. However, the industry is developing specifications for open IT standards and communication protocols that will allow interoperability at the CMS level so a municipality (or BC Hydro) can use a single/common user interface to monitor and interact with multiple networks/ controllers from various vendors.
- Measurement Canada needs to rule in favour of exempting the ASLC network metering from existing regulations and allow it to be used for revenue metering.

If dimming is to be pursued upon replacing the current HPS technology with LED, there are a few steps that need to be considered:

- Only use LED luminaires with 7 pin ANSI C136.41-2013 compliant sockets to allow for further implementation of ASLC systems in the future (see page 3 for more information). This should be adopted as a minimum requirement for the LED street lighting luminaire standards.
- Selecting light point controllers (nodes) that are interoperable and interchangeable should be priority.

Additionally, the ASLC adoption could be influenced by emerging, value-added services as non-energy decision drivers:

- Since the streetlights are permanently under power, a large amount of sensors and applications can be mounted on the lighting network. CCTV cameras, pollution sensors, noise detectors or traffic density sensors could target to improve the citizens' lives and help maintain a safer city environment. Others applications could generate extra incomes for the community, like street parking detection, monitoring and billing.

Appendix A

Adaptive Control Evaluation

Test Results

Devices under Test

Control Node	Manuf. 1	Manuf. 2	Manuf. 3	Manuf. 4	Manuf. 5
Luminaire	Manuf. 1	Manuf. 2	Manuf. 3	Manuf. 4	Manuf. 3
Fixture Wattage	64W	143W	53W	108W	96W

Power Consumption Test Results (completed in the lab)

Dimming Scenario	Meter	Control Manufacturer									
		Manuf. 1 (65W)		Manuf. 2 (143W)		Manuf. 3 (54W)		Manuf. 4 (108W)		Manuf. 5 (92W)	
100% illum.	Smart Meter (W)	64	100%	140	98%	53	100%	112	104%	96	100%
	Fluke Meter (W)	65	100%	138.2	97%	54	100%	111.8	104%	93.5	100%
	Vendor Platform (W)	62	97%	148	97%	53.5	100%	N/A	Note 2	93	101%
	Illum. Measurement (lux)	7750	100%	65000	100%	15400	99%	N/A	Note 2	34800	100%
90% illum.	Smart Meter (W)	60	94%	125	87%	48	89%	112	104%	92	100%
	Fluke Meter (W)	57	88%	127	89%	47	87%	109	101%	89.8	96%
	Vendor Platform (W)	55	86%	125.7	88%	48.6	91%	N/A	Note 2	82	89%
	Illum. Measurement (lux)	7090	91%	59300	91%	13000	84%	N/A	Note 2	32700	94%

70% illum.	Smart Meter (W)	50	78%	98	70%	37	70%	100	93%	68	74%
	Fluke Meter (W)	45	69%	96.8	68%	35	65%	99.8	89%	66	71%
	Vendor Platform (W)	43	67	97.5	68%	37.8	71%	N/A	Note 2	66.5	72%
	Illum. Measurement (lux)	5610	72%	48900	75%	12700	82%	N/A	Note 2	26200	75%
50% illum.	Smart Meter (W)	34	53%	72	51%	25	47%	72	67%	46	50%
	Fluke Meter (W)	35	55%	70	49%	24	44%	67.3	62%	43.7	48%
	Vendor Platform (W)	32	50%	70	49%	27	50%	N/A	Note 2	45	49%
	Illum. Measurement (lux)	4410	57%	36400	56%	6130	40%	N/A	Note 2	18200	52%
0% illum.	P916 Smart Meter (W)	1.16	2%	3.49	2.4%	1.12	2.1%	2.32	2.1%	2.32	2.5%
	Fluke Meter (W)	0	0%	0	0%	0	0%	0	0%	0	0%
	Vendor Platform (W)	N/A	0%	1.6	0%	N/A	0%	N/A	Note 2	N/A	0%
	Illum. Measurement (lux)	0	0%	0	0%	0	0%	N/A	Note 2	53	0%

Table 1: Power Consumption Results

Notes:

- The measurements were performed in the lab under high ambient light level environment:
 - Illuminance measurements were done at one spot under the fixture. Dimming levels have been measured down to 50%. It is expected that dimming beyond 50% illumination would not be required as this would result in insufficient lighting levels.

