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April 1, 2021

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:

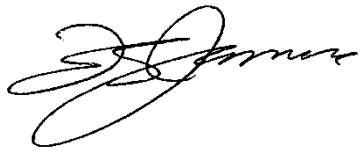
RE: Project No. 1599147
British Columbia Utilities Commission (BCUC or Commission)
British Columbia Hydro and Power Authority (BC Hydro)
2020 Street Lighting Rate Application (the Application)

BC Hydro writes in compliance with Commission Order No. G-43-21 to provide its responses to Round 2 information requests as follows:

Exhibit B-6	Responses to Commission IRs
Exhibit B-7	Responses to Interveners IRs
Exhibit B-5-2	Revision to Responses to Round 1 Intervener IRs – MHPOABC IRs 1.1A, 1.1B and 1.2G

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

Yours sincerely,



Fred James
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ch/rh

Enclosure

18.0 A. Rate Schedule 1701

Reference: INTRODUCTION
Exhibit B-4, British Columbia Utilities Commission Information Request 1.1, 1.1.1
Proposed effective date

In response to British Columbia Utilities Commission (BCUC) Information Request (IR) 1.1, British Columbia Hydro and Power Authority (BC Hydro) states:

> … a timely decision on [Rate Schedule] RS 1755 is requested as BC Hydro is facing the Federal [Poly-Chlorinated Biphenyls] PCB regulation deadline of December 31, 2025…

In response to BCUC IR 1.1.1, BC Hydro states:

> There is however a potential impact on customer rates of delayed final approval of RS 1701 amendments beyond May 1, 2021. This impact is specific to the supplemental charge. As described in section 5.2.2 of the Application, BC Hydro must recover the remaining book value of the replaced streetlights by the end of the Replacement Program, which is expected to be by March 31, 2024. The net book value is $6.55 million. The proposed supplemental charge is calculated based on recovery of the undepreciated value of the existing street lights over the 35 months from May 1, 2021 through March 31, 2024. All else being equal, a delay in approval of the supplemental change could reduce the number of months over which the $6.55 million would need to be recovered, and hence could increase the amount of the supplemental charge that would need be recovered per month per light.

2.18.1 Please explain the significance of the March 31, 2024 end date for the recovery of the undepreciated value of the existing street lights.

RESPONSE:

BC Hydro refers to section 5.2.2 of the Application starting on line 24 of page 28.

> **"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)."

BC Hydro expects to complete the Replacement Program in fiscal 2024 and March 31, 2024 is the last day of that fiscal year.

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2.18.2 Please explain why BC Hydro is only proposing to recover the undepreciated value of the existing street lights over a 35 month period and not by (i) December 31, 2025, in line with the Federal PCB regulation deadline; or (ii) any other period.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.18.1 where we state that the proposed supplemental charge is designed to recover the undepreciated value of the street lights to be removed from service approximately matching the removal of these assets through the Replacement Program in accordance with accounting rules. BC Hydro targets to complete all RS 1701 removals by March 31, 2024 to allow time to conduct final data and field audits to ensure full compliance with the Federal PCB Regulation deadline by December 31, 2025.

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2.18.2.1 Please discuss if the end date for recovery of the undepreciated value of the existing street lights can be extended. If yes, please explain why a later date was not chosen.

RESPONSE:

For the reasons described in BC Hydro's response to BCUC IR 2.18.1, the recovery of the undepreciated value of the existing street lights cannot be extended absent deferral treatment as discussed in BC Hydro' response to BCUC IR 2.30.13.

19.0 A. Rate Schedule 1701

Reference: BACKGROUND AND NEED FOR RS 1701 CHANGES
Exhibit B-1, Application, Section 3.5, pp. 16–17; Exhibit B-4, BCUC IR 3.6, 3.8;
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LED Pilot Studies and Maintenance

On page 16 and 17 of BC Hydro's 2020 Street Lighting Rate Application (Application), it states:

> …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.
>
> In 2016 and 2017, BC Hydro installed 195 LED street lights as part of its LED pilot studies. These pilot studies were conducted in the municipality of Richmond and in Haida Gwaii (Port Clements, Queen Charlotte City, Village of Masset, Skidegate).

In response to Zone II Ratepayers Group (Zone II RPG) IR 4.1, BC Hydro states:

> While BC Hydro would have liked to conduct another pilot in the Northern Interior, the program focus changed after the Richmond and Haida Gwaii pilots towards vendor procurement activities and reviewing possible solutions with adaptive controls.
>
> Instead of a third pilot in the Northern Interior, BC Hydro contacted other utilities that had installations in very extreme weather conditions. We are confident that the street lights will perform satisfactorily in these locations.

2.19.1 Please explain why the program focus shifted towards vendor procurement activities and reviewing possible solutions with adaptive controls upon completing the Richmond and Haida Gwaii pilot studies.

RESPONSE:

With the Richmond and Haida Gwaii pilot studies completed by 2018 and the Federal PCB Regulation deadline of December 31, 2025 approaching, BC Hydro shifted focus of the program to:

- **Obtain more information about the performance of the street light luminaires, photocells and adaptive controls available on the market. This assisted BC Hydro in determining how this equipment would perform in various**

weather conditions that could be experienced in B.C. and in obtaining references for actual installations throughout North America (from the different manufacturers that responded); and

- **Obtain options for LED street light luminaires and control technologies through procurement activities so that the necessary documentation and approvals can be put in place and equipment and labour be secured to ensure program completion in compliance with the federal regulation.**

The decision to progress with LEDs was also supported via the Union of British Columbia Municipalities (UBCM) letter submitted to BC Hydro on October 22, 2018 which included a motion endorsed by the UBCM for "the Province of British Columbia to direct BC Hydro to begin an LED Conversion Project to programmable LED streetlights in all local governments."

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>
> Instead of a third pilot in the Northern Interior, BC Hydro contacted other utilities that had installations in very extreme weather conditions. We are confident that the street lights will perform satisfactorily in these locations.

2.19.2 Please explain why BC Hydro did not perform an LED pilot study in the Northern Interior to test the suitability of LED lighting in extreme weather conditions.

RESPONSE:

Further to drivers listed in BC Hydro's response to BCUC IR 2.19.1, BC Hydro saw limited benefits in conducting a further pilot in the Northern Interior given that through the procurement activities it was engaging LED street lights manufacturers and others (including utilities) who have implemented LED streetlights. As stated in BC Hydro's response to ZONE II RPG IR 1.4.1.2 this engagement provided confidence that LED street lights would be suitable for extreme weather conditions such as those found in British Columbia's Northern Interior.

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2.19.2.1 Please provide a list of the utilities BC Hydro contacted in lieu of conducting a third LED pilot study. In your response, please provide (i) the location of LED street lighting exposed to comparable extreme weather conditions; and (ii) a summary of the information these utilities provided with respect to LED performance.

RESPONSE:

BC Hydro had discussions with a number of utilities and cities that had started or completed conversion of their existing street lights to LEDs. The utilities included: Manitoba Hydro, SaskPower, and Nova Scotia Power. The cities included City of Montreal and the City of Richmond.

Because of confidentiality, BC Hydro will not specify which of the above contacts provided the information below.

Two contacts provided insight into units operating in extremely low temperatures. These contacts have units installed in areas that have extremely low temperatures in the winter, as low or lower than experienced in B.C. Issues identified in low extreme low temperatures included:

- **Strobing of lights if units were not properly bonded to ground or if grounding at the pole was not sufficient; and**
- **Some luminaires consumed more electricity during extremely low temperatures.**

The strobing effect was resolved by addressing bonding and ground issues locally. BC Hydro has allowed for bonding at each street light on the system, as well as adding grounding locally, if required, within the contingency amount of the Replacement Program costs.

Other non-extreme weather-related issues identified included:

- **Glare complaints from customers are often the result of improper installation of the street light and can often be resolved by adjusting aim. In extreme cases, shields can be installed if necessary;**
- **Units from some manufacturers that receive low voltage (90 V or lower) or have poor grounding may begin to strobe;**
- **Discussion of quality among the different manufacturers of lights – units from some manufacturers have come from the factory with loose wires or the incorrect driver unit installed or batch issues with specific components;**
- **Actual unit failures are usually a result of assembly or installation issues and are generally within the tolerance rates expected;**
- **Some LED street lights can cause interference with radios in vehicles and HAM radios despite being FCC and Industry Canada approved. This can be resolved by ensuring proper grounding and bonding at the pole;**
- **Luminaire cleaning should be factored into the lifecycle of the lights; and**
- **Level of after sales support provided by different manufacturers – positive comments were received for most manufacturers, one of which was selected by BC Hydro to supply its lights.**

BC Hydro has taken into consideration the above identified issues and has incorporated mitigation procedures to ensure they are addressed in the Replacement Program implementation.

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2.19.2.1.1 Please discuss how this information allowed BC Hydro to conclude that its procured street lights would perform satisfactorily in extreme winter conditions.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.19.2.1.

BC Hydro concluded from the discussions with utilities and cities that issues related to extreme weather conditions could be addressed with mitigations allowed for in the Replacement Program contingency as were implemented by other utilities that experienced these issues.

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In response to BCUC IR 3.6, BC Hydro states:

> BC Hydro agrees that these LED street lights can be repaired. However, in the event of a failed LED street light, BC Hydro plans to replace the entire street light luminaire and/or photocell on site and return the failed unit(s) back to the street light vendor for repair or replacement during the first 10 years of LED street light ownership.
>
> Several factors were considered in making this decision including:
>
> - BC Hydro has negotiated a 10-year repair or replacement warranty with our street light vendor for both the luminaires and photocells; […]
> - Given the vastly lower volumes of failures and LED street lighting repairs not representing typical day-to-day work for these crews, BC Hydro believes the extra costs of stocking LED street light components at several line offices and keeping crews trained to troubleshoot the LED units across the province are greater than the cost to return the units to the vendor for repairs or replacements in the first 10 years of ownership. However, BC Hydro has not performed a detailed cost comparison analysis between these maintenance approaches; and
> - Beyond the warranty period, BC Hydro may consider other repair or replacement options which also factor in the remaining life of the units as well as the availability of new technologies at that time which may be lower cost, more energy efficient, and more reliable.

In response to BCUC IR 3.8, BC Hydro states:

> A similar maintenance approach will be taken with LED street lights. As units fail, the luminaire and/or the photocell will be replaced when failures are reported to BC Hydro by its customers. The number of reported failures for LED street lights is estimated to be about 15 per cent of those reported for HPS and MV street lights. Given the much reduced frequency of failures expected with LED street lights, BC Hydro has factored into the lifecycle maintenance costs a proactive group luminaire cleaning at year 10 of ownership to ensure light output is maintained at acceptable levels throughout the 20-year life of the luminaires.

2.19.3 Please confirm, or explain otherwise, if the repair or replacement warranty period for a failed LED street light begins upon street lighting installation.

RESPONSE:

The warranty period for the street lights and photocells begins upon BC Hydro receiving and taking possession of the assets. The vast majority of the street lights received during the course of the deployment period will be installed within months of receipt.

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2.19.4 Please discuss other repair or replacement warranties that were considered and why BC Hydro selected a 10-year warranty period.

RESPONSE:

As part of the procurement process and contract negotiations with the supplier, BC Hydro received a 10-year warranty for both the luminaires and photocells. While BC Hydro negotiated terms within the warranty, it did not evaluate alternatives to the duration of the warranty. This warranty duration was deemed to be reasonable because of the value of the individual assets and the assets have an expected life of 20 years. Furthermore, the supplier will repair or replace the impacted units if any luminaires or photocells fail within this period, are found to be defective, or do not meet BC Hydro's specifications.

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2.19.4.1 Please indicate whether the negotiated warranty is set at a reduced rate per street light or at a fixed cost per year.

RESPONSE:

BC Hydro understands this information request to be asking whether the negotiated warranty is included within the purchase price of the luminaires and photocells. Yes, the negotiated warranty is included within the purchase price (for each unit). Furthermore, during the warranty period, the supplier will repair or replace products under the warranty at no charge to BC Hydro.

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2.19.4.2 Please confirm, or otherwise explain, that BC Hydro does not intend to stock any LED units or components at its local line offices.

RESPONSE:

BC Hydro currently stocks LED luminaires and photocells in its Main Distribution Centre and local field stores (line offices) for use in new installations, repairs/replacements and customer requested modifications. However, BC Hydro does not intend to stock "components" of the LED luminaires (e.g., drivers or LED optics).

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2.19.4.3 Please indicate the estimated lead time for BC Hydro's vendors to replace a failed LED street light. In your response, please discuss the logistics of where the repair and/or replacement is sourced and how long a street light may be out of service until it is repaired and/or replaced.

RESPONSE:

BC Hydro targets replacing a failed street light within 10 business days from when it is reported to BC Hydro. However, this is dependent upon BC Hydro receiving accurate information on the failed street light, e.g., the correct location of the street light from customers or the general public.

As mentioned in BC Hydro's response to BCUC IR 2.19.4.2, BC Hydro stocks luminaires at its Main Distribution Centre and fields stores. If a street light fails, BC Hydro will replace the failed unit with one from its stock. BC Hydro does not need to wait for an individual failed unit to be repaired/replaced by the supplier prior to the luminaires being replaced in the field.

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> - Given the vastly lower volumes of failures and LED street lighting repairs not representing typical day-to-day work for these crews, BC Hydro believes the extra costs of stocking LED street light components at several line offices and keeping crews trained to troubleshoot the LED units across the province are greater than the cost to return the units to the vendor for repairs or replacements in the first 10 years of ownership. However, BC Hydro has not performed a detailed cost comparison analysis between these maintenance approaches; and
> - Beyond the warranty period, BC Hydro may consider other repair or replacement options which also factor in the remaining life of the units as well as the availability of new technologies at that time which may be lower cost, more energy efficient, and more reliable.

In response to BCUC IR 3.8, BC Hydro states:

> A similar maintenance approach will be taken with LED street lights. As units fail, the luminaire and/or the photocell will be replaced when failures are reported to BC Hydro by its customers. The number of reported failures for LED street lights is estimated to be about 15 per cent of those reported for HPS and MV street lights. Given the much reduced frequency of failures expected with LED street lights, BC Hydro has factored into the lifecycle maintenance costs a proactive group luminaire cleaning at year 10 of ownership to ensure light output is maintained at acceptable levels throughout the 20-year life of the luminaires.

2.19.4.4 Please indicate whether there are any incremental costs outside of the warranty when an LED street light fails. If yes, please provide an estimate of these incremental costs.

RESPONSE:

Yes, when a street light fails during the warranty period, BC Hydro will incur incremental costs beyond what is covered by the warranty when replacing a failed street light. The main incremental cost is the labour for field crews to physically replace the street light. This cost varies depending on several factors such as travel time and can range from approximately $200 to $300 plus per street light. Other incremental costs include material handling and internal cost loadings.

19.0 A. Rate Schedule 1701

Reference: BACKGROUND AND NEED FOR RS 1701 CHANGES
Exhibit B-1, Application, Section 3.5, pp. 16–17; Exhibit B-4, BCUC IR 3.6, 3.8;
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2.19.4.5 Please confirm, or explain otherwise, that BC Hydro has contracted with third party installation crews to assist with the RS 1701 deployment schedule.

RESPONSE:

Confirmed. BC Hydro has awarded contracts to three third-party installation services contractors to assist with the Replacement Program deployment.

19.0 A. Rate Schedule 1701

Reference: BACKGROUND AND NEED FOR RS 1701 CHANGES
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2.19.4.5 Please confirm, or explain otherwise, that BC Hydro has contracted with third party installation crews to assist with the RS 1701 deployment schedule.

2.19.4.5.1 If confirmed, please explain why BC Hydro contracted with a third party. In your response, please provide an estimate of the savings achieved using a third party instead of utilizing BC Hydro technicians.

RESPONSE:

BC Hydro awarded contracts to installation services contractors (Contractors) for a number of reasons including, but not limited to:

- **BC Hydro's internal field crews do not have the capacity to complete all of the required field work within the Street Light Replacement Program's deployment timeline;**
- **Internal crews that are trained and equipped to work on BC Hydro's distribution system have other powerline work which requires their attention. The Contractors are dedicated to supporting the conversion of BC Hydro's street lights and therefore can focus on that work (rather than also addressing other powerline work); and**
- **While all the Contractors are using qualified electrical workers, most are using electricians versus Powerline Technicians, (who are qualified and equipped to do high voltage work on BC Hydro's distribution system) and use different vehicles than BC Hydro's. This enables the Contractors to replace a greater number of street lights with LEDs within given time period at lower unit costs (costs directly attributed to replacing a given street light).**

However, internal crews will continue to perform most of the repairs of failed street lights because the Contractors are not based throughout the province. Internal crews will also undertake replacements in cases of exceptions (e.g., where the Contractors are unable to complete the work), escalations and the planned replacements of street lights in certain locations.

Based upon the reasons noted above – specifically that internal crews do not have the capacity to complete all of the work within the Replacement Program's timelines – BC Hydro has not calculated the cost to have internal crews complete the entire scope of work for the program. Moreover, the assignment of additional internal crews to the Replacement Program would result in the need to use contractors to complete the work that such internal crews would otherwise be doing.

19.0 A. Rate Schedule 1701

Reference: BACKGROUND AND NEED FOR RS 1701 CHANGES
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2.19.5 Please provide forecast cost comparison analyses between the following two maintenance approaches:

(i) costs to stock LED street light components and retaining trained crews; and
(ii) costs to return LED units to the vendor for repair and replacement for the first 10 years of ownership.

RESPONSE:

BC Hydro currently does not have sufficient information to provide reasonably accurate cost forecasts for this request. BC Hydro has not engaged the luminaire vendor regarding the cost of spare parts nor has it negotiated these prices through the procurement process. However, the activities that BC Hydro would cost out in each approach would include:

Stocking Repair Components Approach:

- **Cost of purchasing and stocking spare parts and keep minimum stock on hand for 58 headquarters in the province. Stock levels could double in five years after current vendor contract expires or sooner if vendor discontinues current models;**
- **Cost to train 500-plus crew members on how to troubleshoot street lights;**
- **Added time and cost of at least two crew members troubleshooting failures on-site – (estimate, half to one hour each unit additional time);**
- **Re-training crews once street light contract with vendor has expired (crews will need to continue to repair original LED units as well as new models); and**
- **Opportunity costs of crews doing more work internally on the distribution system resulting in the potential for more distribution work needing to be contracted out.**

Unit Replacement / Warranty Approach:

- **Cost to segregate returned street lights from materials returned to stores (all materials removed from worksite are returned to central stores for warranty return or scrap);**
- **Cost to store and periodically collect serial numbers from failed units returned to central stores and contact vendor for warranty claim;**
- **Cost to contact vendor to pick up failed units (if returns are required); and**
- **Cost to receive repaired or replacement units (likely shipped with newly ordered stock for new installations).**

19.0 A. Rate Schedule 1701

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2.19.5.1 Please provide a cost comparison for the selected 10-year warranty period, any other warranty periods considered and the in-house street light replacement.

RESPONSE:

BC Hydro did not pursue pricing options in the procurement process for warranty periods other than 10 years.

As indicated in BC Hydro's response to BCUC IR 2.19.5, BC Hydro has insufficient information from the vendor to compare the warranty options suggested above with the in-house repair option.

19.0 A. Rate Schedule 1701

Reference: BACKGROUND AND NEED FOR RS 1701 CHANGES
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2.19.6 Please discuss the potential repair or replacement options that may be available to BC Hydro beyond the 10-year warranty period.

RESPONSE:

Potential repair options beyond the 10-year warranty period could include:

- **A centralized unit refurbishment program if the vendor still stocks replacement components at a very low cost. BC Hydro does not currently have such a process for street lights; and**
- **Replacement of failed units with commercially available comparable units.**

19.0 A. Rate Schedule 1701

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2.19.6.1 Given LED street lights are expected to have a 20 year life, please explain why BC Hydro chose not to train and utilize in-house crews in order to service BC Hydro's LED street lights before and after the 10-year warranty period.

RESPONSE:

BC Hydro has chosen not to train and utilize in-house crews to service BC Hydro LED street lights that fail, as opposed to replacing the failed units, in order to minimize overall life cycle costs for managing street lights and to ensure customers are provided with very reliable street light service.

The training of crews, who normally perform other work on the distribution system, stocking of components in each of BC Hydro's 58 headquarters, troubleshooting of units in the field from a bucket truck with at least two crew members present, and repair of the unit with the spare parts would be more costly than these same crews replacing the failed unit with a new unit.

BC Hydro has taken a similar approach with failed High Pressure Sodium and Mercury Vapour street lights since at least 2004.

19.0 A. Rate Schedule 1701

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2.19.6.2 Please confirm if BC Hydro intends to retain a minimum complement of trained crews across the province to service BC Hydro's LED street lights after the 10-year warranty period.

RESPONSE:

BC Hydro has a complement of crews that work on the distribution system that will respond to failed LED street lights. BC Hydro does not intend to have crews trained to troubleshoot, repair and replace LED luminaire components in the field.

19.0 A. Rate Schedule 1701

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2.19.7 Please explain how BC Hydro estimated the failure rate of LED luminaires relative to HPS and MV street lights. In your response, please provide the projected number of failures for LED street lights each year and the anticipated timing of occurrence of such failures following completion of the Replacement Program.

RESPONSE:

In BC Hydro's response to BCUC IR 1.3.8, BC Hydro provided a rough estimate figure of 15 per cent to represent the percentage of failures that will be experienced on the system once the fleet of street lights is completely converted to LEDs compared to the number of failures experienced using HPS/MV street lights.

A more in-depth analysis is provided below to calculate this percentage:

- **In fiscal 2020, BC Hydro performed 10,648 HPS/MV spot repairs on RS 1701 street lights; and**
- **Based a population of 88,812 RS 1701 street lights and on an average annual LED failure rate of 1.125 per cent per year, the percentage of failures expected from LED street lights compared to HPS/MV will be (88,812 x 1.125 per cent) / 10,648 = 9.3 per cent.**

Above, 1.125 per cent is the average annual failure rate of LED street lights based on projected annual failures from the table below. The 9.3 per cent is the updated percentage of failures that will be experienced on the system once the fleet of street lights is completely converted to LEDs compared to the number of failures experienced with HPS/MV street lights.

The rates of failure and the number of LED luminaires expected to fail each year used in calculating LED lifecycle costs at part of the implementation Business Case are shown in the table below based on an RS 1701 population of 88,812 units.

Year of Operation	Failure Rate (%)	Est. No. of Failures
1	0.9	799
2	0.5	444
3	0.5	444
4	0.5	444
5	0.5	444

Year of Operation	Failure Rate (%)	Est. No. of Failures
6	**0.5**	**444**
7	**0.5**	**444**
8	**0.5**	**444**
9	**0.5**	**444**
10	**0.5**	**444**
11	**0.9**	**799**
12	**1.8**	**1599**
13	**1.8**	**1599**
14	**1.8**	**1599**
15	**1.8**	**1599**
16	**1.8**	**1599**
17	**1.8**	**1599**
18	**1.8**	**1599**
19	**1.8**	**1599**
20	**1.8**	**1599**
Yearly Average	**1.125**	**999**

20.0 A. Rate Schedule 1701

Reference: RS 1701 LED STREET LIGHT REPLACEMENT PROGRAM Exhibit B-4, BCUC IR 4.3–4.6, 8.8; Exhibit B-5, Zone II RPG IR 6.1.1; BC Sustainable Energy Association IR 6.2 LED installation plan and procurement process

In response to BCUC IR 4.3, BC Hydro states:

> BC Hydro does not plan to introduce any additional wattages or colour temperature options to customers during the deployment of LED Street Light Replacement Program. BC Hydro has provided a selection of wattages and colour temperatures that we believe meet the needs of our customers. BC Hydro did not receive significant feedback in this regard during the customer consultation sessions of the program.
>
> However as new, more efficient, and more effective luminaire options become available and as customer demand changes, BC Hydro will consider adding or replacing wattages and colour temperatures after the completion of this program.

2.20.1 As more efficient and effective luminaire options become available, please explain how BC Hydro plans to offer additional wattage and colour temperature options to customers after completion of the Replacement Program. In your response, please discuss the potential changes, if any, to LED rates if additional wattages and colour temperatures are offered.

RESPONSE:

BC Hydro will endeavour to maintain the current fleet of LED street lights at their existing locations through the 20-year estimated life of these units. As current models become obsolete and are replaced by the manufacturer with equivalents of lower wattages, these new units will be offered to customers for new installations and replacements of units that fail in service. The input wattages of the new equivalents will dictate the rate that will be charged for these new units.

Current colour temperatures will continue to be offered as long as they are commercially available. If one or both colour temperatures become obsolete, BC Hydro will provide the future equivalents of "warm" and "cool" colour temperature units.

BC Hydro has proposed LED wattage ranges in the 2020 Street Light Rate Application that can accommodate new lower wattage units as they become available on the market.

20.0 A. Rate Schedule 1701

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In response to BCUC IR 4.4, BC Hydro states:

> Other than markets for scrap metal value, BC Hydro is not aware of secondary markets to sell its current inventory of street lights. If such a market were to exist, BC Hydro could only sell units that were confirmed to have no PCBs.

In response to BCUC IR 4.5, BC Hydro states:

> Yes, BC Hydro considered the potential resale value. However, as explained in BC Hydro's response to BCUC IR 1.4.4, BC Hydro is not aware of secondary markets to sell its current inventory of street lights.
>
> BC Hydro will recover scrap value by transferring ownership of non-PCB units and components to installation contractors for resale as part of the LED street light installation services contract prices for the majority of units removed.

In response to BC Sustainable Energy Association (BCSEA) IR 6.2, BC Hydro states:

> BC Hydro confirms that there can be a range of PCB concentration amounts in these street lights and it can be in a concentration that exceeds 50 mg/kg. BC Hydro cannot determine the concentration of PCBs in a street light without destroying the fixture. As a result, BC Hydro has assumed all of the lights have PCB concentrations exceeding 50mg/kg such that the restriction on transfer and operation would apply.

2.20.2 Please provide the approximate scrap value that BC Hydro will recover from transferring ownership of non-PCB units and components to its installation contractors. In your response, please discuss what BC Hydro intends to do with the recovered scrap value.

RESPONSE:

BC Hydro will not be directly recovering the scrap value of the non-PCB units that are removed by the installation service contractors. Any scrap value the installation service contractors receive is intended to off-set some of their costs associated with handling the removed units. This value is reflected within the unit prices which the contractors are charging BC Hydro.

20.0 A. Rate Schedule 1701

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> BC Hydro will recover scrap value by transferring ownership of non-PCB units and components to installation contractors for resale as part of the LED street light installation services contract prices for the majority of units removed.

In response to BC Sustainable Energy Association (BCSEA) IR 6.2, BC Hydro states:

> BC Hydro confirms that there can be a range of PCB concentration amounts in these street lights and it can be in a concentration that exceeds 50 mg/kg. BC Hydro cannot determine the concentration of PCBs in a street light without destroying the fixture. As a result, BC Hydro has assumed all of the lights have PCB concentrations exceeding 50mg/kg such that the restriction on transfer and operation would apply.

2.20.3 Please discuss how other Canadian utilities, namely Manitoba Hydro, Hydro Québec, SaskPower and Nova Scotia Power, have taken into account the potential scrap values of their existing HPS/MV street lights with respect to LED rate design.

RESPONSE:

BC Hydro has not discussed potential scrap values of existing HPS/MV lights with the listed Canadian utilities.

20.0 A. Rate Schedule 1701

Reference: RS 1701 LED STREET LIGHT REPLACEMENT PROGRAM
Exhibit B-4, BCUC IR 4.3–4.6, 8.8; Exhibit B-5,
Zone II RPG IR 6.1.1; BC Sustainable Energy
Association IR 6.2
LED installation plan and procurement process

In response to BCUC IR 4.4, BC Hydro states:

> Other than markets for scrap metal value, BC Hydro is not aware of secondary markets to sell its current inventory of street lights. If such a market were to exist, BC Hydro could only sell units that were confirmed to have no PCBs.

In response to BCUC IR 4.5, BC Hydro states:

> Yes, BC Hydro considered the potential resale value. However, as explained in BC Hydro's response to BCUC IR 1.4.4, BC Hydro is not aware of secondary markets to sell its current inventory of street lights.
>
> BC Hydro will recover scrap value by transferring ownership of non-PCB units and components to installation contractors for resale as part of the LED street light installation services contract prices for the majority of units removed.

In response to BC Sustainable Energy Association (BCSEA) IR 6.2, BC Hydro states:

> BC Hydro confirms that there can be a range of PCB concentration amounts in these street lights and it can be in a concentration that exceeds 50 mg/kg. BC Hydro cannot determine the concentration of PCBs in a street light without destroying the fixture. As a result, BC Hydro has assumed all of the lights have PCB concentrations exceeding 50mg/kg such that the restriction on transfer and operation would apply.

2.20.3 Please discuss how other Canadian utilities, namely Manitoba Hydro, Hydro Québec, SaskPower and Nova Scotia Power, have taken into account the potential scrap values of their existing HPS/MV street lights with respect to LED rate design.

2.20.3.1 Please discuss how these Canadian utilities are managing their HPS/MV inventories upon removal from their respective street light networks.

RESPONSE:

BC Hydro has not discussed with these Canadian utilities how they are managing their HPS/MV inventories upon removal.

20.0 A. Rate Schedule 1701

Reference: RS 1701 LED STREET LIGHT REPLACEMENT PROGRAM Exhibit B-4, BCUC IR 4.3–4.6, 8.8; Exhibit B-5, Zone II RPG IR 6.1.1; BC Sustainable Energy Association IR 6.2 LED installation plan and procurement process

In response to BCUC IR 4.4, BC Hydro states:

> Other than markets for scrap metal value, BC Hydro is not aware of secondary markets to sell its current inventory of street lights. If such a market were to exist, BC Hydro could only sell units that were confirmed to have no PCBs.

In response to BCUC IR 4.5, BC Hydro states:

> Yes, BC Hydro considered the potential resale value. However, as explained in BC Hydro's response to BCUC IR 1.4.4, BC Hydro is not aware of secondary markets to sell its current inventory of street lights.
>
> BC Hydro will recover scrap value by transferring ownership of non-PCB units and components to installation contractors for resale as part of the LED street light installation services contract prices for the majority of units removed.

In response to BC Sustainable Energy Association (BCSEA) IR 6.2, BC Hydro states:

> BC Hydro confirms that there can be a range of PCB concentration amounts in these street lights and it can be in a concentration that exceeds 50 mg/kg. BC Hydro cannot determine the concentration of PCBs in a street light without destroying the fixture. As a result, BC Hydro has assumed all of the lights have PCB concentrations exceeding 50mg/kg such that the restriction on transfer and operation would apply.

2.20.3 Please discuss how other Canadian utilities, namely Manitoba Hydro, Hydro Québec, SaskPower and Nova Scotia Power, have taken into account the potential scrap values of their existing HPS/MV street lights with respect to LED rate design.

2.20.3.2 Please compare the approach used by other Canadian utilities with BC Hydro's approach as it relates to managing their HPS/MV inventories upon removal from their respective street light networks.

RESPONSE:

BC Hydro cannot compare how it is managing its HPS/MV inventories upon removal from its respective street light networks with these Canadian utilities because BC Hydro has not discussed this topic with these Canadian utilities.

20.0 A. Rate Schedule 1701

Reference: RS 1701 LED STREET LIGHT REPLACEMENT PROGRAM
Exhibit B-4, BCUC IR 4.3–4.6, 8.8; Exhibit B-5, Zone II RPG IR 6.1.1; BC Sustainable Energy Association IR 6.2
LED installation plan and procurement process

In response to BCUC IRs 4.6 and 14.6.1, BC Hydro states:

> BC Hydro does not anticipate light shields will be needed because LED street lighting has more defined cut off than do HPS lights. As installation of a light shield would be done after the initial deployment of LED lights, the main cost is the labour required for a second visit to the location. We will evaluate whether there is a need to offer light shields as we continue to roll out LED street lights and will determine whether a charge is warranted to recover the added costs in the future.
>
> […]
>
> As stated in BC Hydro's response to BCUC IR 4.6, BC Hydro does not anticipate needing lights shields. That being said, BC Hydro will work with its customers on any specific lighting concerns. Based on discussions with other utilities and luminaire manufacturers, light shields are generally not required as LED luminaires have more defined lighting cut-off than HPS street lights. BC Hydro's installation crews will follow the instructions provided to minimize light spill into residential dwellings. Furthermore, BC Hydro will work with the customer on a one-off basis and may perform a site check, re-aim the luminaire, confirm the appropriate luminaire is installed. The resolution could also include moving the light to another pole and/or installing a shield (if required). [*emphasis added*]

2.20.4 Please provide a cost estimate to install an LED light shield, including labour costs. In your response, please explain how BC Hydro intends to recover these costs.

RESPONSE:

At this time BC Hydro is not offering shields and therefore has not developed the processes or costs for installing them.

However, if BC Hydro were to offer shields, we anticipate that the addition of the shield would be charged to the customer requesting the shield. A preliminary estimate of the cost of installing a shield (material + labour + overhead) is approximately $300 to $500.

20.0 A. Rate Schedule 1701

Reference: RS 1701 LED STREET LIGHT REPLACEMENT PROGRAM
Exhibit B-4, BCUC IR 4.3–4.6, 8.8; Exhibit B-5, Zone II RPG IR 6.1.1; BC Sustainable Energy Association IR 6.2
LED installation plan and procurement process

In response to BCUC IRs 4.6 and 14.6.1, BC Hydro states:

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>
> […]
>
> As stated in BC Hydro's response to BCUC IR 4.6, BC Hydro does not anticipate needing lights shields. That being said, BC Hydro will work with its customers on any specific lighting concerns. Based on discussions with other utilities and luminaire manufacturers, light shields are generally not required as LED luminaires have more defined lighting cut-off than HPS street lights. BC Hydro's installation crews will follow the instructions provided to minimize light spill into residential dwellings. Furthermore, BC Hydro will work with the customer on a one-off basis and may perform a site check, re-aim the luminaire, confirm the appropriate luminaire is installed. The resolution could also include moving the light to another pole and/or installing a shield (if required). [*emphasis added*]

2.20.5 If the installed luminaire is deemed to be unsuitable, please discuss whether the customer or BC Hydro is responsible for the luminaire's undepreciated value upon removal.

RESPONSE:

During the Street Light Replacement Program deployment, BC Hydro is installing street lights based upon the selections provided by its customers. If an issue with the installed LED street light is identified by the Customer, BC Hydro will endeavor to work with the customer to remedy the situation. During the Replacement Program deployment, if it is determined that a newly installed LED street light requires re-work (e.g., replacing the street light with a different wattage or colour temperature), Customers will not be charged the undepreciated value of the street light. Customers will be charged if the re-work results in costs that go

beyond those reasonably anticipated as part of the Replacement Program deployment.

This approach is consistent with Rate Schedule RS 1701 Special Condition 4 as incremental costs incurred by BC Hydro will be recovered from the Customer and there would be no undepreciated value of the light. The light, still being new, can reliably and safely be re-used during the Replacement Program deployment.

BC Hydro notes that in its response to BCSEA IR 1.5.1 we describe limitations on the re-use of street lights and for clarity we note that these limitations apply to sustainment and are not applicable under the conditions describe above which are unique to the deployment phase of the Replacement Program.