- The manufacturer's software may not report the power consumption from the control nodes.
 - All Columns for % of wattage are compared with the wattage from the LED luminaire manufacturers' specification sheets
2. Manuf. 4's control needs to be placed outside for the GPS signal. The outside light level is too bright to accurately measure illuminance for dimming. The platform doesn't measure power; therefore, the software platform values are not provided.

Luminaires and Control Node Interchangeability Testing (completed in the lab)

	Luminaires dimmed at 50% power			
Control Nodes	Manuf. 1	Manuf. 2	Manuf. 3	Manuf. 4
	Illuminance % change	Illuminance % change	Illuminance % change	Illuminance % change
Manuf. 1	57%	49%	40%	56%
Manuf. 5	66%	63%	52%	70%
Manuf. 3	66%	53%	40%	60%
Manuf. 2	59%	56%	52%	54%
Manuf. 4	53%	57%	47%	

Table 2: Illuminance at 50% Power

Note:

1. The illuminance measurement was conducted inside the lab (one fixture per vendor) under high light level environment. The measurements were taken exactly at the same spot directly under each fixture. Dimming power levels have been measured down to 50%, as this is a realistic dimming scenario.
2. We used manuf. 5 nodes to control manuf. 3 luminaires under the dimming testing as shown in clause 1.2.

Evaluation Summary

Evaluated Criteria	Summary
Control hardware	<ul style="list-style-type: none"> The different manufacturers' modem, gateway, or integrated modem and gateway weighs 7lbs to 25 lbs, and were positioned and installed by hand. A gateway can support 500 to 2000 control nodes, depending on the manufacturer. The clear space line from the gateway to nodes is from 1,000ft to 1,600ft.
Ease of installation for the gateway/modem	<ul style="list-style-type: none"> Overall, all the equipment is easy to install. However, an integrated modem and gateway is preferred to reduce labour and troubleshooting points. See the Clause 2.3 Installation Crew Survey for additional details.
Ease of commissioning	<ul style="list-style-type: none"> Some manufacturers require the bar code on the control node be scanned during installation which requires extra time on site. Some manufacturers enable manual operation of the control node through the software to aid commissioning of the system and confirm communication.
Ease of use of the software interface	<ul style="list-style-type: none"> Overall, it is easy to use the software. All systems have ability to set up different levels of authorization. For instance, one authorization level can only access the energy report level. Another authorization level may be able to set up the schedule. No manufacturers offer a smart phone application. Some systems have manual on/off/dimming options for troubleshooting or commissioning. Some software interfaces can provide distinct color for luminaires on/off status, which will help to confirm the luminaire status remotely.
Malfunction report ability	<ul style="list-style-type: none"> Malfunction alarm notifications can be pre-set. No systems can report a detailed diagnosis of the malfunction. When the gateway loses power, no alarm notification will be sent out.
Interchangeability	<ul style="list-style-type: none"> Every control system can control other manufacturers' luminaires in terms of turning lights on/off or dimming. See Luminaire and Control Node Interchangeability Testing for additional detail.

Local service	<ul style="list-style-type: none"> Not all manufacturers have local technical support.
Scheduling	<ul style="list-style-type: none"> Every system sets up the schedule differently. Some systems are easier to learn than others. Overall, each system requires training from the manufacturer. Changes to the schedule are not implemented immediately. Implementation requires 15 minutes to 4 hours depending on the manufacturer.
Gateway/Node Communication	<ul style="list-style-type: none"> Most manufacturers use 3G network. This may be updated to 4G or higher in the future. The network communication band is normally 2.4GHz or 900MHz.
Energy Report	<ul style="list-style-type: none"> All manufacturers provide a energy consumption report of the luminaires (kWh). Some manufacturers also include other reports, such as burning hours, power, and voltage ,etc. Most systems can generate a net monthly report. One system only provides the raw data in 15 minute increments. The raw data must be summarized by the user. Some systems can provide a daily, weekly, and/or monthly report, but others can only provide a monthly report.
Others	<ul style="list-style-type: none"> Use of cellular data may have an additional fee. Some manufacturers updated the central management system during the 6 month testing period.