20.0 A. Rate Schedule 1701

Reference: RS 1701 LED STREET LIGHT REPLACEMENT PROGRAM
Exhibit B-4, BCUC IR 4.3–4.6, 8.8; Exhibit B-5, Zone II RPG IR 6.1.1; BC Sustainable Energy Association IR 6.2
LED installation plan and procurement process

In response to BCUC IRs 4.6 and 14.6.1, BC Hydro states:

> BC Hydro does not anticipate light shields will be needed because LED street lighting has more defined cut off than do HPS lights. As installation of a light shield would be done after the initial deployment of LED lights, the main cost is the labour required for a second visit to the location. We will evaluate whether there is a need to offer light shields as we continue to roll out LED street lights and will determine whether a charge is warranted to recover the added costs in the future.
>
> […]
>
> As stated in BC Hydro's response to BCUC IR 4.6, BC Hydro does not anticipate needing lights shields. That being said, BC Hydro will work with its customers on any specific lighting concerns. Based on discussions with other utilities and luminaire manufacturers, light shields are generally not required as LED luminaires have more defined lighting cut-off than HPS street lights. BC Hydro's installation crews will follow the instructions provided to minimize light spill into residential dwellings. Furthermore, BC Hydro will work with the customer on a one-off basis and may perform a site check, re-aim the luminaire, confirm the appropriate luminaire is installed. The resolution could also include moving the light to another pole and/or installing a shield (if required). [*emphasis added*]

2.20.5 If the installed luminaire is deemed to be unsuitable, please discuss whether the customer or BC Hydro is responsible for the luminaire's undepreciated value upon removal.

2.20.5.1 Please explain how the recovery of the undepreciated value in this scenario differs from how BC Hydro currently treats undepreciated values, if applicable.

RESPONSE:

Currently, BC Hydro is not, in most cases, recovering costs from customers for street lights removed prior to full depreciation. These undepreciated costs are therefore recovered from all ratepayers or applied to the account of the shareholder. Please also refer to BC Hydro's response to BCUC IR 1.5.2.1.

Upon BCUC approval of BC Hydro's proposed RS 1701, including Special Condition 4, undepreciated costs will be offset by the Early Removal Fee which in most cases will be charged to the customer.

20.0 A. Rate Schedule 1701

Reference: RS 1701 LED STREET LIGHT REPLACEMENT PROGRAM Exhibit B-4, BCUC IR 4.3–4.6, 8.8; Exhibit B-5, Zone II RPG IR 6.1.1; BC Sustainable Energy Association IR 6.2 LED installation plan and procurement process

In response to BCUC IR 8.8, BC Hydro states:

> the actual deployment schedule will be adjusted to enable a cost-efficient roll-out considering the timing of BC Hydro receiving customer selections, geographical distribution of the street lights and field crews, field crew capacity, seasonality, etc.

In response to Zone II RPG IR 6.1.1., BC Hydro states:

> Table 4 is a high level and preliminary deployment schedule based on the installation capacity of BC Hydro's installation service contractors and internal crew. The actual deployment schedule is still being finalized and will be adjusted over the course of the deployment period.

2.20.6 Please provide the anticipated date when BC Hydro plans to issue the final deployment schedule to all RS 1701 customers. In your response, please discuss how BC Hydro intends to notify all RS 1701 customers of its deployment schedule.

RESPONSE:

The actual deployment schedule for the conversion of all RS 1701 street lights is dependent upon several factors including, but not limited to, the capacity and throughput of the installation services contractor and internal crews as well as the receipt of the LED selections from individual and groups of customers within a given geographical area. Therefore, the actual deployment schedule will be fluid and adjusted throughout the deployment period.

BC Hydro will engage customers multiple times ahead of the deployment of LED street lights in their community, including:

- **Approximately six to nine months ahead of the deployment to request and obtain their 'detailed LED selections' – the type of LED street light (wattage and colour temperature) they would like installed in each location; and**
- **Two to five weeks prior to the start of deployment to confirm the deployment logistics.**

At times the schedule may be adjusted to enable an efficient deployment, while also ensuring a positive experience for BC Hydro's customers and the local community.

20.0 A. Rate Schedule 1701

Reference: RS 1701 LED STREET LIGHT REPLACEMENT PROGRAM Exhibit B-4, BCUC IR 4.3–4.6, 8.8; Exhibit B-5, Zone II RPG IR 6.1.1; BC Sustainable Energy Association IR 6.2 LED installation plan and procurement process

In response to BCUC IR 8.8, BC Hydro states:

> the actual deployment schedule will be adjusted to enable a cost-efficient roll-out considering the timing of BC Hydro receiving customer selections, geographical distribution of the street lights and field crews, field crew capacity, seasonality, etc.

In response to Zone II RPG IR 6.1.1., BC Hydro states:

> Table 4 is a high level and preliminary deployment schedule based on the installation capacity of BC Hydro's installation service contractors and internal crew. The actual deployment schedule is still being finalized and will be adjusted over the course of the deployment period.

2.20.6.1 Please discuss the potential impacts to customers if any changes are required to the final deployment schedule. In your response, please include potential changes to LED rates and customer bill impacts, if any.

RESPONSE:

As mentioned in BC Hydro's response to BCUC IR 2.20.6, BC Hydro will engage with customers ahead of the deployment in their communities and will advise them of any adjustment to the schedule. This includes situations where opportunities arise to have the lights in their community converted earlier.

Customer bills are based on the number of street lights by types (e.g., LED, HPS) and wattage associated with their account. Therefore, as their lights are converted to LEDs, their bill will reflect their street light counts and types. BC Hydro's proposed RS 1701 LED rates are not expected to be impacted by adjustments to the deployment schedule.

21.0 A. Rate Schedule 1701

Reference: RS 1701 LED STREET LIGHT REPLACEMENT PROGRAM
Exhibit B-5, British Columbia Old Age Pensioners' Organization et al. IR 6.1, 10.3
Proactive replacement model

In response to British Columba Old Age Pensioners' Organization et al. (BCOAPO) IR 6.1, BC Hydro provides Attachment 1, the Line Asset Planning Business Case for Expenditure Authorization Request: Streetlight Replacement Program's Implementation Phase (Business Case), supporting the proactive replacement model as the best alternative based on regulatory compliance, financial and reputational considerations.

On page 38 of the Business Case, BC Hydro provides a Structured Decision Making (SDM) table:

SDM Table
Completed as part of the Program's Identification Phase – Feasibility Design Stage Business Case

Point of Comparison | Better | Similar | Worse

Objective	Criteria	Measure	Alt 1 (Status quo) Reactive replacement of Failed High Pressure Sodium (HPS) street lights with new bulbs or fixtures	Alt 2 Reactive Replacement of failed HPS street lights or HPS street lights contains PCBs in a concentration of50 ppm or more with new HPS street lights (fixture)	Alt 3 Reactive Upgrade - Convert failed HPS street lights to LED street lights	Alt 4 Proactive Upgrade - mass conversion of all HPS street lights to LED street lights	Notes
Technical							
Increase Operational Efficiency	Reduction in Annual Energy consumed by BCH owned lights	GWhs per year (reduced compared to F2019 base)	None	None	~40GWh or more/year as it could allow customers to select lower wattage LED lights.	~40GWh or more/year as it could allow customers to select lower wattage LED lights.	
	Reduction in street light failures	Estimated annual number of failures at steady state	13,000	14,000	2,000	2,000	
	Efficiently locate street lights in Geospatial Information System (GIS) e.g. for failure response, billing, customer service	Yes/No	No	No	Yes	Yes - will realize earlier depending on deployment duration	For Alt 3 & 4 - Yes if controllers with GPS functionality and a control application are implemented in these alternatives.
	More efficient deployment of streetlight replacement	Yes/No	n/a	No	No	Yes	
Financial							
Minimize One-Time Investment Costs	One-Time Investment Loaded Capital and Non-Capital Costs (including Installation Labour, Materials, Program and Deployment Costs)	$M	$0M	$16M	$82M	$73M	Base model only. Does not include controller solution
Manage Annual Maintenance (OMA) Costs	Steady State Annual OMA Costs	$M	$2.8M	$3.0M	$0M	$0M	For Alt 1 and 2, assume maintenance program will continue to be fully funded. Higher OMA cost in Alt 2 compared to Alt 1 because RS1755 MV street lights are replaced with HPS street lights to meet PCB compliance and HPS street lights have higher failure rate. $0 OMA cost in Alt 3 and 4 because LED spot failure replacement would be capital cost.
Minimize Lifecycle Cost	22 Year Evaluation Period	$M in PV	$104M	$109M	$91M	$86M	Base model only. Does not include controller solution
Improve Financial Accuracy	Improved billing accuracy to minimize over and under billing	Yes/No	No	No	Yes	Yes – could realize earlier depending on deployment duration	For Alt 3 & 4 - Yes if controllers with GPS functionality and a control application are implemented in these alternatives.

In response to BCOAPO IR 10.3, BC Hydro states:

> The Maintenance Savings reported for each year in Table G-5 were determined by comparing the High Pressure Sodium (HPS) street light historical maintenance budget average with the LED street lights ongoing costs.

2.21.1 Please explain how BC Hydro calculated the values listed in the Financial section for all four alternatives included in the above SDM Table.

RESPONSE:

The calculation of the values listed in the Financial section for all four alternatives included in the SDM Table is as follows:

- **One-Time Investment Costs:**
  - **Alt 1 – $0**
    - **Since this alternative is to remain status quo, there is $0 one-time investment cost to replace existing HPS/MV street lights fixtures that contains PCB > 50ppm with new HPS street lights fixtures, or to convert existing HPS/MV street lights to LED street lights.**
  - **Alt 2 - $16 million**
    - **The $16 million one-time investment cost is derived by multiplying 20 per cent of the RS 1701 HPS/MV street light population and 100 per cent of RS 1755 HPS/MV street light population with the labour and material unit costs of replacing the existing HPS/MV street light fixtures with new HPS street light fixtures for both RS 1701 and RS 1755 and replacing the arms for RS 1755 street lights. The total cost also includes 5 per cent project management cost and 14.5 per cent of capital overhead cost. The replacement percentages are based on the assumptions that 20 per cent of the existing RS 1701 street lights contain PCB > 50ppm and 100 per cent of the existing RS 1755 street lights contain PCB > 50ppm.**
  - **Alt 3 - $82 million**
    - **The $82 million one-time investment cost is derived by multiplying the RS 1701 and RS 1755 HPS/MV street light population with the labour and material unit costs of converting the HPS/MV street lights to LED street lights and replacing the arms for RS 1755 street lights. The total cost also includes the indirect costs to manage the replacement program (e.g., program management, deployment management, supporting technology, etc.), 15 per cent direct cost contingency, 20 per cent indirect cost contingency and 14.5 per cent capital overhead.**
    - **The labour cost is based on reactive replacement unit cost.**
  - **Alt 4 - $73 million**
    - **The one-time investment costs for Alt 4 are derived similarly as the one-time investment costs for Alt 3.**
    - **The difference is the labour unit cost used. For Alt 4, the planned deployment units labour costs are based on proactive replacement**

unit cost and the unplanned deployment units (i.e., driven by HPS/MV failure rates) labour costs are based on reactive replacement unit cost.

- **The other difference is that the indirect costs for Alt 4 are slightly higher than Alt 3 since there is more deployment planning involved.**

- **Annual Maintenance (OMA) Costs:**

  - **This is based on the annual maintenance costs when the street lights are at their steady state (i.e., have reached their highest failure rate and the failure rate will stay constant going forward until the street lights are replaced).**

  - **The values are derived by multiplying the street lights population with the steady state failure rate and the labour and material unit costs of replacing the spot failure units with new units.**

  - **For Alt 1 and 2, the spot failures of HPS/MV street lights are assumed to be 90 per cent lamp replacement and 10 per cent fixture replacement. The replacement costs are expensed when incurred and budgeted under maintenance OMA costs.**

  - **For Alt 3 and 4, the Annual Maintenance (OMA) Costs are $0 since the LED street lights spot failure replacement costs are treated as capital rather than OMA because when one fails, a new one is installed. The HPS street lights spot failure replacement costs are treated as OMA because in most cases, just the lamps need replacement (versus the entire fixture). Also, when the SDM table was completed for the Program's Identification Phase Feasibility Design Stage funding request, the need to wash the lights was not identified, which is an OMA cost now included in the calculation of maintenance savings.**

- **Lifecycle Costs:**

  - **For all alternatives, the lifecycle costs include the projected cash flow of the following components over the 22-year evaluation period and discounted back to Net Present Value using the real discount rate of 4 per cent.**

    - **One-Time Investment Costs.**

    - **Asset Residual Value (i.e., asset value at the end of the evaluation period) as a credit.**

    - **Ongoing Costs (i.e., spot failures replacement costs).**

    - **Property Tax Impact (based on change in asset net book value multiplied by estimated property tax rate for street lights as part of the distribution system).**

- **Cost of Energy (based on street lights energy usage x energy pricing effective at the time of the analysis).**
- **Cost of Capacity (based on street lights capacity x capacity pricing effective at the time of the analysis).**

21.0 A. Rate Schedule 1701

Reference: RS 1701 LED STREET LIGHT REPLACEMENT PROGRAM
Exhibit B-5, British Columbia Old Age Pensioners' Organization et al. IR 6.1, 10.3
Proactive replacement model

In response to British Columba Old Age Pensioners' Organization et al. (BCOAPO) IR 6.1, BC Hydro provides Attachment 1, the Line Asset Planning Business Case for Expenditure Authorization Request: Streetlight Replacement Program's Implementation Phase (Business Case), supporting the proactive replacement model as the best alternative based on regulatory compliance, financial and reputational considerations.

On page 38 of the Business Case, BC Hydro provides a Structured Decision Making (SDM) table:

SDM Table
Completed as part of the Program's Identification Phase – Feasibility Design Stage Business Case

Point of Comparison	Better	Similar	Worse

Objective	Criteria	Measure	Alt 1	Alt 2	Alt 3	Alt 4	Notes
			(Status quo) Reactive replacement of failed High Pressure Sodium (HPS) street lights with new bulbs or fixtures	Reactive Replacement of failed HPS street lights or HPS street lights contains PCBs in a concentration of50 ppm or more with new HPS street lights (fixture)	Reactive Upgrade - Convert failed HPS street lights to LED street lights	Proactive Upgrade - mass conversion of all HPS street lights to LED street lights	
Technical							
Increase Operational Efficiency	Reduction in Annual Energy consumed by BCH owned lights	GWhs per year (reduced compared to F2019 base)	None	None	~40GWh or more/year as it could allow customers to select lower wattage LED lights.	~40GWh or more/year as it could allow customers to select lower wattage LED lights.	
	Reduction in street light failures	Estimated annual number of failures at steady state	13,000	14,000	2,000	2,000	
	Efficiently locate street lights in Geospatial Information System (GIS) e.g. for failure response, billing, customer service	Yes/No	No	No	Yes	Yes - will realize earlier depending on deployment duration	For Alt 3 & 4 - Yes if controllers with GPS functionality and a control application are implemented in these alternatives.
	More efficient deployment of streetlight replacement	Yes/No	n/a	No	No	Yes	
Financial							
Minimize One-Time Investment Costs	One-Time Investment Loaded Capital and Non-Capital Costs (including Installation Labour, Materials, Program and Deployment Costs)	$M	$0M	$16M	$82M	$73M	Base model only. Does not include controller solution
Manage Annual Maintenance (OMA) Costs	Steady State Annual OMA Costs	$M	$2.8M	$3.0M	$0M	$0M	For Alt 1 and 2, assume maintenance program will continue to be fully funded. Higher OMA cost in Alt 2 compared to Alt 1 because RS1755 MV street lights are replaced with HPS street lights to meet PCB compliance and HPS street lights have higher failure rate.
							$0 OMA cost in Alt 3 and 4 because LED spot failure replacement would be capital cost.
Minimize Lifecycle Cost	22 Year Evaluation Period	$M in PV	$104M	$109M	$91M	$86M	Base model only. Does not include controller solution
Improve Financial Accuracy	Improved billing accuracy to minimize over and under billing	Yes/No	No	No	Yes	Yes – could realize earlier depending on deployment duration	For Alt 3 & 4 - Yes if controllers with GPS functionality and a control application are implemented in these alternatives.

In response to BCOAPO IR 10.3, BC Hydro states:

> The Maintenance Savings reported for each year in Table G-5 were determined by comparing the High Pressure Sodium (HPS) street light historical maintenance budget average with the LED street lights ongoing costs.

2.21.2 Please reconcile the difference between the "Minimize One-Time Investment Costs" objective found in the Alternative 4 (Proactive Upgrade) column ($73M) and the "Requested Total Authorized"

value ($83.28M) stated on Table G-4 in Appendix G of the Application.

RESPONSE:

The $73 million in the Minimize One-Time Investment Costs objective found in the Alternative 4 (Proactive Upgrade) column of the SDM was calculated early in the Streetlight Replacement Program. This value was used as part of the evaluation of the alternatives documented within the Replacement Program's Identification Phase business case.

Whereas, the "Requested Total Authorized" value ($83.28 million) stated on Table G-4 in Appendix G of the Application was calculated with revised data to update the costing information included in the Replacement Program's Implementation Phase business case. (This is the business case to request the full funds to enable the implementation of the Replacement Program.)

These two values cannot be directly reconciled for two reasons. First, the two numbers were calculated at different stages of the Replacement Program with different inputs and assumptions; the latter with updated information. Second, the two numbers represent different things:

- **$73 million is an expected amount; and**
- **$83.28 million is an authorized amount that also includes $9.92 million Program Reserve, which was neither included in expected amount nor required for earlier phase estimates.**

Please refer to BC Hydro response to BCAC IR 2.16.5 for the definition of Program Reserve.

21.0 A. Rate Schedule 1701

Reference: RS 1701 LED STREET LIGHT REPLACEMENT PROGRAM
Exhibit B-5, British Columbia Old Age Pensioners' Organization et al. IR 6.1, 10.3
Proactive replacement model

In response to British Columba Old Age Pensioners' Organization et al. (BCOAPO) IR 6.1, BC Hydro provides Attachment 1, the Line Asset Planning Business Case for Expenditure Authorization Request: Streetlight Replacement Program's Implementation Phase (Business Case), supporting the proactive replacement model as the best alternative based on regulatory compliance, financial and reputational considerations.

On page 38 of the Business Case, BC Hydro provides a Structured Decision Making (SDM) table:

SDM Table
Completed as part of the Program's Identification Phase – Feasibility Design Stage Business Case

Point of Comparison	Better	Similar	Worse

Objective	Criteria	Measure	Alt 1	Alt 2	Alt 3	Alt 4	Notes
			(Status quo) Reactive replacement of failed High Pressure Sodium (HPS) street lights with new bulbs or fixtures	Reactive Replacement of failed HPS street lights or HPS street lights contains PCBs in a concentration of50 ppm or more with new HPS street lights (fixture)	Reactive Upgrade - Convert failed HPS street lights to LED street lights	Proactive Upgrade - mass conversion of all HPS street lights to LED street lights	
Technical							
Increase Operational Efficiency	Reduction in Annual Energy consumed by BCH owned lights	GWhs per year (reduced compared to F2019 base)	None	None	~40GWh or more/year as it could allow customers to select lower wattage LED lights.	~40GWh or more/year as it could allow customers to select lower wattage LED lights.	
	Reduction in street light failures	Estimated annual number of failures at steady state	13,000	14,000	2,000	2,000	
	Efficiently locate street lights in Geospatial Information System (GIS) e.g. for failure response, billing, customer service	Yes/No	No	No	Yes	Yes - will realize earlier depending on deployment duration	For Alt 3 & 4 - Yes if controllers with GPS functionality and a control application are implemented in these alternatives.
	More efficient deployment of streetlight replacement	Yes/No	n/a	No	No	Yes	
Financial							
Minimize One-Time Investment Costs	One-Time Investment Loaded Capital and Non-Capital Costs (including Installation Labour, Materials, Program and Deployment Costs)	$M	$0M	$16M	$82M	$73M	Base model only. Does not include controller solution
Manage Annual Maintenance (OMA) Costs	Steady State Annual OMA Costs	$M	$2.8M	$3.0M	$0M	$0M	For Alt 1 and 2, assume maintenance program will continue to be fully funded. Higher OMA cost in Alt 2 compared to Alt 1 because RS1755 MV street lights are replaced with HPS street lights to meet PCB compliance and HPS street lights have higher failure rate.
							$0 OMA cost in Alt 3 and 4 because LED spot failure replacement would be capital cost.
Minimize Lifecycle Cost	22 Year Evaluation Period	$M in PV	$104M	$109M	$91M	$86M	Base model only. Does not include controller solution
Improve Financial Accuracy	Improved billing accuracy to minimize over and under billing	Yes/No	No	No	Yes	Yes – could realize earlier depending on deployment duration	For Alt 3 & 4 - Yes if controllers with GPS functionality and a control application are implemented in these alternatives.

In response to BCOAPO IR 10.3, BC Hydro states:

> The Maintenance Savings reported for each year in Table G-5 were determined by comparing the High Pressure Sodium (HPS) street light historical maintenance budget average with the LED street lights ongoing costs.

2.21.3 Please explain why "Manage Annual Maintenance (OMA) Costs" is $nil for Alternative 4 in the above SDM Table given that there

are expected ongoing LED street light costs which are explained in the calculation of maintenance savings.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.21.1

21.0 A. Rate Schedule 1701

Reference: RS 1701 LED STREET LIGHT REPLACEMENT PROGRAM
Exhibit B-5, British Columbia Old Age Pensioners' Organization et al. IR 6.1, 10.3
Proactive replacement model

In response to British Columba Old Age Pensioners' Organization et al. (BCOAPO) IR 6.1, BC Hydro provides Attachment 1, the Line Asset Planning Business Case for Expenditure Authorization Request: Streetlight Replacement Program's Implementation Phase (Business Case), supporting the proactive replacement model as the best alternative based on regulatory compliance, financial and reputational considerations.

On page 38 of the Business Case, BC Hydro provides a Structured Decision Making (SDM) table:

SDM Table
Completed as part of the Program's Identification Phase – Feasibility Design Stage Business Case

Point of Comparison | Better | Similar | Worse

Objective	Criteria	Measure	Alt 1	Alt 2	Alt 3	Alt 4	Notes
			(Status quo) Reactive replacement of failed High Pressure Sodium (HPS) street lights with new bulbs or fixtures	Reactive Replacement of failed HPS street lights or HPS street lights contains PCBs in a concentration of50 ppm or more with new HPS street lights (fixture)	Reactive Upgrade - Convert failed HPS street lights to LED street lights	Proactive Upgrade - mass conversion of all HPS street lights to LED street lights	
Technical							
Increase Operational Efficiency	Reduction in Annual Energy consumed by BCH owned lights	GWhs per year (reduced compared to F2019 base)	None	None	~40GWh or more/year as it could allow customers to select lower wattage LED lights.	~40GWh or more/year as it could allow customers to select lower wattage LED lights.	
	Reduction in street light failures	Estimated annual number of failures at steady state	13,000	14,000	2,000	2,000	
	Efficiently locate street lights in Geospatial Information System (GIS) e.g. for failure response, billing, customer service	Yes/No	No	No	Yes	Yes - will realize earlier depending on deployment duration	For Alt 3 & 4 - Yes if controllers with GPS functionality and a control application are implemented in these alternatives.
	More efficient deployment of streetlight replacement	Yes/No	n/a	No	No	Yes	
Financial							
Minimize One-Time Investment Costs	One-Time Investment Loaded Capital and Non-Capital Costs (including Installation Labour, Materials, Program and Deployment Costs)	$M	$0M	$16M	$82M	$73M	Base model only. Does not include controller solution
Manage Annual Maintenance (OMA) Costs	Steady State Annual OMA Costs	$M	$2.8M	$3.0M	$0M	$0M	For Alt 1 and 2, assume maintenance program will continue to be fully funded. Higher OMA cost in Alt 2 compared to Alt 1 because RS1755 MV street lights are replaced with HPS street lights to meet PCB compliance and HPS street lights have higher failure rate. $0 OMA cost in Alt 3 and 4 because LED spot failure replacement would be capital cost.
Minimize Lifecycle Cost	22 Year Evaluation Period	$M in PV	$104M	$109M	$91M	$86M	Base model only. Does not include controller solution
Improve Financial Accuracy	Improved billing accuracy to minimize over and under billing	Yes/No	No	No	Yes	Yes – could realize earlier depending on deployment duration	For Alt 3 & 4 - Yes if controllers with GPS functionality and a control application are implemented in these alternatives.

In response to BCOAPO IR 10.3, BC Hydro states:

> The Maintenance Savings reported for each year in Table G-5 were determined by comparing the High Pressure Sodium (HPS) street light historical maintenance budget average with the LED street lights ongoing costs.

2.21.4 Please explain why the "Minimize Lifecycle Cost" point of comparison is based on a 22-year evaluation period in the above

SDM Table when the marginal cost analysis and proposed rate design for RS 1701 is based on a 20-year analysis.

RESPONSE:

The Lifecycle Costs point of comparison is based on a 22-year evaluation period because it includes the cash flow for planning activities in the pre-deployment years, whereas the 20-year period in the marginal cost analysis presented in Appendix G of the Application and used in BC Hydro's proposed RS 1701 LED Rate begins when the deployment starts.

21.0 A. Rate Schedule 1701

Reference: RS 1701 LED STREET LIGHT REPLACEMENT PROGRAM
Exhibit B-5, British Columbia Old Age Pensioners' Organization et al. IR 6.1, 10.3
Proactive replacement model

In response to British Columba Old Age Pensioners' Organization et al. (BCOAPO) IR 6.1, BC Hydro provides Attachment 1, the Line Asset Planning Business Case for Expenditure Authorization Request: Streetlight Replacement Program's Implementation Phase (Business Case), supporting the proactive replacement model as the best alternative based on regulatory compliance, financial and reputational considerations.

On page 38 of the Business Case, BC Hydro provides a Structured Decision Making (SDM) table:

SDM Table
Completed as part of the Program's Identification Phase – Feasibility Design Stage Business Case

Point of Comparison	Better	Similar	Worse

Objective	Criteria	Measure	Alt 1	Alt 2	Alt 3	Alt 4	Notes
			(Status quo) Reactive replacement of Failed High Pressure Sodium (HPS) street lights with new bulbs or fixtures	Reactive Replacement of failed HPS street lights or HPS street lights contains PCBs in a concentration of50 ppm or more with new HPS street lights (fixture)	Reactive Upgrade - Convert failed HPS street lights to LED street lights	Proactive Upgrade - mass conversion of all HPS street lights to LED street lights	
Technical							
Increase Operational Efficiency	Reduction in Annual Energy consumed by BCH owned lights	GWhs per year (reduced compared to F2019 base)	None	None	~40GWh or more/year as it could allow customers to select lower wattage LED lights.	~40GWh or more/year as it could allow customers to select lower wattage LED lights.	
	Reduction in street light failures	Estimated annual number of failures at steady state	13,000	14,000	2,000	2,000	
	Efficiently locate street lights in Geospatial Information System (GIS) e.g. for failure response, billing, customer service	Yes/No	No	No	Yes	Yes - will realize earlier depending on deployment duration	For Alt 3 & 4 - Yes if controllers with GPS functionality and a control application are implemented in these alternatives.
	More efficient deployment of streetlight replacement	Yes/No	n/a	No	No	Yes	
Financial							
Minimize One-Time Investment Costs	One-Time Investment Loaded Capital and Non-Capital Costs (including Installation Labour, Materials, Program and Deployment Costs)	$M	$0M	$16M	$82M	$73M	Base model only. Does not include controller solution
Manage Annual Maintenance (OMA) Costs	Steady State Annual OMA Costs	$M	$2.8M	$3.0M	$0M	$0M	For Alt 1 and 2, assume maintenance program will continue to be fully funded. Higher OMA cost in Alt 2 compared to Alt 1 because RS1755 MV street lights are replaced with HPS street lights to meet PCB compliance and HPS street lights have higher failure rate.
							$0 OMA cost in Alt 3 and 4 because LED spot failure replacement would be capital cost.
Minimize Lifecycle Cost	22 Year Evaluation Period	$M in PV	$104M	$109M	$91M	$86M	Base model only. Does not include controller solution
Improve Financial Accuracy	Improved billing accuracy to minimize over and under billing	Yes/No	No	No	Yes	Yes – could realize earlier depending on deployment duration	For Alt 3 & 4 - Yes if controllers with GPS functionality and a control application are implemented in these alternatives.

In response to BCOAPO IR 10.3, BC Hydro states:

> The Maintenance Savings reported for each year in Table G-5 were determined by comparing the High Pressure Sodium (HPS) street light historical maintenance budget average with the LED street lights ongoing costs.

2.21.4.1 Please explain and provide the difference between a 22-year and 20-year analysis period for each of the four alternatives.

RESPONSE:

For clarity, the Lifecycle Costs calculation included in the Structured Decision Making (SDM) – to enable the investment decision – is based on the incremental cash flow impacts of the Street Light Replacement Program over the Program's 22-year duration for all four alternatives. The 22-year duration includes the pre-deployment period as well as the year 20 asset lifecycle period. In contrast, the 20-year marginal cost model presented in Table G-5 of the Application aligns with the asset lifecycle period.

21.0 A. Rate Schedule 1701

Reference: RS 1701 LED STREET LIGHT REPLACEMENT PROGRAM
Exhibit B-5, British Columbia Old Age Pensioners' Organization et al. IR 6.1, 10.3
Proactive replacement model

In response to British Columba Old Age Pensioners' Organization et al. (BCOAPO) IR 6.1, BC Hydro provides Attachment 1, the Line Asset Planning Business Case for Expenditure Authorization Request: Streetlight Replacement Program's Implementation Phase (Business Case), supporting the proactive replacement model as the best alternative based on regulatory compliance, financial and reputational considerations.

On page 38 of the Business Case, BC Hydro provides a Structured Decision Making (SDM) table:

SDM Table
Completed as part of the Program's Identification Phase – Feasibility Design Stage Business Case

Point of Comparison	Better	Similar	Worse

Objective	Criteria	Measure	Alt 1	Alt 2	Alt 3	Alt 4	Notes
			(Status quo) Reactive replacement of failed High Pressure Sodium (HPS) street lights with new bulbs or fixtures	Reactive Replacement of failed HPS street lights or HPS street lights contains PCBs in a concentration of50 ppm or more with new HPS street lights (fixture)	Reactive Upgrade - Convert failed HPS street lights to LED street lights	Proactive Upgrade - mass conversion of all HPS street lights to LED street lights	
Technical							
Increase Operational Efficiency	Reduction in Annual Energy consumed by BCH owned lights	GWhs per year (reduced compared to F2019 base)	None	None	~40GWh or more/year as it could allow customers to select lower wattage LED lights.	~40GWh or more/year as it could allow customers to select lower wattage LED lights.	
	Reduction in street light failures	Estimated annual number of failures at steady state	13,000	14,000	2,000	2,000	
	Efficiently locate street lights in Geospatial Information System (GIS) e.g. for failure response, billing, customer service	Yes/No	No	No	Yes	Yes - will realize earlier depending on deployment duration	For Alt 3 & 4 - Yes if controllers with GPS functionality and a control application are implemented in these alternatives.
	More efficient deployment of streetlight replacement	Yes/No	n/a	No	No	Yes	
Financial							
Minimize One-Time Investment Costs	One-Time Investment Loaded Capital and Non-Capital Costs (including Installation Labour, Materials, Program and Deployment Costs)	$M	$0M	$16M	$82M	$73M	Base model only. Does not include controller solution
Manage Annual Maintenance (OMA) Costs	Steady State Annual OMA Costs	$M	$2.8M	$3.0M	$0M	$0M	For Alt 1 and 2, assume maintenance program will continue to be fully funded. Higher OMA cost in Alt 2 compared to Alt 1 because RS1755 MV street lights are replaced with HPS street lights to meet PCB compliance and HPS street lights have higher failure rate.
							$0 OMA cost in Alt 3 and 4 because LED spot failure replacement would be capital cost.
Minimize Lifecycle Cost	22 Year Evaluation Period	$M in PV	$104M	$109M	$91M	$86M	Base model only. Does not include controller solution
Improve Financial Accuracy	Improved billing accuracy to minimize over and under billing	Yes/No	No	No	Yes	Yes – could realize earlier depending on deployment duration	For Alt 3 & 4 - Yes if controllers with GPS functionality and a control application are implemented in these alternatives.

In response to BCOAPO IR 10.3, BC Hydro states:

> The Maintenance Savings reported for each year in Table G-5 were determined by comparing the High Pressure Sodium (HPS) street light historical maintenance budget average with the LED street lights ongoing costs.

2.21.4.2 Please explain what costs are included in the "Minimize Lifecycle Cost" point of comparison. To the extent that the amount for Alternative 4 has been updated since the preparation of the

Business Case, please provide the current estimate for the "lifecycle" cost of Alternative 4.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.21.1 for an explanation on what costs are included in the "Minimize Lifecycle Cost" point of comparison.

The structured decision making table noted was completed as part of the business case. Since that time, some of the costs, estimates and assumptions in Alternative 4 have been updated, where practical. For clarity, BC Hydro notes that the RS 1701 LED Rates presented in the Application incorporate the updates presented below and therefore already account for these revisions.

The current estimate for the "lifecycle" cost of Alternative 4 is $95 million, which is $9 million higher than the $86 million for Alternative 4 in the structured decision making Table. The $95 million lifecycle cost calculation is based on the Replacement Program's updated estimates for one-time and on-going costs.

The main reasons for the $9 million increase are:

- **LED on-going costs: Street light washing cost was not identified in the lifecycle cost in the SDM Table; and**
- **Electricity costs: There are increases in the cost of energy and cost of capacity because the LED wattage in the updated lifecycle cost calculation is higher. The updated LED wattage inputs are derived from procurement processes completed after preparation of the business case. These on-going electricity costs are not part of the Replacement Program's one-time investment costs.**

BC Hydro has not re-calculated the lifecycle costs for the other alternatives; however, the factors noted above would similarly impact Alternative 3.

22.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-4, BCUC IR 6.1
Bonbright criteria

In response to BCUC IR 6.1, BC Hydro explains that it generally assesses Bonbright criteria as being "Very Good, Good, Fair, or Poor." BC Hydro also explains that the economic efficiency and stability criteria were assessed as being "good" and provides the specific reasons why the criteria were not assessed as "very good." With respect to customer understanding and acceptance, BC Hydro states:

> … [proposed RS 1701 rates] was assessed as only "fair" on customer understanding and acceptance because BC Hydro understands that customers were expecting a rate reduction as a result of the LED replacement program, which is not the case. In addition, customer feedback on the supplemental charge has not indicated strong customer acceptance…

2.22.1 Please elaborate on the reasons why the proposed RS 1701 rates were assessed as "fair" but not "poor" on the customer understanding and acceptance criteria.

RESPONSE:

The Proposed RS 1701 LED Rate is not rated poor on customer understanding and acceptance because it is not hard to understand. As a simple, flat per monthly charge, the Proposed RS 1701 LED Rate has low complexity and is easy for customers to understand, plan and budget for.

22.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-4, BCUC IR 6.1
Bonbright criteria

In response to BCUC IR 6.1, BC Hydro explains that it generally assesses Bonbright criteria as being "Very Good, Good, Fair, or Poor." BC Hydro also explains that the economic efficiency and stability criteria were assessed as being "good" and provides the specific reasons why the criteria were not assessed as "very good." With respect to customer understanding and acceptance, BC Hydro states:

> … [proposed RS 1701 rates] was assessed as only "fair" on customer understanding and acceptance because BC Hydro understands that customers were expecting a rate reduction as a result of the LED replacement program, which is not the case. In addition, customer feedback on the supplemental charge has not indicated strong customer acceptance…

2.22.2 Please explain the steps taken by BC Hydro to improve the assessment of the customer understanding and acceptance criteria.