Metering Evaluation (SMI vs Software metering) (completed in the field)

The energy consumed by the modem and gateway (when applicable) is not included in the energy report provided by the software. An adjustment was made to compare the results from the BC Hydro smart meter to the results from the manufacturers' energy report.

Manuf. 1			
Metering duration	SMI KWH	Software KWH	Discrepancy
August 1st - September 30th	217.0249467	204.377	-5.83%
Estimated gateway consumption		8.052	
Adjustment		212.429	-2.12%

Note: Manufacturer 2 updated the server during the testing period, which caused energy data for 10 days to be lost. However, the manufacturer managed to get the data from their server. The Software KWH data are partially from the vendor not from the software directly.

Manuf. 2			
Metering duration	SMI KWH	Software KWH	Discrepancy
August 1st - October 31st	394.0608702	374.9033	-4.86%
Estimated gateway consumption		13.248	
Adjustment		388.1513	-1.50%

Manuf.3			
Metering duration	SMI KWH	Software KWH	Discrepancy
August 1st - October 31st	270.7830867	249.439896	-7.88%
Estimated gateway consumption		17.664	
Adjustment		267.103896	-1.36%

Manuf. 4			
Metering duration	SMI KWH	Software KWH	Discrepancy
September 1st - October 31st	143.513439	141.996	-1.06%
Estimated gateway consumption			
Adjustment		141.996	-1.06%

Manuf. 5			
Metering duration	SMI KWH	Software KWH	Discrepancy
August 1st - October 31st	439.8078924	438.23	-0.36%
Estimated gateway consumption			
Adjustment		438.23	-0.36%

Installation Crew Survey

Criteria	Manuf. 1	Manuf. 2	Manuf. 3	Manuf. 4	Manuf. 5
Control hardware	Modem and gateway are integrated.	Modem and gateway are separated.	Modem and gateway are integrated.	Every node functions both as a gateway and modem; plug and play.	Modem and gateway are intergraded.
Overall ease of handling the equipment	Modem can mount right on street light so framing on pole is not needed. Bar code on node needed for set up, this requires additional time	Overall easy to handle. Modem and gateway separate and takes a bit more time	Overall easy. Bar code on node and street light head needed for set up, this requires additional time.	Overall very easy. Everything is built right into the node	Overall easy
Ease of installation of the gateway/modem (score1-5)	4	2	3	5	4
Ease of wiring the gateway/modem (score 1-5)	4	2	3	5	4
Ease of installing the nodes (score 1-5)	4	5	4	4	4

Note:

- 1 means most difficult and 5 means easiest

BC Hydro 2020 Street Light Rates Application

Appendix G

BC Hydro's Proposed Final Rate Schedule 1701 Financial Analysis

Table of Contents

1	RS 1701 Marginal Cost Model.....	1
1.1	Maintenance Savings.....	1
1.2	Electricity Savings.....	4
1.2.1	Energy Savings.....	4
1.2.2	Capacity Savings.....	5
1.3	Program Costs.....	8
1.4	Undepreciated Value of Existing Street Lights.....	10
1.5	Twenty-Year Marginal Cost Model RS 1701 and RS 1755 Group 2.....	11
2	Proposed Final RS 1701 Pricing.....	13
2.1	Calculation of Supplemental Charge.....	17

List of Tables

Table G-1	Maintenance Budget for Existing RS 1701 Street Lights.....	2
Table G-2	Maintenance Expenditures for Existing RS 1701 Street Lights.....	3
Table G-3	Calculation of Electricity Savings of the Replacement Program.....	6
Table G-4	Total Program Costs (Inclusive of LED Installation for RS 1755, RS 1701, and Contingency).....	9
Table G-5	RS 1701 Marginal Cost Model Outcomes.....	12
Table G-6	RS 1701 Rate Design and Pricing Model Summary.....	15
Table G-7	Calculation of the Supplemental Charge.....	17

1 **RS 1701 Marginal Cost Model**

To develop the target revenue estimate after the LED conversion program, a marginal cost model was developed by adjusting fiscal 2021 RS 1701 revenue for the savings and marginal costs directly attributed to the program, which are:

- a) maintenance savings, b) electricity savings, c) program capital and installation costs, and d) undepreciated value of existing lights removed before their end of life.