RESPONSE:

BC Hydro took the following steps to improve customer understanding and acceptance of the proposed RS 1701 LED Rate:

- **As stated in section 5.3.2 of the Application and BC Hydro's response to BCUC IR 1.11.1, BC Hydro engaged customers and incorporated customer feedback into the RS 1701 rate design such as applying the supplemental charge as a fixed charge per light and starting the supplemental charge later to allow time for customers to include the charge in their budget;**
- **Established a dedicated customer support team to answer customer enquiries and support customers through the LED replacement in their community;**
- **Invited customers to participate in the regulatory proceeding to examine BC Hydro's proposals with the Commission and other interveners; and**
- **Communicated the status of the Street Light Rates Application to customers as soon as practical through posting updates on bchydro.com and sending customers direct emails and letters.**

22.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-4, BCUC IR 6.1
Bonbright criteria

In response to BCUC IR 6.1, BC Hydro explains that it generally assesses Bonbright criteria as being "Very Good, Good, Fair, or Poor." BC Hydro also explains that the economic efficiency and stability criteria were assessed as being "good" and provides the specific reasons why the criteria were not assessed as "very good." With respect to customer understanding and acceptance, BC Hydro states:

> … [proposed RS 1701 rates] was assessed as only "fair" on customer understanding and acceptance because BC Hydro understands that customers were expecting a rate reduction as a result of the LED replacement program, which is not the case. In addition, customer feedback on the supplemental charge has not indicated strong customer acceptance…

2.22.3 In BC Hydro's view, aside from customer reactions to pricing signals, what other factors should the BCUC consider with respect to customer understanding and acceptance? Please discuss.

RESPONSE:

BC Hydro believes the Commission should also consider the following factors related to customer understanding and acceptance in addition to the pricing of the RS 1701 rates:

- **The simplicity of the rate, being a fixed price per light per month based on a wattage range of the LED luminaire, as well as a fixed supplemental charge per light per month;**
- **The effective date of the final LED rates and the supplemental charge to allow customers time to include the changes in their budgets;**
- **The duration of the supplemental charge; and**
- **The method of the rate calculation, such that all benefits of replacing HPS lights with LEDs are provided to RS 1701 customers. Similarly, Replacement Project costs are allocated to RS 1701 customers to avoid impacts to other ratepayers that do not benefit from RS 1701 service.**

22.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-4, BCUC IR 6.1
Bonbright criteria

In response to BCUC IR 6.1, BC Hydro explains that it generally assesses Bonbright criteria as being "Very Good, Good, Fair, or Poor." BC Hydro also explains that the economic efficiency and stability criteria were assessed as being "good" and provides the specific reasons why the criteria were not assessed as "very good." With respect to customer understanding and acceptance, BC Hydro states:

> … [proposed RS 1701 rates] was assessed as only "fair" on customer understanding and acceptance because BC Hydro understands that customers were expecting a rate reduction as a result of the LED replacement program, which is not the case. In addition, customer feedback on the supplemental charge has not indicated strong customer acceptance…

2.22.4 Please explain why the proposed RS 1701 rates represent a reasonable balance of all Bonbright criteria given that there is a "fair" rating on the customer understanding and acceptance criteria.

RESPONSE:

The Proposed Rates are reasonable balance of the Bonbright criteria, being assessed as Good or Very Good on Bonbright criteria related to economic efficiency, fairness and stability, as shown in Table 5 of the Application.

Rate design always involves trade offs and competing priorities, and Bonbright criteria are used as a means to understand and describe those trade offs. It is not common for a rate design to excel on all Bonbright criteria.

22.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-4, BCUC IR 6.1
Bonbright criteria

In response to BCUC IR 6.1, BC Hydro explains that it generally assesses Bonbright criteria as being "Very Good, Good, Fair, or Poor." BC Hydro also explains that the economic efficiency and stability criteria were assessed as being "good" and provides the specific reasons why the criteria were not assessed as "very good." With respect to customer understanding and acceptance, BC Hydro states:

> … [proposed RS 1701 rates] was assessed as only "fair" on customer understanding and acceptance because BC Hydro understands that customers were expecting a rate reduction as a result of the LED replacement program, which is not the case. In addition, customer feedback on the supplemental charge has not indicated strong customer acceptance…

2.22.5 Please explain BC Hydro's view as to how much weight should be given to one Bonbright criterion over another (i.e. please rank the relative priority of the Bonbright criteria in BC Hydro's assessment and explain the basis for such ranking)?

RESPONSE:

BC Hydro has not prioritized the Bonbright criteria for the purpose of the Application. All the Bonbright criteria provide relevant considerations. We use the Bonbright criteria to understand and describe the trade-offs inherent in rate design and assess the overall performance of the proposed RS 1701 LED Rate.

23.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Appendix G, pp. 8–9; Exhibit B-4, BCUC IR 9.2, 8.5, 4.1, 4.5; Exhibit B-5, BCOAPO IR 14.2; BCSEA IR 5.3; the Commercial Energy Consumers Association of British Columbia IR 3.3; BC Hydro 2020-2021 Revenue Requirement Application, Transcript Volume 13 Oral Hearing, p. 2502
Program costs

On page 9 of the Appendix G to the Application, BC Hydro provides Table G-4 showing the breakdown of total Program Costs:

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**

In response to BCUC IR 9.2, BC Hydro provides a working Pricing Model Excel spreadsheet as Attachment 1. BC Hydro states that the “PricingModel” Tab of the model performs the calculations and the results are linked to the “AppTables” and “AppxG” Tabs of the model. The “AppxG” includes the results as presented in Table G-6.

In Columns K to M of Excel Rows 20 to 35 in the "PricingModel” Tab, BC Hydro shows a breakdown of the “Total Replacement Program Count” cost inputs, where the individual “Total Cost ($)” amounts sum to $42,900,635 and the “Cost Per Unit ($)” is calculated based on 89,182 lights (Cell L22).

In response to BCOAPO IR 14.2, BC Hydro states:

> The $83.28 million requested authorized amount in Table G-4 is the maximum amount for which BC Hydro sought and received authorization

from its Board of Directors in accordance with the Replacement Program business case dated December 4, 2019… Total investment-related costs in Table G-6 are calculated in order to determine the amount of annual depreciation to be included in the rate calculation.

On page 8 of Appendix G to the Application, BC Hydro states:

> 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 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.

2.23.1 Please confirm, or explain otherwise, that the difference between the breakdown of Program Costs shown in Table G-4 and the amounts in Columns K to M of Excel Rows 20 to 35 in the "PricingModel" Tab is due to BC Hydro's subsequent decision to "terminate RS 1755 service and to only convert the [RS 1755] Group 2 lights to LEDs."

RESPONSE:

Not confirmed. The inputs shown in in columns K to M of Excel rows 20 to 35 in the "PricingModel" Tab are from the revised expected program costs of $63.5 million. The pricing model uses these inputs, updates the number of street lights based on current information, and adds luminaire costs based on procurement to determine the pricing for the Rate Schedule. An update of Table G-4 to show the inputs used in the pricing model is included in BC Hydro's response to BCUC IR 2.23.2.1.

The total program costs per the business case are $73.4 million expected and $83.3 million Authorized, as shown in Table G-4 of the Application. This includes costs to convert all RS 1701 and RS 1755 street lights to LED. Subsequent to the business case being approved, a decision was made to terminate the RS 1755 service and to only convert the RS 1755 Group 2 lights to LEDs.

Following this decision, the total expected cost for the Replacement Program including contingency was revised to $69.2 million. When reserve is added the authorized cost is $78.6 million. The revised expected and authorized costs include the dismantling costs of $5.7 million associated with removing the RS 1755 Group 1 and Group 3 lights. The expected costs to convert RS 1701 and RS 1755 Group 2 lights to LED is $63.5 million.

The difference between this $63.5 million and the sum of the amounts in columns K to M of Excel rows 20 to 35 in the "Pricing_Model" Tab of $42.9 million is $20.6 million and represents the luminaire material costs.

23.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Appendix G, pp. 8–9; Exhibit B-4, BCUC IR 9.2, 8.5, 4.1, 4.5; Exhibit B-5, BCOAPO IR 14.2; BCSEA IR 5.3; the Commercial Energy Consumers Association of British Columbia IR 3.3; BC Hydro 2020-2021 Revenue Requirement Application, Transcript Volume 13 Oral Hearing, p. 2502
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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**

In response to BCUC IR 9.2, BC Hydro provides a working Pricing Model Excel spreadsheet as Attachment 1. BC Hydro states that the “PricingModel” Tab of the model performs the calculations and the results are linked to the “AppTables” and “AppxG” Tabs of the model. The “AppxG” includes the results as presented in Table G-6.

In Columns K to M of Excel Rows 20 to 35 in the "PricingModel” Tab, BC Hydro shows a breakdown of the “Total Replacement Program Count” cost inputs, where the individual “Total Cost ($)” amounts sum to $42,900,635 and the “Cost Per Unit ($)” is calculated based on 89,182 lights (Cell L22).

In response to BCOAPO IR 14.2, BC Hydro states:

> The $83.28 million requested authorized amount in Table G-4 is the maximum amount for which BC Hydro sought and received authorization from its Board of Directors in accordance with the Replacement Program business case dated December 4, 2019… Total investment-related costs in Table G-6 are calculated in order to determine the amount of annual depreciation to be included in the rate calculation.

On page 8 of Appendix G to the Application, BC Hydro states:

> 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 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.

2.23.2 Please confirm, or explain otherwise, that the RS 1701 rates for which BC Hydro seeks BCUC approval are the rates which are determined (in part) on the program amounts in Columns K to M of Excel Rows 20 to 35 in the "PricingModel" Tab and not the amounts in Table G-4.

RESPONSE:

Confirmed. Note that amounts shown in columns K to M of Excel rows 20 to 35 in the "PricingModel" Tab are from the updated program costs of $63.5 million to convert RS 1701 and RS 1755 Group 2 lights to LED (please refer to BC Hydro's response to BCUC IR 2.23.1), except for the luminaire cost (for which the total cost is not shown in columns K to M). The luminaire unit cost in row 22 is not based on luminaire costs included in the $63.5 million program costs, rather it is based on more updated information from the procurement events. The luminaire average unit cost included in the $63.5 million program costs is $230.96, whereas the luminaire average unit cost in row 22 is $212.47.

23.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Appendix G, pp. 8–9; Exhibit B-4, BCUC IR 9.2, 8.5, 4.1, 4.5; Exhibit B-5, BCOAPO IR 14.2; BCSEA IR 5.3; the Commercial Energy Consumers Association of British Columbia IR 3.3; BC Hydro 2020-2021 Revenue Requirement Application, Transcript Volume 13 Oral Hearing, p. 2502
Program costs

On page 9 of the Appendix G to the Application, BC Hydro provides Table G-4 showing the breakdown of total Program Costs:

Table G-4 Total Program Costs (Inclusive of LED Installation for RS 1755, RS 1701, and Contingency)

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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**

In response to BCUC IR 9.2, BC Hydro provides a working Pricing Model Excel spreadsheet as Attachment 1. BC Hydro states that the “PricingModel” Tab of the model performs the calculations and the results are linked to the “AppTables” and “AppxG” Tabs of the model. The “AppxG” includes the results as presented in Table G-6.

In Columns K to M of Excel Rows 20 to 35 in the "PricingModel” Tab, BC Hydro shows a breakdown of the “Total Replacement Program Count” cost inputs, where the individual “Total Cost ($)” amounts sum to $42,900,635 and the “Cost Per Unit ($)” is calculated based on 89,182 lights (Cell L22).

In response to BCOAPO IR 14.2, BC Hydro states:

> The $83.28 million requested authorized amount in Table G-4 is the maximum amount for which BC Hydro sought and received authorization from its Board of Directors in accordance with the Replacement Program business case dated December 4, 2019… Total investment-related costs in Table G-6 are calculated in order to determine the amount of annual depreciation to be included in the rate calculation.

On page 8 of Appendix G to the Application, BC Hydro states:

> 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 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.

2.23.2 Please confirm, or explain otherwise, that the RS 1701 rates for which BC Hydro seeks BCUC approval are the rates which are determined (in part) on the program amounts in Columns K to M of Excel Rows 20 to 35 in the "PricingModel" Tab and not the amounts in Table G-4.

2.23.2.1 If confirmed, please provide the following:

(a) The amounts in Columns K to M of Rows 20 to 35 in the "PricingModel" Tab in the same format as Table G-4;
(b) Supporting analysis and calculation for "Direct Costs Contingency" of $5,765,219 in the "PricingModel" Tab (Cell L28);
(c) Supporting assumptions and calculation for "Inflation costs" of $2,518,013 in the "PricingModel" Tab (Cell L31); and
(d) Clarification for whether there are any reserve amounts in Columns K to M of Excel Rows 20 to 35, including the basis and amount of reserves, if applicable.

RESPONSE:

(a) The requested information is provided in the following Table as an update to Table G-4 in the Application. The total program costs in Table G-4 were based on the Replacement Program's Implementation Phase business case. Subsequent to the approval of the business case, a decision was made to terminate RS 1755 service and only to convert RS 1755 Group 2 lights to LED. The revised total program expected costs based on this decision is $69.2 million which includes the dismantling costs of $5.7 million associated with removing RS 1755 Group 1 and Group 3 lights and the total program

expected costs of $63.5 million to convert RS 1701 and RS 1755 Group 2 lights to LED (please refer to BC Hydro's response to BCOAPO IR 1.11.3).

The $42.9 million from the Pricing Model columns K to M of rows 20 to 35 reflect the costs from the $63.5 million minus the luminaire cost of $20.6 million. The luminaire cost in the Pricing Model columns K to M of rows 20 to 35 was updated to $18.95 million based on more current information from the procurement process. As a result, the total program expected costs to convert RS 1701 and RS 1755 Group 2 lights to LED reflected in the Pricing Model is $61.85 million. The direct cost contingency ($5.8 million) and the inflation ($2.5 million) amounts were calculated based on the $63.5 million (including the $20.6 million luminaire cost) and were not updated to reflect the lower luminaire costs of $18.95 million.

Note that the pricing model objective is to calculate pricing for the various wattage categories of street lights using costing information from the business case and not to derive the rates using a bottom up calculation approach. If different inputs are assumed in columns K to M of rows 20 to 35, excel row 68 of the pricing model will simply adjust so that the same average rate is calculated to recover the revenue calculated in the marginal cost model described in section 1 of Appendix G. The effect will be to alter the differences between the wattage category prices and the average price but not the average price itself. The average price will only change if the marginal savings and costs that are calculated in the marginal cost model change.

Total Program Costs

Program Costs	Total Request Amount ($ million)	From Pricing Model K-M ($ million)
Direct Deployment Costs (Materials + Installation)		
Labour	**20.14**	**15.65**
Materials	**24.55**	**20.84**
Indirect Program Costs		
Program Management	**1.34**	**1.28**
Deployment Management	**3.21**	**3.05**
Supporting Technology	**2.24**	**2.02**
Customer Engagement	**0.83**	**0.78**
Other (Change Management, Material Management, Procurement, Regulatory	**0.64**	**0.62**
Dismantling	**2.41**	**2.06**

Program Costs	Total Request Amount ($ million)	From Pricing Model K-M ($ million)
Total Program Costs before Loadings and Contingency	**55.36**	**46.29**
Contingency	**7.55**	**6.50**
Inflation	**2.92**	**2.52**
Capital Overhead	**7.53**	**6.53**
Program Expected Cost	**73.36**	**61.85**
Program Reserve (Loaded)	**9.92**	
Requested Total Authorized	**83.28**	

(b) The calculation of Direct Cost Contingency is shown in the following table:

Labour - Installation	**15,648,952**
Labour - Dismantling	**2,062,240**
Materials	**22,488,291**
Total Direct Costs	**40,199,484**
Contingency per cent	**14 per cent**
Direct Cost Contingency	**5,765,219**

(c) The derivation of Inflation is shown in the following table:

Fiscal Year	2019	2020	2021	2022	2023	2024	Total
Inflation Rate (%)			2.5	2.0	2.0	2.0	
Inflation Factor (%)	100.0	100.0	102.5	104.6	106.6	108.8	
Total Program Costs - before inflation and capital overhead	342,786	2,252,865	13,293,067	19,743,986	17,033,142	1,779,891	54,445,737
Inflation	-	-	332,327	898,351	1,131,171	156,164	2,518,013

(d) No reserve is included in the columns K to M of Excel rows 20 to 35 as shown in the response to part (a) above.

23.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Appendix G, pp. 8–9; Exhibit B-4, BCUC IR 9.2, 8.5, 4.1, 4.5; Exhibit B-5, BCOAPO IR 14.2; BCSEA IR 5.3; the Commercial Energy Consumers Association of British Columbia IR 3.3; BC Hydro 2020-2021 Revenue Requirement Application, Transcript Volume 13 Oral Hearing, p. 2502
Program costs

On page 9 of the Appendix G to the Application, BC Hydro provides Table G-4 showing the breakdown of total Program Costs:

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**

In response to BCUC IR 9.2, BC Hydro provides a working Pricing Model Excel spreadsheet as Attachment 1. BC Hydro states that the “PricingModel” Tab of the model performs the calculations and the results are linked to the “AppTables” and “AppxG” Tabs of the model. The “AppxG” includes the results as presented in Table G-6.

In Columns K to M of Excel Rows 20 to 35 in the "PricingModel” Tab, BC Hydro shows a breakdown of the “Total Replacement Program Count” cost inputs, where the individual “Total Cost ($)” amounts sum to $42,900,635 and the “Cost Per Unit ($)” is calculated based on 89,182 lights (Cell L22).

In response to BCOAPO IR 14.2, BC Hydro states:

> The $83.28 million requested authorized amount in Table G-4 is the maximum amount for which BC Hydro sought and received authorization from its Board of Directors in accordance with the Replacement Program business case dated December 4, 2019… Total investment-related costs in Table G-6 are calculated in order to determine the amount of annual depreciation to be included in the rate calculation.

On page 8 of Appendix G to the Application, BC Hydro states:

> 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 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.

2.23.2 Please confirm, or explain otherwise, that the RS 1701 rates for which BC Hydro seeks BCUC approval are the rates which are determined (in part) on the program amounts in Columns K to M of Excel Rows 20 to 35 in the "PricingModel" Tab and not the amounts in Table G-4.