The use of marginal cost analysis is intended to allocate costs and savings of the Replacement Program to RS 1701 customers. This approach aligns with Bonbright fairness criteria as described in section 5.1 of the Application. Marginal cost analysis is also intended to develop pricing that is economically efficient, and therefore the approach also aligns with the Bonbright economic efficiency criteria as also discussed in section 5.1 of the Application.

Below are details on each of these steps, and [Table G-5](#) presents the outcomes of the model.

1.1 **Maintenance Savings**

Maintenance cost savings arise because re-lamping is required with the current street lights and is not required with LED street lights. BC Hydro valued the maintenance savings using the historic average budgeted maintenance costs of maintaining the existing street lights, as per BC Hydro's revenue requirements applications, based on the most recent five years of fiscal 2016 to fiscal 2020. These figures are provided below.

Table G-1 Maintenance Budget for Existing RS 1701 Street Lights

Fiscal Years	Maintenance Budget (\$ million)
F2016	1.10
F2017	1.14
F2018	1.49
F2019	1.41
F2020	1.11
Five year average	1.25

The advantages of using budget figures for the rate design are that they are transparent, having already been subject to revenue requirements applications, and they represent the actual value that BC Hydro was able to spend on re-lamping on a planning basis, and without negatively impacting other critical maintenance programs. BC Hydro used maintenance budget estimates for the RS 1701 rate design.

BC Hydro also considered two alternate approaches to valuing the maintenance savings, but ultimately did not adopt them for the reasons described below.

Alternative Approach 1: Historical Actuals

We also examined valuing the maintenance savings using actual maintenance expenditures to maintain the existing street lighting technology, based on the most recent five years of fiscal 2016 to fiscal 2020. Actuals reflect completion of all repairs reported by Street Light Customers to BC Hydro during the fiscal year. [Table G-2](#) presents the actual maintenance expenditures on existing RS 1701 street lights

**Table G-2 Maintenance Expenditures for Existing
RS 1701 Street Lights**

Fiscal Years	Maintenance Actual Spend (\$ million)
F2016	1.75
F2017	1.79
F2018	1.81
F2019	1.99
F2020	1.96
Five year average	1.86

The concern with this approach arises because historic actual spend has been higher than budget due to unplanned re-lamping costs. BC Hydro does not view this situation as being sustainable, or its cost outcomes as being or suitable for use as an input to the rate design. We therefore did not advance this approach.

Alternative Approach 2: Forecast Potential Costs

We also examined valuing the maintenance savings based on a forecast of potential future maintenance costs if the Replacement Program was not undertaken and BC Hydro were to continue to maintain the existing street lights. The forecast included an estimate of future failure rates of HPS street lights, which are expected to be higher than the current level. The average annual maintenance savings calculated using this approach was \$2.7 million dollars per year excluding inflation. While this approach provides useful insights to the decision and cost assessment of LED Replacement Program, BC Hydro does not view it as being applicable to the RS 1701 rate design for the following reasons:

- First, the approach relies on developing a counterfactual future scenario that will not occur, due to the technological changes described in section 3.2 of the Application. As a result, there is considerable uncertainty in the forecast and it cannot be verified; and

-
- Second, the estimate of maintenance cost savings exceeds the value that BC Hydro has historically budgeted for or spent on maintenance for the existing lights. Therefore, it may overstate the amount that BC Hydro could dedicate to maintaining the existing lighting technology in our maintenance cost constrained environment.

1.2 Electricity Savings

Electricity savings arise because LED technology has lower energy and peak demand than the existing technology. This results in electricity savings associated with energy, transmission, distribution and generation capacity. This section provides details on how these savings were valued for the RS 1701 rate design. Electricity savings presented below include savings due to the replacement of existing RS 1701 street lights and the migration of Group 2 lights from RS 1755 to RS 1701.¹

All electricity savings are estimated using the system wide average marginal costs. This is the same approach as has recently been tested and adopted in BC Hydro's Fleet Rate Design Application, approved by Commission Order No. G-67-20 issued March 26, 2020.

1.2.1 Energy Savings

The Replacement Program is estimated to result in energy savings of approximately 28 GWh/yr. after it is fully implemented. These savings are valued at BC Hydro's market energy price forecast. The most recent market energy price forecast is BC Hydro's June 2020 Market Price Forecast, which is based on the ABB Spring 2020 Reference Case forecast. The average annual value of the energy savings is \$1.1 million per year.

¹ Due to the small number Group 2 lights compared to RS 1701 (< 400 RS 1755 Group 2, > 90,000 RS 1701) the inclusion of Group 2 RS 1755 lights has minor impact on the analysis.

1.2.2 Capacity Savings

Once it is fully implemented the Replacement Program is expected to reduce BC Hydro's peak demand by 6.7 MW. This reduction results in capacity savings associated with generation capacity, transmission and distribution.

Capacity savings are based on BC Hydro's Long Run Marginal Costs (**LRMCs**) for generation and bulk transmission capacity,² for non-bulk transmission and for distribution. The average value of the annual capacity related savings is estimated to be \$1.1 million per year.

The detail of the electricity savings is presented below in [Table G-3](#).

² This LRMC was last updated in order to prepare the updated 20-year load forecast as filed in Exhibit B-15 of BC Hydro's Fiscal 2020 to Fiscal 2021 Revenue Requirements Application (**RRA**) <https://www.bcuc.com/ApplicationView.aspx?ApplicationId=664>; at Exhibit B-15.

1 **Table G-3 Calculation of Electricity Savings of the Replacement Program**

Fiscal Years	A Demand Reduction (kW)	B Energy Reduction (MWh)	C Marginal Energy Cost per Unit (\$/MWh)	D Generation & Bulk Transmission Capacity Marginal Unit Cost (\$/kW-yr)	E Distribution Capacity Marginal Unit Cost (\$/kW-yr)	F Non-bulk Transmission Marginal Unit Cost (\$/kW-yr)	G Energy Savings (\$ million) (=BxC)	H Capacity Savings (\$ million) (=(D+E+F)xA)	I Total Savings (\$ million) ³ (=G+H)
2021	330	1,385	27.9	40.7	26.1	52.2	0.0	0.0	0.1
2022	2,255	9,471	30.5	41.5	26.6	53.2	0.3	0.3	0.6
2023	5,206	21,865	28.7	42.4	27.1	54.3	0.6	0.6	1.3
2024	6,611	27,768	32.1	43.2	27.7	55.4	0.9	0.8	1.7
2025	6,661	27,978	35.7	44.1	28.2	56.5	1.0	0.9	1.9
2026	6,661	27,978	36.9	45.0	28.8	57.6	1.0	0.9	1.9
2027	6,661	27,978	37.4	45.9	29.4	58.8	1.0	0.9	1.9
2028	6,661	27,978	38.4	46.8	30.0	59.9	1.1	0.9	2.0
2029	6,661	27,978	41.1	47.7	30.6	61.1	1.1	0.9	2.1
2030	6,661	27,978	42.3	48.7	31.2	62.4	1.2	0.9	2.1
2031	6,661	27,978	42.1	78.4	31.8	63.6	1.2	1.2	2.3
2032	6,661	27,978	45.6	79.9	32.4	64.9	1.3	1.2	2.5
2033	6,661	27,978	46.2	81.5	33.1	66.2	1.3	1.2	2.5
2034	6,661	27,978	47.5	83.2	33.7	67.5	1.3	1.2	2.6
2035	6,661	27,978	49.6	84.8	34.4	68.8	1.4	1.3	2.6
2036	6,661	27,978	51.8	86.5	35.1	70.2	1.5	1.3	2.7
2037	6,661	27,978	53.7	88.3	35.8	71.6	1.5	1.3	2.8
2038	6,661	27,978	58.3	184.6	36.5	73.1	1.6	2.0	3.6
2039	6,661	27,978	61.1	188.3	37.3	74.5	1.7	2.0	3.7

³ Figures may not add up due to rounding.