2.23.2.2 If not confirmed, please update the "PricingModel" Tab on the basis of the Program Costs in Table G-4, as well as updating the results linked to the "AppTables" and "AppxG" Tabs of the model.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.23.2.

23.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Appendix G, pp. 8–9; Exhibit B-4, BCUC IR 9.2, 8.5, 4.1, 4.5; Exhibit B-5, BCOAPO IR 14.2; BCSEA IR 5.3; the Commercial Energy Consumers Association of British Columbia IR 3.3; BC Hydro 2020-2021 Revenue Requirement Application, Transcript Volume 13 Oral Hearing, p. 2502
Program costs

On page 9 of the Appendix G to the Application, BC Hydro provides Table G-4 showing the breakdown of total Program Costs:

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**

In response to BCUC IR 9.2, BC Hydro provides a working Pricing Model Excel spreadsheet as Attachment 1. BC Hydro states that the “PricingModel” Tab of the model performs the calculations and the results are linked to the “AppTables” and “AppxG” Tabs of the model. The “AppxG” includes the results as presented in Table G-6.

In Columns K to M of Excel Rows 20 to 35 in the "PricingModel” Tab, BC Hydro shows a breakdown of the “Total Replacement Program Count” cost inputs, where the individual “Total Cost ($)” amounts sum to $42,900,635 and the “Cost Per Unit ($)” is calculated based on 89,182 lights (Cell L22).

In response to BCOAPO IR 14.2, BC Hydro states:

> The $83.28 million requested authorized amount in Table G-4 is the maximum amount for which BC Hydro sought and received authorization from its Board of Directors in accordance with the Replacement Program business case dated December 4, 2019… Total investment-related costs in Table G-6 are calculated in order to determine the amount of annual depreciation to be included in the rate calculation.

On page 8 of Appendix G to the Application, BC Hydro states:

> 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 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.

2.23.3 Please explain why the number of lights used in the "Cost Per Unit($)" calculation in the "PricingModel" Tab is based on 89,182 lights (Cell L22) whereas the "Number of Fixtures" is 90,850 in Cell E20.

RESPONSE:

89,182 street lights was BC Hydro's estimate of the number of street lights under RS 1701 when the Street Light Replacement Program business case included as Attachment 1 to BC Hydro's response to BCOAPO IR 1.6.1 was prepared in 2019.

Subsequently, the number of street lights was audited by BC Hydro and 90,850 is the number of street lights being used for the purposes of implementation of the Replacement Program; including 90,480 RS 1701 street lights and 370 RS 1755 street lights to be migrated to RS 1701. The difference is not material, being covered by the RS 1755 cost estimate and contingency allowance that were included in the business case approval.

23.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Appendix G, pp. 8–9; Exhibit B-4, BCUC IR 9.2, 8.5, 4.1, 4.5; Exhibit B-5, BCOAPO IR 14.2; BCSEA IR 5.3; the Commercial Energy Consumers Association of British Columbia IR 3.3; BC Hydro 2020-2021 Revenue Requirement Application, Transcript Volume 13 Oral Hearing, p. 2502
Program costs

In response to BCUC IR 8.5, BC Hydro states, "Program Costs that would be considered fixed costs, if fixed costs are defined as costs that do not directly increase or decrease based upon the number of street lights, include…"

In response to BCUC IR 4.1, BC Hydro states:

> For the conversion of street lights on RS 1701, BC Hydro has completed the procurement process for the supply of luminaires and photocells as well as for the required installation services… BC Hydro has commenced the installation and billing of LED street lights. Therefore, a delay in receiving the final rate approval will not a have a cost or schedule impact on this portion of the Program.

2.23.4 In the same format as Table G-4, please identify the costs in the table which are firm costs (i.e., costs that will not change) for example, due to executed procurement contracts.

RESPONSE:

None of the costs in Table G-4 for the Street Light Replacement Program are firm costs that will not change, for example, due to executed procurement contracts.

Through the procurements for streetlight installation services and for the supply of luminaires and photocells, BC Hydro has received fixed unit prices for the services (e.g., the replacement of HPS luminaire with an LED) and assets (i.e., luminaires and photocells) needed for the Replacement Program.

The indirect cost estimates below were identified by completing a bottom up assessment - leveraging past program/project experience – to determine the types of resources, their rate and duration for which they'd be required. BC Hydro's experience with using Monte Carlo Sensitivity analyses was used to confirm the required contingency and reserve values (and percentages).

Program Costs: RS1701 and RS1755 Group 2	**Total Request Amount ($ million)**	**Cost Drivers & Nature of Uncertainty**
Direct Deployment Costs (Materials + Installation)		
Labour	**15.65**	**The actual cost is dependent upon the actual volumes of each required unit (proactive replacement of a luminaire, arm change, etc.), on the number of street lights that are converted to LEDs proactively versus reactively (as part of a repair of an HPS light), and on the actual allocation of work between contractors and internal crews. It is also dependent upon the condition of the assets found in the field (e.g., volume of poles requiring ACA remediation and/or arms replaced).**
Materials	**22.49**	**The actual cost is dependent upon the total number and type of luminaires procured. This is in part dependent upon the LED selections received from customers and the total number of luminaires that need to be replaced with LEDs.**
Indirect Program Costs		
Program Management	**1.28**	**Estimates are based upon the number and type of resources required, their standard labour rate or contract rate and the duration for which the resource is required.**
Deployment Management	**3.05**	**Estimates are based upon the number and type of resources required, their standard labour rate or contract rate and the duration for which the resource is required.**
Supporting Technology	**2.02**	**Changes to scope, e.g., identification of new requirements or unanticipated technical complexities, could impact the actual costs associated with modifying the supporting technology.**

Program Costs: RS1701 and RS1755 Group 2	**Total Request Amount ($ million)**	**Cost Drivers & Nature of Uncertainty**
Customer Engagement	**0.78**	**Estimates are based upon the number and type of resources required, their standard labour rate or contract rate and the duration for which the resource is required.**
Other (Change Management, Material Management, Procurement, Regulatory	**0.62**	**Estimates are based upon the number and type of resources required, their standard labour rate or contract rate and the duration for which the resource is required.**
Dismantling	**2.06**	**Since dismantling is associated with the labour, please see comments regarding labour above.**
Total Program Costs before Loadings and Contingency	**47.94**	
Contingency	**6.50**	
Inflation	**2.52**	**Impacts will be reflected in the actual costs of the various direct and indirect costs above.**
Capital Overhead	**6.53**	**Since this is a percent of the capital costs noted above, it is dependent upon the comments above.**
Program Expected Cost	**63.50**	
Program Reserve (Loaded)	**8.57**	
Requested Total Authorized	**72.07**	

23.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Appendix G, pp. 8–9; Exhibit B-4, BCUC IR 9.2, 8.5, 4.1, 4.5; Exhibit B-5, BCOAPO IR 14.2; BCSEA IR 5.3; the Commercial Energy Consumers Association of British Columbia IR 3.3; BC Hydro 2020-2021 Revenue Requirement Application, Transcript Volume 13 Oral Hearing, p. 2502 Program costs

In response to BCUC IR 8.5, BC Hydro states, "Program Costs that would be considered fixed costs, if fixed costs are defined as costs that do not directly increase or decrease based upon the number of street lights, include…"

In response to BCUC IR 4.1, BC Hydro states:

> For the conversion of street lights on RS 1701, BC Hydro has completed the procurement process for the supply of luminaires and photocells as well as for the required installation services… BC Hydro has commenced the installation and billing of LED street lights. Therefore, a delay in receiving the final rate approval will not a have a cost or schedule impact on this portion of the Program.

2.23.4.1 For the costs that are subject to change, please explain the cost drivers and nature of the uncertainty. Please also discuss this in relation to BC Hydro's experience with other capital projects after executed procurement contracts are in place, as appropriate.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.23.4.

23.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Appendix G, pp. 8–9; Exhibit B-4, BCUC IR 9.2, 8.5, 4.1, 4.5; Exhibit B-5, BCOAPO IR 14.2; BCSEA IR 5.3; the Commercial Energy Consumers Association of British Columbia IR 3.3; BC Hydro 2020-2021 Revenue Requirement Application, Transcript Volume 13 Oral Hearing, p. 2502
Program costs

In response to BCUC IR 8.5, BC Hydro states, "Program Costs that would be considered fixed costs, if fixed costs are defined as costs that do not directly increase or decrease based upon the number of street lights, include…"

In response to BCUC IR 4.1, BC Hydro states:

> For the conversion of street lights on RS 1701, BC Hydro has completed the procurement process for the supply of luminaires and photocells as well as for the required installation services… BC Hydro has commenced the installation and billing of LED street lights. Therefore, a delay in receiving the final rate approval will not a have a cost or schedule impact on this portion of the Program.

2.23.5 If applicable, please also provide a response to BCUC IRs 6.4 and 6.4.1 in respect of any table provided in response to BCUC IR 6.2.1 (a).

RESPONSE:

BC Hydro assumes the BCUC meant to reference BCUC IRs 2.23.4, 2.23.4.1 and 2.23.2.1(a).

BC Hydro does not believe it is applicable. Please refer to BC Hydro's response to BCUC IRs 2.23.4 and 2.23.4.1. The same source of data has been used in all cases and cost drivers and uncertainty are similar.

23.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Appendix G, pp. 8–9; Exhibit B-4, BCUC IR 9.2, 8.5, 4.1, 4.5; Exhibit B-5, BCOAPO IR 14.2; BCSEA IR 5.3; the Commercial Energy Consumers Association of British Columbia IR 3.3; BC Hydro 2020-2021 Revenue Requirement Application, Transcript Volume 13 Oral Hearing, p. 2502 Program costs

In response to BCSEA IR 5.3, BC Hydro states that it cannot predict the number of future RS 1701 removal requests. However, BC Hydro provides the following table showing the number of RS street lights removal requests received in calendar years 2018, 2019 and 2020:

Year Completed	Total
2018	236
2019	198
2020	351
Grand Total	820

BC Hydro further states:

> We expect customers will take the opportunity to examine their current and future street lighting needs and encourage customers to remove street lights that are no longer needed. We expect to receive an increased number of removal requests, as well as additions and alterations, during the LED street light deployment period.

2.23.6 Please confirm whether BC Hydro assumes all street lights currently on RS 1701 will be converted to LED street lights in the proposed rate design and pricing model for RS 1701.

RESPONSE:

Confirmed. BC Hydro's proposed RS 1701 rate design and pricing model were based on the assumption that all current RS 1701 street lights will be converted to LED.

23.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Appendix G, pp. 8–9; Exhibit B-4, BCUC IR 9.2, 8.5, 4.1, 4.5; Exhibit B-5, BCOAPO IR 14.2; BCSEA IR 5.3; the Commercial Energy Consumers Association of British Columbia IR 3.3; BC Hydro 2020-2021 Revenue Requirement Application, Transcript Volume 13 Oral Hearing, p. 2502
Program costs

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Year Completed	Total
2018	236
2019	198
2020	351
Grand Total	820

BC Hydro further states:

> We expect customers will take the opportunity to examine their current and future street lighting needs and encourage customers to remove street lights that are no longer needed. We expect to receive an increased number of removal requests, as well as additions and alterations, during the LED street light deployment period.

2.23.6 Please confirm whether BC Hydro assumes all street lights currently on RS 1701 will be converted to LED street lights in the proposed rate design and pricing model for RS 1701.

2.23.6.1 If confirmed, please explain why this is an appropriate assumption given the availability of historical data related to RS 1701 removal requests.

RESPONSE:

BC Hydro does not believe historical street light removal requests are representative of future street light additions and removal forecasts because of the following reasons:

- **Customers' RS 1701 street lighting needs are influenced by many non-linear factors such as area development, capital budget availability (i.e., whether a**

customer chooses to install RS 1701 or RS 1702 street lights), BC Hydro's pole locations and BC Hydro's distribution system development plans; and

- **It is expected that there will be a temporary increase of street light addition, modification and removal requests due to the need for customers to review their street lighting design for the Street Light Replacement Program.**

While changes to the number of RS 1701 lights occur in a non-predictable manner over the short-term, over the longer term BC Hydro forecasts that the number of RS 1701 lights will be stable, and therefore the current RS 1701 street light count is the most appropriate base for the rate design and pricing model for this Application.

23.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Appendix G, pp. 8–9; Exhibit B-4, BCUC IR 9.2, 8.5, 4.1, 4.5; Exhibit B-5, BCOAPO IR 14.2; BCSEA IR 5.3; the Commercial Energy Consumers Association of British Columbia IR 3.3; BC Hydro 2020-2021 Revenue Requirement Application, Transcript Volume 13 Oral Hearing, p. 2502
Program costs

In response to BCSEA IR 5.3, BC Hydro states that it cannot predict the number of future RS 1701 removal requests. However, BC Hydro provides the following table showing the number of RS street lights removal requests received in calendar years 2018, 2019 and 2020:

Year Completed	Total
2018	236
2019	198
2020	351
Grand Total	820

BC Hydro further states:

> We expect customers will take the opportunity to examine their current and future street lighting needs and encourage customers to remove street lights that are no longer needed. We expect to receive an increased number of removal requests, as well as additions and alterations, during the LED street light deployment period.

2.23.6 Please confirm whether BC Hydro assumes all street lights currently on RS 1701 will be converted to LED street lights in the proposed rate design and pricing model for RS 1701.

2.23.6.2 If not confirmed, please explain the assumptions made as it relates to RS 1701 removal requests. Please indicate the net number of street lights that will be replaced as incorporated in the proposed rate design and pricing model for RS 1701.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.23.6 where BC Hydro confirms that it has assumed all street lights currently on RS 1701 will be converted to LED street lights for the purpose of the proposed rate design and pricing model for RS 1701.

23.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Appendix G, pp. 8–9; Exhibit B-4, BCUC IR 9.2, 8.5, 4.1, 4.5; Exhibit B-5, BCOAPO IR 14.2; BCSEA IR 5.3; the Commercial Energy Consumers Association of British Columbia IR 3.3; BC Hydro 2020-2021 Revenue Requirement Application, Transcript Volume 13 Oral Hearing, p. 2502 Program costs

In response to BCUC IR 4.5, BC Hydro states:

> BC Hydro will recover scrap value by transferring ownership of non-PCB units and components to installation contractors for resale as part of the LED street light installation services contract prices for the majority of units removed. [*emphasis added*]

2.23.7 Please explain how the recovery of scrap value "as part of the LED street light installation services contract prices" is accounted for in the proposed rate design and pricing model for RS 1701.

RESPONSE:

The recovery of any scrap value associated materials removed by the Installation Services Contractors is indirectly accounted for in the proposed rate design and pricing model. Any scrap value obtained by the Installation Services Contractors is intended to off-set some of their costs and thereby is accounted for in the prices which they charge to BC Hydro in connection with the Street Light Replacement Program.

23.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Appendix G, pp. 8–9; Exhibit B-4, BCUC IR 9.2, 8.5, 4.1, 4.5; Exhibit B-5, BCOAPO IR 14.2; BCSEA IR 5.3; the Commercial Energy Consumers Association of British Columbia IR 3.3; BC Hydro 2020-2021 Revenue Requirement Application, Transcript Volume 13 Oral Hearing, p. 2502 Program costs

In response to BCUC IR 4.5, BC Hydro states:

> BC Hydro will recover scrap value by transferring ownership of non-PCB units and components to installation contractors for resale as part of the LED street light installation services contract prices for the majority of units removed. [*emphasis added*]

2.23.7 Please explain how the recovery of scrap value "as part of the LED street light installation services contract prices" is accounted for in the proposed rate design and pricing model for RS 1701.

2.23.7.1 If it is in the proposed model, please provide the scrap value recovery amount and explain any assumptions BC Hydro made with respect to scrap value amounts.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.23.7.

23.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Appendix G, pp. 8–9; Exhibit B-4, BCUC IR 9.2, 8.5, 4.1, 4.5; Exhibit B-5, BCOAPO IR 14.2; BCSEA IR 5.3; the Commercial Energy Consumers Association of British Columbia IR 3.3; BC Hydro 2020-2021 Revenue Requirement Application, Transcript Volume 13 Oral Hearing, p. 2502 Program costs

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> BC Hydro will recover scrap value by transferring ownership of non-PCB units and components to installation contractors for resale as part of the LED street light installation services contract prices for the majority of units removed. [*emphasis added*]

2.23.7 Please explain how the recovery of scrap value "as part of the LED street light installation services contract prices" is accounted for in the proposed rate design and pricing model for RS 1701.

2.23.7.2 If it is not in the proposed model, please explain why not and provide a model which would be net of the recovered scrap value.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.23.7.

23.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Appendix G, pp. 8–9; Exhibit B-4, BCUC IR 9.2, 8.5, 4.1, 4.5; Exhibit B-5, BCOAPO IR 14.2; BCSEA IR 5.3; the Commercial Energy Consumers Association of British Columbia IR 3.3; BC Hydro 2020-2021 Revenue Requirement Application, Transcript Volume 13 Oral Hearing, p. 2502 Program costs

In response to Commercial Energy Consumer Association of British Columbia (CEC) IR 3.3, BC Hydro states:

> BC Hydro's RS 1701 street light service offers customers a variety of street lights to be installed on existing poles placed exclusively to support the BC Hydro distribution system equipment and conductors (as well as TELUS equipment and conductors in the case of jointly owned poles).

On page 2502 of the Transcript from the BC Hydro 2020-2021 Revenue Requirement Application (RRA) proceeding, BC Hydro stated that 80 percent of its distribution poles are jointly owned with TELUS and that any change in terms of the distribution budgets for vegetation management would entail a discussion with TELUS in terms of their ability to actually contribute to the budget.

2.23.8 Please discuss whether there are any BC Hydro owned street lights which also have TELUS attachments. If yes, please identify how many (number or percentage).

RESPONSE:

There are no BC Hydro owned street lights which also have TELUS attachments, however there are poles that have TELUS attachments.

Of the poles that have BC Hydro owned street lights on them, at least 86 per cent are accompanied by a TELUS attachment. This percentage is likely higher because BC Hydro and TELUS permit limited use of their solely owned poles to enable each others' delivery of services (i.e., single attachments to bridge facilities to a customer); however, these contacts are not recorded in BC Hydro's asset management system.