Fiscal Years	A Demand Reduction (kW)	B Energy Reduction (MWh)	C Marginal Energy Cost per Unit (\$/MWh)	D Generation & Bulk Transmission Capacity Marginal Unit Cost (\$/kW-yr)	E Distribution Capacity Marginal Unit Cost (\$/kW-yr)	F Non-bulk Transmission Marginal Unit Cost (\$/kW-yr)	G Energy Savings (\$ million) (=BxC)	H Capacity Savings (\$ million) (=(D+E+F)xA)	I Total Savings (\$ million) ³ (=G+H)
2040	6,661	27,978	64.9	192.0	38.0	76.0	1.8	2.0	3.9
Average	6,049	25,407	43.6	79.7	31.7	63.4	1.1	1.1	2.2

1.3 Program Costs

The costs for the program as documented in the Implementation Phase business case includes the conversion of both RS 1701 and RS 1755 lights to LEDs. The total expected cost for the Program including contingency is \$73.4 million. When reserve is added the authorized cost is \$83.3 million. Subsequent to the business case being approved a decision was made to terminate the RS 1755 service and to only convert the Group 2 lights to LEDs.

The Program's estimate for direct costs is based upon historical actual costs as well as pricing received from the supply and installation services procurement process. The indirect costs were calculated from discussions with impacted business units with regard to the Program's scope and the activities and resources required to support the Program. The business groups provided their estimates based upon a resource allocation model or from prior experiences. The contingency percentage for the Implementation Phase and the Program's reserve value, were derived from a Monte Carlo analysis.

Program funding was approved by BC Hydro's Board of Directors in February 2020. The itemization of these costs is provided below.

Table G-4 Total Program Costs (Inclusive of LED Installation for RS 1755, RS 1701, and Contingency)

Program Costs	Total Request Amount (\$ million)
Direct Deployment Costs (Materials + Installation)	
Labour	20.14
Materials	24.55
Indirect Program Costs	
Program Management	1.34
Deployment Management	3.21
Supporting Technology	2.24
Customer Engagement	0.83
Other (Change Management, Material Management, Procurement, Regulatory)	0.64
Dismantling	2.41
Total Program Costs before Loadings and Contingency	55.36
Contingency	7.55
Inflation	2.92
Capital Overhead	7.53
Program Expected Cost	73.36
Program Reserve (Loaded)	9.92
Requested Total Authorized	83.28

The indirect program costs are comprised of the following:

- **Project Management:** Development of timelines and budgets as well as managing and coordinating the program's activities;
- **Deployment Management:** Includes the costs of managing the scope related to converting the street lights in the field, which includes coordinating with contractors and internal field crews, managing the work orders and exceptions, as well as managing and coordinating materials;

-
- 1 • **Supporting Technology:** In order to efficiently manage the coordination with
2 customers and the field work modifications were made to existing technology
3 solutions;
 - 4 • **Customer Engagement:** Recognizing the importance of engaging with
5 customers, funds were identified to cover resources to support customers and
6 the associated engagement activities;
 - 7 • **Other:** There are several other small categories of costs associated with
8 Change Management (for internal resources), Material Management,
9 Procurement, Regulatory; and
 - 10 • **Dismantling:** these costs were calculated as a proportion of the installation
11 labour costs in order to account for the proportion of the labour costs that are
12 associated with removing the existing assets.

13 For the 20-year analysis period used in the rate design, the average annualized
14 value of amortization of one-time Replacement Program capital and non-capital
15 costs is \$3 million per year after installation completes. These costs include the
16 replacement of RS 1701 street lights and migration of RS 1755 Group 2 street lights.
17 These costs are presented in [Table G-5](#).

18 **1.4 Undepreciated Value of Existing Street Lights**

19 As the existing fleet of street lights still contain some useful life, they have yet to be
20 fully depreciated. As of October 31, 2020, the total net book value of the existing
21 lights is \$21.59 million, of which \$7.19 million is for the luminaires including
22 approximately 0.5 per cent of arms to be replaced. The Replacement Program will
23 take several years to complete, and the estimated depreciation during the
24 Replacement Program installation period is \$0.63 million. This results in
25 \$6.55 million of net book value that needs to be recovered before the lights are
26 removed from service. Assuming lights are removed from service over fiscal 2021,

1 fiscal 2022 and fiscal 2023, the annual value that needs to be recovered is
2 2.18 million per year, although the actual value to be recovered in each year will
3 depend on when the supplemental charge becomes effective.