23.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Appendix G, pp. 8–9; Exhibit B-4, BCUC IR 9.2, 8.5, 4.1, 4.5; Exhibit B-5, BCOAPO IR 14.2; BCSEA IR 5.3; the Commercial Energy Consumers Association of British Columbia IR 3.3; BC Hydro 2020-2021 Revenue Requirement Application, Transcript Volume 13 Oral Hearing, p. 2502 Program costs

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2.23.9 Please discuss whether BC Hydro has had any discussions with TELUS to contribute to any portion of the incremental cost of the LED street lights. If yes, please provide a summary of the discussions. If no, please explain why not.

RESPONSE:

BC Hydro has not had any discussions with TELUS regarding contribution towards the Street Light Replacement Program. Under the Joint Ownership and Use agreement, TELUS is a joint owner of the pole, but each party is responsible for the costs related to their own equipment. The only costs that are shared relate to the pole (and associated anchors and ground wires). As the street lights are BC Hydro equipment (similar to our electrical conductors), TELUS would not be responsible to contribute towards those costs under the agreement.

23.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Appendix G, pp. 8–9; Exhibit B-4, BCUC IR 9.2, 8.5, 4.1, 4.5; Exhibit B-5, BCOAPO IR 14.2; BCSEA IR 5.3; the Commercial Energy Consumers Association of British Columbia IR 3.3; BC Hydro 2020-2021 Revenue Requirement Application, Transcript Volume 13 Oral Hearing, p. 2502 Program costs

In response to Commercial Energy Consumer Association of British Columbia (CEC) IR 3.3, BC Hydro states:

> BC Hydro's RS 1701 street light service offers customers a variety of street lights to be installed on existing poles placed exclusively to support the BC Hydro distribution system equipment and conductors (as well as TELUS equipment and conductors in the case of jointly owned poles).

On page 2502 of the Transcript from the BC Hydro 2020-2021 Revenue Requirement Application (RRA) proceeding, BC Hydro stated that 80 percent of its distribution poles are jointly owned with TELUS and that any change in terms of the distribution budgets for vegetation management would entail a discussion with TELUS in terms of their ability to actually contribute to the budget.

2.23.9.1 Please explain whether there are any revenue offsets from TELUS (or any other party) reflected in BC Hydro's revenue requirements. If yes, what portion is currently being allocated to the BC Hydro owned street lighting rate class and how is this reflected in the proposed rate design and pricing model for RS 1701? If it is not reflected in the proposed rate design and pricing model for RS 1701, please explain why not.

RESPONSE:

BC Hydro receives recoveries from TELUS for performing inspections, maintenance and replacement of jointly owned poles. These recoveries offset costs incurred by BC Hydro to sustain distribution poles on the system, the primary purpose of which is to support the delivery of electricity to its customers. The total TELUS contribution was reflected in External Recoveries of line 21 in Schedule 5.1 of Appendix A of BC Hydro's Fiscal 2020 to Fiscal 2021 Revenue Requirements Application filed to BCUC on December 1, 2020.

Distribution related costs are allocated and recovered from all of BC Hydro's rate classes with the exception of the Transmission Service Rate Class which does not use the distribution system. Distribution related costs and any offsets to these

costs are reflected in the Proposed RS 1701 LED rates trough their inclusion in the Revenue without Replacement Program ($ million) column in Table G-5 of the Application.

As described in our F2020 Fully Allocated Cost of Service Study (FACOS), the total distribution related costs allocated to the BC Hydro Owned Street Lighting Service customers were $6.4 million in fiscal 2020, which was the allocated distribution related cost after the offset of the external recoveries of the Telus contribution. Approximately 0.2 per cent of the TELUS contribution was used to offset the maintenance cost of BC Hydro Owned Street Lighting Service Customers according to its demand and customer related cost allocators in F2020 FACOS.

24.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-4, BCUC IR 9.2
Investment Related Costs: SLIM sustainment cost allocation

In response to BCUC IR 9.2, BC Hydro provides a working Pricing Model Excel spreadsheet as Attachment 1. BC Hydro states that the "PricingModel" Tab of the model performs the calculations and the results are linked to the "AppTables" and "AppxG" Tabs of the model. The "AppxG" includes the results as presented in Table G-6.

Excel Row 45 of "PricingModel" Tab identifies that there is a "SLIM sustainment cost allocation" included in the proposed pricing of RS 1701.

2.24.1 Please explain the nature of the "SLIM sustainment cost allocation" and the source of the amount of $39,438 in Cell E45.

RESPONSE:

SLIM sustainment cost refers to an allocation of a portion of the ongoing costs to BC Hydro to maintain and operate its Street Light Information Management system, which is used by customers taking service under RS 1701, as well as by other street lighting customers. The costs consist of:

- **Information technology costs to sustain the SLIM system of which BC Hydro estimates that approximately twenty per cent of these cost are attributable to service under RS 1701 based on the number of street lights supported. Calculated as $113,000 * 20 per cent = $22,600; and**
- **Estimated labour cost to support the use of SLIM by RS 1701 customers of approximately $17,000.**

25.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-4, BCUC IR 8.6, 8.7, 9.2; Exhibit B-1, Appendix G, p. 15
Electricity savings

In response to BCUC IR 8.6, BC Hydro states that the estimated annual energy savings of 28 GWh/year is estimated as follows:

Annual energy savings = Energy Savings per Street Light × number of the street lights × (1+T&D Loss Factor)

= ($Wattage_{HPS}$ - $Wattage_{LED}$)× HOU × 365 × the number of the street lightings× (1+T&D Loss Factor)

= (159.2 w -90.7 w)/1000 × 11.5 hour per day*365 days × 90,850 × (1+7 per cent)

≈28 GWh

Where $Wattage_{HPS}$ denotes the weighted average of wattage per HPS street light, and it was estimated as 159.2 w per HPS street light;

$Wattage_{LED}$ denotes the weighted average of wattage per to be installed LED street light, and it was estimated as 90.7 w per LED street light;

HOU denotes the average hour of use per street light per day;

T&D loss factor denotes the transmission and distribution loss factor and was assumed to be 7 per cent for street lighting.

In response to BCUC IR 8.7, BC Hydro states, starting from F2025, the annual capacity savings is estimated to be 6.7 MW as shown below:

Annual capacity savings = capacity savings per street light × the number of street lightings × (1 + T&D Loss Factor)

=($Wattage_{HPS}$ - $Wattage_{LED}$)× 90,850 ×(1+7 per cent)

=(159.2w -90.7w)/1,000,000 × 90,850 ×(1+7 per cent)

≈6.7MW

Where $Wattage_{HPS}$ denotes the weighted average of wattage per HPS street light, and it was estimated as 159.2 w per HPS street light;

$Wattage_{LED}$ denotes the weighted average of wattage per LED street light to be installed, and it was estimated as 90.7 w per LED street light;

T&D loss factor denotes the transmission and distribution loss factor and was assumed to be 7 per cent for street lighting.

In response to BCUC IR 9.2, BC Hydro provides a working Pricing Model Excel spreadsheet as Attachment 1. BC Hydro states that the "PricingModel" Tab of the model performs the calculations and the results are linked to the "AppTables" and "AppxG" Tabs of the model. The "AppxG" Tab includes the results as presented in Table G-6.

2.25.1 Please explain the basis for the following underlying assumptions in the annual energy savings and annual capacity savings (starting from F2025) calculations:

(i) Estimated wattage average of wattage per HPS street light of 159.2w;
(ii) Estimated weighed average wattage per installed LED street light of 90.7w;
(iii) Average hour of use per street light per day of 11.5 hours per day (annual energy savings calculation only); and
(iv) T&D loss factor of seven percent.

RESPONSE:

(i) Please refer to line 8 of the Pricing_Model tab: The weighed average wattage for the existing RS 1701 HPS street lights is based on BC Hydro's assessment of the current distribution of street lights through the rate classes and is calculated to be 122 watts. Adding 30 per cent for the ballast to this results in a total weighted average of 159.2 watts.

(ii) Please refer to line 14 of the Pricing_Model tab: The weighed average wattage for the replacement LED street lights is calculated to be 90.7 watts and is based on the assumption that street lights are replaced with street lights of equivalent light out-put except that 10 per cent of the 100-watt HPS category are replaced with street lights in the new low wattage category.

(iii) BC Hydro's best estimate of the average time that street lights under RS 1701 throughout the province are in use throughout a given year is 4,200 hours. This works out to an average of 11.5 hours per day. Since the RS 1701 street light rates are postage-stamp, BC Hydro has used the 11.5 hours per day to develop the rate for all street lights in the province under RS 1701. This assumption is necessary since it is currently not feasible to provide metered service for each light.

(iv) The 7 per cent T&D loss factor was estimated based on 4 per cent distribution loss and 3 per cent intra-regional transmission cost.

25.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-4, BCUC IR 8.6, 8.7, 9.2; Exhibit B-1, Appendix G, p. 15
Electricity savings

In response to BCUC IR 8.6, BC Hydro states that the estimated annual energy savings of 28 GWh/year is estimated as follows:

Annual energy savings = Energy Savings per Street Light × number of the street lights × (1+T&D Loss Factor)

= ($Wattage_{HPS}$ - $Wattage_{LED}$)× HOU × 365 × the number of the street lightings× (1+T&D Loss Factor)

= (159.2 w -90.7 w)/1000 × 11.5 hour per day*365 days × 90,850 × (1+7 per cent)

≈28 GWh

Where $Wattage_{HPS}$ denotes the weighted average of wattage per HPS street light, and it was estimated as 159.2 w per HPS street light;

$Wattage_{LED}$ denotes the weighted average of wattage per to be installed LED street light, and it was estimated as 90.7 w per LED street light;

HOU denotes the average hour of use per street light per day;

T&D loss factor denotes the transmission and distribution loss factor and was assumed to be 7 per cent for street lighting.

In response to BCUC IR 8.7, BC Hydro states, starting from F2025, the annual capacity savings is estimated to be 6.7 MW as shown below:

Annual capacity savings = capacity savings per street light × the number of street lightings × (1 + T&D Loss Factor)

=($Wattage_{HPS}$ - $Wattage_{LED}$)× 90,850 ×(1+7 per cent)

=(159.2w -90.7w)/1,000,000 × 90,850 ×(1+7 per cent)

≈6.7MW

Where $Wattage_{HPS}$ denotes the weighted average of wattage per HPS street light, and it was estimated as 159.2 w per HPS street light;

$Wattage_{LED}$ denotes the weighted average of wattage per LED street light to be installed, and it was estimated as 90.7 w per LED street light;

T&D loss factor denotes the transmission and distribution loss factor and was assumed to be 7 per cent for street lighting.

In response to BCUC IR 9.2, BC Hydro provides a working Pricing Model Excel spreadsheet as Attachment 1. BC Hydro states that the "PricingModel" Tab of the model performs the calculations and the results are linked to the "AppTables" and "AppxG" Tabs of the model. The "AppxG" Tab includes the results as presented in Table G-6.

2.25.2 Please confirm, or explain otherwise, that the estimated weighed average wattage per installed LED street light of 90.7w in response to BCUC IRs 8.6 and 8.7 corresponds to Column E, Excel Rows 15 and 57 in the "PricingModel" Tab of the Excel model.

RESPONSE:

Confirmed. Please refer to cell B:6 of the "Input 3 (Street Lighting)" tab of Attachment 2 to BC Hydro's response to BCUC IR 1.8.8 which shows that the average street light wattage of 90.7 watts in BC Hydro's response to BCUC IRs 1.8.6 and 1.8.7 corresponds to column E, Excel rows 15 and 57 in the "Pricing_Model" tab of the Excel model.

25.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-4, BCUC IR 8.6, 8.7, 9.2; Exhibit B-1, Appendix G, p. 15
Electricity savings

In response to BCUC IR 8.6, BC Hydro states that the estimated annual energy savings of 28 GWh/year is estimated as follows:

Annual energy savings = Energy Savings per Street Light × number of the street lights × (1+T&D Loss Factor)

= ($Wattage_{HPS}$ - $Wattage_{LED}$)× HOU × 365 × the number of the street lightings× (1+T&D Loss Factor)

= (159.2 w -90.7 w)/1000 × 11.5 hour per day*365 days × 90,850 × (1+7 per cent)

≈28 GWh

Where $Wattage_{HPS}$ denotes the weighted average of wattage per HPS street light, and it was estimated as 159.2 w per HPS street light;

$Wattage_{LED}$ denotes the weighted average of wattage per to be installed LED street light, and it was estimated as 90.7 w per LED street light;

HOU denotes the average hour of use per street light per day;

T&D loss factor denotes the transmission and distribution loss factor and was assumed to be 7 per cent for street lighting.

In response to BCUC IR 8.7, BC Hydro states, starting from F2025, the annual capacity savings is estimated to be 6.7 MW as shown below:

Annual capacity savings = capacity savings per street light × the number of street lightings × (1 + T&D Loss Factor)

=($Wattage_{HPS}$ - $Wattage_{LED}$)× 90,850 ×(1+7 per cent)

=(159.2w -90.7w)/1,000,000 × 90,850 ×(1+7 per cent)

≈6.7MW

Where $Wattage_{HPS}$ denotes the weighted average of wattage per HPS street light, and it was estimated as 159.2 w per HPS street light;

$Wattage_{LED}$ denotes the weighted average of wattage per LED street light to be installed, and it was estimated as 90.7 w per LED street light;

T&D loss factor denotes the transmission and distribution loss factor and was assumed to be 7 per cent for street lighting.

In response to BCUC IR 9.2, BC Hydro provides a working Pricing Model Excel spreadsheet as Attachment 1. BC Hydro states that the "PricingModel" Tab of the model performs the calculations and the results are linked to the "AppTables" and "AppxG" Tabs of the model. The "AppxG" Tab includes the results as presented in Table G-6.

2.25.2 Please confirm, or explain otherwise, that the estimated weighed average wattage per installed LED street light of 90.7w in response to BCUC IRs 8.6 and 8.7 corresponds to Column E, Excel Rows 15 and 57 in the "PricingModel" Tab of the Excel model.

2.25.2.1 If confirmed, please also confirm that the estimated annual energy savings and annual capacity savings would be reflected in Section VII (Excel Rows 77 to 85) of the "PricingModel" Tab via the comparison of the proposed "F21 Effective Rates" (Excel Row 84) to "F21 HPS Rates" (Excel Row 78) which is calculated in Excel Row 85.

RESPONSE:

Confirmed. The annual energy savings and annual capacity savings are reflected in the "Pricing_Model" calculations through the "savings" stream that is brought in to the "Pricing_Model" tab in column F, excel rows 124 through 143 and results in the "F21 LED Rate" on excel row 82. Note that this transfer excludes the supplemental charge, which is then included on excel row 83 of the "Pricing_Model" tab to calculate the "F21 Effective Rate" on excel row 84.

25.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-4, BCUC IR 8.6, 8.7, 9.2; Exhibit B-1, Appendix G, p. 15
Electricity savings

In response to BCUC IR 8.6, BC Hydro states that the estimated annual energy savings of 28 GWh/year is estimated as follows:

Annual energy savings = Energy Savings per Street Light × number of the street lights × (1+T&D Loss Factor)

= ($Wattage_{HPS}$ - $Wattage_{LED}$)× HOU × 365 × the number of the street lightings× (1+T&D Loss Factor)

= (159.2 w -90.7 w)/1000 × 11.5 hour per day*365 days × 90,850 × (1+7 per cent)

≈28 GWh

Where $Wattage_{HPS}$ denotes the weighted average of wattage per HPS street light, and it was estimated as 159.2 w per HPS street light;

$Wattage_{LED}$ denotes the weighted average of wattage per to be installed LED street light, and it was estimated as 90.7 w per LED street light;

HOU denotes the average hour of use per street light per day;

T&D loss factor denotes the transmission and distribution loss factor and was assumed to be 7 per cent for street lighting.

In response to BCUC IR 8.7, BC Hydro states, starting from F2025, the annual capacity savings is estimated to be 6.7 MW as shown below:

Annual capacity savings = capacity savings per street light × the number of street lightings × (1 + T&D Loss Factor)

=($Wattage_{HPS}$ - $Wattage_{LED}$)× 90,850 ×(1+7 per cent)

=(159.2w -90.7w)/1,000,000 × 90,850 ×(1+7 per cent)

≈6.7MW

Where $Wattage_{HPS}$ denotes the weighted average of wattage per HPS street light, and it was estimated as 159.2 w per HPS street light;

$Wattage_{LED}$ denotes the weighted average of wattage per LED street light to be installed, and it was estimated as 90.7 w per LED street light;

T&D loss factor denotes the transmission and distribution loss factor and was assumed to be 7 per cent for street lighting.

In response to BCUC IR 9.2, BC Hydro provides a working Pricing Model Excel spreadsheet as Attachment 1. BC Hydro states that the "PricingModel" Tab of the model performs the calculations and the results are linked to the "AppTables" and "AppxG" Tabs of the model. The "AppxG" Tab includes the results as presented in Table G-6.

2.25.2 Please confirm, or explain otherwise, that the estimated weighed average wattage per installed LED street light of 90.7w in response to BCUC IRs 8.6 and 8.7 corresponds to Column E, Excel Rows 15 and 57 in the "PricingModel" Tab of the Excel model.

2.25.2.1.1 If not confirmed, please explain where the estimated annual energy savings and annual capacity savings are reflected in the Pricing Model Excel spreadsheet.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.25.2 which confirms that the estimated annual energy savings and annual capacity savings are reflected in the Pricing Model Excel spreadsheet.