4 **1.5 Twenty-Year Marginal Cost Model RS 1701 and RS 1755**
5 **Group 2**

6 As shown in [Table G-5](#) below, the net sum of the marginal financial benefits and
7 costs is calculated as net savings for each year of the 20-year expected life for the
8 LED luminaires.

1 **Table G-5 RS 1701 Marginal Cost Model Outcomes**

Fiscal Year	Electricity Savings (\$ million)	Undepreciated Value of Existing HPS Lights (\$ million)	One-time Investment Replacement Program Cost (\$ million)	Maintenance Savings (\$ million)	Net Savings (\$ million)	Revenue without Replacement Program (\$ million)	Planned Revenue after Savings ⁴ (\$ million)
F2021	(0.1)	2.2	1.2	(0.5)	2.8	23.0	25.8
F2022	(0.6)	2.2	2.3	(1.3)	2.6	23.6	26.2
F2023	(1.3)	2.2	3.2	(1.3)	2.8	23.5	26.4
F2024	(1.7)	-	3.0	(1.3)	0.0	24.2	24.2
F2025	(1.9)		3.0	(1.3)	(0.2)	24.7	24.6
F2026	(1.9)	-	3.0	(1.4)	(0.2)	25.2	25.0
F2027	(1.9)	-	3.0	(1.4)	(0.3)	25.7	25.4
F2028	(2.0)	-	3.0	(1.4)	(0.4)	26.2	25.9
F2029	(2.1)	-	3.0	(1.4)	(0.5)	26.8	26.3
F2030	(2.1)	-	3.0	(1.5)	(0.6)	27.3	26.7
F2031	(2.3)	-	3.0	(0.8)	(0.1)	27.8	27.8
F2032	(2.5)	-	3.0	(0.2)	0.4	28.4	28.8
F2033	(2.5)	-	3.0	(0.3)	0.3	29.0	29.2
F2034	(2.6)	-	3.0	(1.4)	(0.9)	29.5	28.7
F2035	(2.6)	-	3.0	(1.4)	(1.0)	30.1	29.1
F2036	(2.7)		3.0	(1.4)	(1.1)	30.7	29.6
F2037	(2.8)		3.0	(1.4)	(1.2)	31.3	30.2
F2038	(3.6)		3.0	(1.4)	(1.9)	32.0	30.0
F2039	(3.7)		3.0	(1.4)	(2.0)	32.6	30.6
F2040	(3.9)		3.0	(1.3)	(2.2)	33.3	31.1

⁴ Figures may not add up due to rounding.

2 Proposed Final RS 1701 Pricing

Using the Marginal Cost Model outputs from [Table G-5](#), pricing is then determined as shown in [Table G-6](#) below. The LED rates for inclusion in RS 1701 are calculated to recover the total revenue estimated by the marginal cost model presented in [Table G-5](#) and to include variation based on wattage classification.

In order to calculate these rates, it is assumed that the net cost savings in [Table G-5](#) above impacts the RS 1701 revenue (without the Replacement Program) over the 20-year rate design period. The total revenue for RS 1701 customers over this period is then equated to a billing stream.

The variation in the calculated RS 1701 pricing based on wattage classification is determined using a bottom-up approach to estimate the impact of higher priced luminaires and higher electricity consumption associated with higher wattage street lights. The calculation estimates the proportion of the total street lighting cost that does vary with wattage compared to the proportion that is independent of wattage and pro rates the average rate into the wattage classifications on this basis.

For example, in [Table G-6](#), the some of the components of the installed street light cost, such as luminaires do vary based on the wattage of the street light however it is assumed that other costs, such as the photocell, pole remediation requirements, installation labour and the net book value of the arms that are re-used are independent of street light wattage.

Street lighting related operating costs are then calculated by depreciating the total installed street lighting assets over the appropriate amortization period and adding street lighting maintenance costs, which are assumed to be independent of wattage, to get a total annual cost excluding electricity. The annual cost of electricity for street lighting is then added to get the annual cost including electricity.

1 The street lighting costs are then matched to the marginal cost model revenue
2 estimates by including non-street light specific cost (e.g., business support, electrical
3 infrastructure). This then gives the amount that is recovered through billing for the
4 first year of the 20-year rate design period. The rates for subsequent fiscal years are
5 then escalated using the same rate increase assumptions that were used to develop
6 the marginal cost model. The rate is then iterated until the total amount recovered
7 from the billing stream matches the total RS 1701 revenue (without conversion) less
8 the net cost savings presented in [Table G-5](#) over the 20-year rate design period.

1 **Table G-6 RS 1701 Rate Design and Pricing Model Summary**

				1	2	3	4	5
	LED RATE CATEGORY	Formula		Average	< 50W	51-80W	81-120W	> 120W
	BASIS FOR CALCULATION							
1	RS 1701 Street Lights		No.	90,480	5,217	46,952	35,958	2,353
2	RS 1755 Lights Converted		No.	370	30	269	71	-
3	Number of Fixtures	L1 + L2	No.	90,850	5,247	47,222	36,029	2,353
	LED REPLACEMENT COSTS							
4	Total Installed cost		\$/Unit	693.51	557.76	629.86	790.39	790.39
5	NBV of Re-Used equipment (Arms)		\$/Unit	158.55	158.55	158.55	158.55	158.55
6	Total Investment Related Costs	L4 + L5	\$/Unit	852.06	716.31	788.41	948.94	948.94
	LED OPERATING COSTS							
7	Depreciation of Investment Related Costs		\$/Unit/Year	40.69	33.90	37.51	45.54	45.54
8	LED Maintenance Cost		\$/Unit/Year	6.10	6.10	6.10	6.10	6.10
9	Total Cost Excluding Electricity	L7 + L8	\$/Unit/Year	46.79	40.01	43.61	51.64	51.64
	COST OF ELECTRICITY							
10	Average Wattage		W	90.6	39.0	75.0	114.0	162.0
11	Electricity Rate (from F2019 FACOS ⁵)		\$/W/Month	0.0398	0.0398	0.0398	0.0398	0.0398
12	Cost of Electricity	L10 * L11 * 12	\$/Unit/Year	43.29	18.63	35.82	54.45	77.37
	RATE DETERMINATION - F2021							
13	Annual LED Cost - Incl Electricity	L9 + L12	\$/Unit/Year	90.09	58.63	79.43	106.09	129.01
14	Shared and Electrical Infrastructure Costs	To match R/C	\$/Unit/Year	157.88	122.34	145.84	175.96	201.87
15	Recovered through Billing	L13 + 14	\$/Unit/Year	247.97	180.97	225.28	282.05	330.88
16	LED Rate	L15 / 12	\$/Unit/Month	20.66	15.08	18.77	23.50	27.57

⁵ F2019 FACOS Available at: <https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/regulatory-planning-documents/regulatory-filings/facos/00-2020-05-13-bchydro-facos-2019-annual-report.pdf>.

				1	2	3	4	5
	LED RATE CATEGORY	Formula		Average	< 50W	51-80W	81-120W	> 120W
	RESULTS - F2021 Marginal Cost Basis							
17	HPS Rates (F2021)		\$/Unit/Month	21.08	19.40	19.40	23.14	26.72
19	LED Rates (F2021)	L18	\$/Unit/Month	20.66	15.08	18.77	23.50	27.57
20	LED Supplemental Charge (assumed, starting F2022)		\$/Unit/Month	2.06	2.06	2.06	2.06	2.06
21	Effective Rate	L20 + L21	\$/Unit/Month	22.72	17.14	20.83	25.56	29.63

This approach results in a fixed monthly per unit charge that varies only with the lumen output of the fixture. As discussed in section 5.1 of the Application, this approach aligns with the Bonbright criteria regarding practicality and stability. The pricing is easy to understand, practical to implement, and stable over time. The rates vary only with general rate increases or decreases.

2.1 Calculation of Supplemental Charge

As discussed in section 1.4, the undepreciated value of the HPS street lighting equipment to be replaced before the end of its service life is \$6.55 million, including allowance for on-going depreciation during the Replacement Program. The Supplemental charge is then calculated to recover this amount over the implementation period of the Replacement Program and is calculated as shown in [Table G-7](#).

Table G-7 Calculation of the Supplemental Charge

Item	Amount
Total NBV of HPS Street Lights (\$ million)	6.55
Number of Street Lights	90,850
NBV Per Street Light (\$/unit)	72.10
Assumed Recovery (months)	35
Supplemental Charge (\$/light/month)	2.06