25.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-4, BCUC IR 8.6, 8.7, 9.2; Exhibit B-1, Appendix G, p. 15
Electricity savings

In response to BCUC IR 8.6, BC Hydro states that the estimated annual energy savings of 28 GWh/year is estimated as follows:

Annual energy savings = Energy Savings per Street Light × number of the street lights × (1+T&D Loss Factor)

= ($Wattage_{HPS}$ - $Wattage_{LED}$)× HOU × 365 × the number of the street lightings× (1+T&D Loss Factor)

= (159.2 w -90.7 w)/1000 × 11.5 hour per day*365 days × 90,850 × (1+7 per cent)

≈28 GWh

Where $Wattage_{HPS}$ denotes the weighted average of wattage per HPS street light, and it was estimated as 159.2 w per HPS street light;

$Wattage_{LED}$ denotes the weighted average of wattage per to be installed LED street light, and it was estimated as 90.7 w per LED street light;

HOU denotes the average hour of use per street light per day;

T&D loss factor denotes the transmission and distribution loss factor and was assumed to be 7 per cent for street lighting.

In response to BCUC IR 8.7, BC Hydro states, starting from F2025, the annual capacity savings is estimated to be 6.7 MW as shown below:

Annual capacity savings = capacity savings per street light × the number of street lightings × (1 + T&D Loss Factor)

=($Wattage_{HPS}$ - $Wattage_{LED}$)× 90,850 ×(1+7 per cent)

=(159.2w -90.7w)/1,000,000 × 90,850 ×(1+7 per cent)

≈6.7MW

Where $Wattage_{HPS}$ denotes the weighted average of wattage per HPS street light, and it was estimated as 159.2 w per HPS street light;

$Wattage_{LED}$ denotes the weighted average of wattage per LED street light to be installed, and it was estimated as 90.7 w per LED street light;

T&D loss factor denotes the transmission and distribution loss factor and was assumed to be 7 per cent for street lighting.

In response to BCUC IR 9.2, BC Hydro provides a working Pricing Model Excel spreadsheet as Attachment 1. BC Hydro states that the "PricingModel" Tab of the model performs the calculations and the results are linked to the "AppTables" and "AppxG" Tabs of the model. The "AppxG" Tab includes the results as presented in Table G-6.

2.25.3 For Line 11 in Table G-6, Electricity Rate, BC Hydro provides a reference from its F2019 Fully Allocated Cost of Service (FACOS). Please provide the reference to the source data in which the derivation of the electricity rate of $0.0398 per watt/month can be located in the F2019 FACOS.

RESPONSE:

Please refer to the derivation of the electricity rate shown starting on excel column K, row 58 of the "Pricing_Model" tab. The following table shows the complete calculation including references to the F2019 FACOS.

	Energy Rate Derived from F2019 FACOS			
1	**Energy Related Costs (FACOS Sch. 4.1)**		**2.0**	**$million**
2	**Demand Related Costs (FACOS Sch. 4.1)**		**3.5**	**$million**
3	**Total Electricity Costs**	**L1 + L2**	**5.5**	**$million**
4	**Energy @ Customer Meter (FACOS Sch. 5.0)**		**47,867**	**MWh**
5	**Electricity Rate**	**L3/L4 * 1000**	**0.114**	**$/kWh**
6	**Calculation Basis (per street light watt)**		**1**	**W**
7	**Operating hours per year**		**4200**	**h/yr**
8	**Energy Use per year (per street light watt)**	**L6 * L7 / 1000**	**4.2**	**kWh/yr/W**
9	**Energy Use per month (per street light watt)**	**L8 / 12**	**0.35**	**kWh/mo/W**
10	**Street Light Electricity Rate (per street light watt)**	**L5 * L9**	**0.0398**	**$/W/mo**

25.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-4, BCUC IR 8.6, 8.7, 9.2; Exhibit B-1, Appendix G, p. 15
Electricity savings

In response to BCUC IR 8.6, BC Hydro states that the estimated annual energy savings of 28 GWh/year is estimated as follows:

Annual energy savings = Energy Savings per Street Light × number of the street lights × (1+T&D Loss Factor)

= ($Wattage_{HPS}$ - $Wattage_{LED}$)× HOU × 365 × the number of the street lightings× (1+T&D Loss Factor)

= (159.2 w -90.7 w)/1000 × 11.5 hour per day*365 days × 90,850 × (1+7 per cent)

≈28 GWh

Where $Wattage_{HPS}$ denotes the weighted average of wattage per HPS street light, and it was estimated as 159.2 w per HPS street light;

$Wattage_{LED}$ denotes the weighted average of wattage per to be installed LED street light, and it was estimated as 90.7 w per LED street light;

HOU denotes the average hour of use per street light per day;

T&D loss factor denotes the transmission and distribution loss factor and was assumed to be 7 per cent for street lighting.

In response to BCUC IR 8.7, BC Hydro states, starting from F2025, the annual capacity savings is estimated to be 6.7 MW as shown below:

Annual capacity savings = capacity savings per street light × the number of street lightings × (1 + T&D Loss Factor)

=($Wattage_{HPS}$ - $Wattage_{LED}$)× 90,850 ×(1+7 per cent)

=(159.2w -90.7w)/1,000,000 × 90,850 ×(1+7 per cent)

≈6.7MW

Where $Wattage_{HPS}$ denotes the weighted average of wattage per HPS street light, and it was estimated as 159.2 w per HPS street light;

$Wattage_{LED}$ denotes the weighted average of wattage per LED street light to be installed, and it was estimated as 90.7 w per LED street light;

T&D loss factor denotes the transmission and distribution loss factor and was assumed to be 7 per cent for street lighting.

In response to BCUC IR 9.2, BC Hydro provides a working Pricing Model Excel spreadsheet as Attachment 1. BC Hydro states that the "PricingModel" Tab of the model performs the calculations and the results are linked to the "AppTables" and "AppxG" Tabs of the model. The "AppxG" Tab includes the results as presented in Table G-6.

2.25.4 Given that BC Hydro has used a marginal cost analysis in the Application, please discuss the significance/relevance of using the source data provided in the IR response above for the cost of electricity from the F2019 FACOS.

RESPONSE:

Marginal costs provide an estimate of the variable costs that will change as a result of the Replacement Program. Embedded costs from our Fully Allocated Cost of Service Study (FACOS) provide an estimate of total costs, including costs that are not impacted by the Replacement Program. Both types of costs are needed to develop the Proposed Rates.

The electricity pricing used in the pricing model is based on the marginal pricing model, which ultimately establishes the average street lighting rate for all street lights. However, the average street lighting rate alone is insufficient for inclusion in RS 1701, which requires differentiation between wattage categories of street lights. The electricity price is used as one input to establish the variation in the pricing for the different wattage categories of street lights, with higher wattage street lights costing more, and consuming more electricity than lower wattage street lights. BC Hydro used the F2019 FACOS to establish the total cost of electricity to be used as this input as the most recent source of information for this value.

25.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-4, BCUC IR 8.6, 8.7, 9.2; Exhibit B-1, Appendix G, p. 15
Electricity savings

In response to BCUC IR 8.6, BC Hydro states that the estimated annual energy savings of 28 GWh/year is estimated as follows:

Annual energy savings = Energy Savings per Street Light × number of the street lights × (1+T&D Loss Factor)

= ($Wattage_{HPS}$ - $Wattage_{LED}$)× HOU × 365 × the number of the street lightings× (1+T&D Loss Factor)

= (159.2 w -90.7 w)/1000 × 11.5 hour per day*365 days × 90,850 × (1+7 per cent)

≈28 GWh

Where $Wattage_{HPS}$ denotes the weighted average of wattage per HPS street light, and it was estimated as 159.2 w per HPS street light;

$Wattage_{LED}$ denotes the weighted average of wattage per to be installed LED street light, and it was estimated as 90.7 w per LED street light;

HOU denotes the average hour of use per street light per day;

T&D loss factor denotes the transmission and distribution loss factor and was assumed to be 7 per cent for street lighting.

In response to BCUC IR 8.7, BC Hydro states, starting from F2025, the annual capacity savings is estimated to be 6.7 MW as shown below:

Annual capacity savings = capacity savings per street light × the number of street lightings × (1 + T&D Loss Factor)

=($Wattage_{HPS}$ - $Wattage_{LED}$)× 90,850 ×(1+7 per cent)

=(159.2w -90.7w)/1,000,000 × 90,850 ×(1+7 per cent)

≈6.7MW

Where $Wattage_{HPS}$ denotes the weighted average of wattage per HPS street light, and it was estimated as 159.2 w per HPS street light;

$Wattage_{LED}$ denotes the weighted average of wattage per LED street light to be installed, and it was estimated as 90.7 w per LED street light;

T&D loss factor denotes the transmission and distribution loss factor and was assumed to be 7 per cent for street lighting.

In response to BCUC IR 9.2, BC Hydro provides a working Pricing Model Excel spreadsheet as Attachment 1. BC Hydro states that the "PricingModel" Tab of the model performs the calculations and the results are linked to the "AppTables" and "AppxG" Tabs of the model. The "AppxG" Tab includes the results as presented in Table G-6.

2.25.4 Given that BC Hydro has used a marginal cost analysis in the Application, please discuss the significance/relevance of using the source data provided in the IR response above for the cost of electricity from the F2019 FACOS.

2.25.4.1 Please discuss why BC Hydro did not use a marginal cost of electricity for Line 11 for Table G-6 from Appendix G given that BC Hydro has prepared a marginal cost analysis in the Application.

RESPONSE:

Line 11 of Table G-6 from Appendix G is used in the calculation of RS 1701 rates by wattage category. BC Hydro used the embedded cost of electricity from our Fully Allocated Cost of Service Studies for the purpose of differentiating RS 1701 rates by wattage category because this cost estimate provides the average cost of all electricity used by the street lights. BC Hydro's view is that the wattage categories should be based the cost of all electricity used, as it is the total cost of all electricity that must be recovered from RS 1701.

In contrast, the marginal costs represent the value of one additional unit of output, and are appropriate for determining value of electricity savings, but not the total cost of electricity to provide street lighting service.

25.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-4, BCUC IR 8.6, 8.7, 9.2; Exhibit B-1, Appendix G, p. 15
Electricity savings

In response to BCUC IR 8.6, BC Hydro states that the estimated annual energy savings of 28 GWh/year is estimated as follows:

Annual energy savings = Energy Savings per Street Light × number of the street lights × (1+T&D Loss Factor)

= ($Wattage_{HPS}$ - $Wattage_{LED}$)× HOU × 365 × the number of the street lightings× (1+T&D Loss Factor)

= (159.2 w -90.7 w)/1000 × 11.5 hour per day*365 days × 90,850 × (1+7 per cent)

≈28 GWh

Where $Wattage_{HPS}$ denotes the weighted average of wattage per HPS street light, and it was estimated as 159.2 w per HPS street light;

$Wattage_{LED}$ denotes the weighted average of wattage per to be installed LED street light, and it was estimated as 90.7 w per LED street light;

HOU denotes the average hour of use per street light per day;

T&D loss factor denotes the transmission and distribution loss factor and was assumed to be 7 per cent for street lighting.

In response to BCUC IR 8.7, BC Hydro states, starting from F2025, the annual capacity savings is estimated to be 6.7 MW as shown below:

Annual capacity savings = capacity savings per street light × the number of street lightings × (1 + T&D Loss Factor)

=($Wattage_{HPS}$ - $Wattage_{LED}$)× 90,850 ×(1+7 per cent)

=(159.2w -90.7w)/1,000,000 × 90,850 ×(1+7 per cent)

≈6.7MW

Where $Wattage_{HPS}$ denotes the weighted average of wattage per HPS street light, and it was estimated as 159.2 w per HPS street light;

$Wattage_{LED}$ denotes the weighted average of wattage per LED street light to be installed, and it was estimated as 90.7 w per LED street light;

T&D loss factor denotes the transmission and distribution loss factor and was assumed to be 7 per cent for street lighting.

In response to BCUC IR 9.2, BC Hydro provides a working Pricing Model Excel spreadsheet as Attachment 1. BC Hydro states that the "PricingModel" Tab of the model performs the calculations and the results are linked to the "AppTables" and "AppxG" Tabs of the model. The "AppxG" Tab includes the results as presented in Table G-6.

2.25.4 Given that BC Hydro has used a marginal cost analysis in the Application, please discuss the significance/relevance of using the source data provided in the IR response above for the cost of electricity from the F2019 FACOS.

2.25.4.2 If so directed, what would be a reasonable proxy for BC Hydro's current marginal cost of electricity. Please discuss.

RESPONSE:

BC Hydro's marginal cost of electricity is provided in Table G-3 of the Application. Using the average marginal cost of electricity to determine the electricity rate on line 11 of Table G-6 results in $0.0222 / W/ Month.

Directionally, the lower the cost of electricity used for the purpose of differentiation of the average RS 1701 street lighting rate by wattage categories, the lower will be the difference in rates by wattage. As BC Hydro's marginal costs of electricity are currently lower than our average costs, the use of marginal costs would reduce the difference between high wattage and a lower wattage street light rate. For clarity we note this would not change the average rate or expected revenue collected by BC Hydro under RS 1701. The following table, which is based on Table 6 in the Application, illustrates how the lower marginal cost of electricity has the effect of reducing the difference between the wattage category rates but does not change the average rate.

Proposed Final RS 1701 Streetlight Charges ($/month/light)

Street Light Charge	Average	< 51 Watts	51-80 Watts	81-120 Watts	> 120 Watts
With $0.0398/W/Mo Average Electricity Rate	20.66	15.08	18.77	23.50	27.57
With $0.0222/W/Mo Marginal Electricity Rate	20.66	17.01	19.36	22.63	24.90

Please refer to BC Hydro's response to BCUC IR 2.25.4.1 for a discussion of why average costs are appropriate for differentiation of RS 1701 street lighting rates by wattage category.

26.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Appendix G, pp. 9, 12; Exhibit B-5, BCOAPO IR 11.1; Exhibit B-4, BCUC IR 9.2
Amortization of one-time investment replacement program costs

In Table G-5 to Appendix G to the Application, BC Hydro provides the following amounts (in column 4) with respect to the amortization of one-time investment replacement program costs, where BCUC Staff note that the sum of the amounts in column 4 is $58.3 million:

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

In response to BCOAPO IR 11.1, BC Hydro states that one-time replacement program capital costs are:

> Amortization of Program capital costs attributable to LED streetlight deployment (depreciated over 20 years) and a small fraction of arm replacements (depreciated over 40 years). Capital costs include materials, installation labour, program management, deployment management, supporting technology, customer engagement, other support costs, as well as corresponding contingency, inflation and capital overhead; and…

Table G-4 to Appendix G to the Application shows that the "Requested Total Authorized" replacement program capital cost is $83.28 million and the "Total Program Costs before Loadings and Contingencies" of $55.36 million.

In response to BCUC IR 9.2, BC Hydro provides a working Pricing Model Excel spreadsheet as Attachment 1. In Columns K to M of Excel Rows 20 to 35 in the "PricingModel" Tab, BC Hydro shows a breakdown of the "Total Replacement Program Count" cost inputs, where the individual "Total Cost ($)" amounts sum to $42,900,635.

2.26.1 Please explain the difference between the sum of the amounts in column 4 of Table G-5 (i.e., $58.3 million) and:

(a) The "Requested Total Authorized" replacement program capital cost of $83.28 million as provided in Table G-4;
(b) The "Total Program Costs before Loadings and Contingencies" replacement program capital cost of $55.36 million as provided in Table G-4; and
(c) The "Total Replacement Program Count" cost inputs in Columns K to M of Excel Rows 20 to 35 in the "PricingModel" Tab of the Pricing Model Excel spreadsheet.

RESPONSE:

The figures referenced in the IR represent estimated program costs at the time of project approval to be depreciated over the life of the installed assets where:

(a) $83.28 million represents the total authorized costs based on the Implementation Phase Business Case, which was determined before the decision to terminate RS 1755 and only convert RS 1755 Group 2 street lights to LED was made (RS 1755 Decision);

(b) $55.36 million represents the total program cost, excluding loadings and contingency, from the Implementation Phase Business Case; and

(c) The inputs in columns K to M of Excel rows 20 to 35 in the "Pricing_Model" tab of the Pricing Model Excel spreadsheet represent costs that have been used to establish the variation in pricing from the average price based on street light wattage, which are included in the revised program cost of $63.5 following the decision noted above in point a regarding RS 1755. In the Pricing model, these cost inputs have been updated to include updates to the number of street lights to be replaced and updated luminaire pricing.

26.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Appendix G, pp. 9, 12; Exhibit B-5, BCOAPO IR 11.1; Exhibit B-4, BCUC IR 9.2
Amortization of one-time investment replacement program costs

In Table G-5 to Appendix G to the Application, BC Hydro provides the following amounts (in column 4) with respect to the amortization of one-time investment replacement program costs, where BCUC Staff note that the sum of the amounts in column 4 is $58.3 million:

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

In response to BCOAPO IR 11.1, BC Hydro states that one-time replacement program capital costs are:

> Amortization of Program capital costs attributable to LED streetlight deployment (depreciated over 20 years) and a small fraction of arm replacements (depreciated over 40 years). Capital costs include materials, installation labour, program management, deployment management, supporting technology, customer engagement, other support costs, as well as corresponding contingency, inflation and capital overhead; and…

Table G-4 to Appendix G to the Application shows that the "Requested Total Authorized" replacement program capital cost is $83.28 million and the "Total Program Costs before Loadings and Contingencies" of $55.36 million.

In response to BCUC IR 9.2, BC Hydro provides a working Pricing Model Excel spreadsheet as Attachment 1. In Columns K to M of Excel Rows 20 to 35 in the "PricingModel" Tab, BC Hydro shows a breakdown of the "Total Replacement Program Count" cost inputs, where the individual "Total Cost ($)" amounts sum to $42,900,635.

2.26.2 To the extent that any of the above differences are due, in whole or part, to the "small fraction of arm replacements" which are depreciated over 40 years instead of the 20-year analysis period of the program capital costs, please reconcile the impact of this factor to the overall difference and explain how BC Hydro determined the net book value of the applicable arm replacements.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.23.2 for discussion of the updated program cost of $63.5 million. The difference referenced in the IR is not attributable to the "small fraction of arm replacements". The difference between the $42.9 million and the $63.5 million is the $20.6 million luminaire cost. The Pricing Model used updated luminaire costs based on BC Hydro's completed procurement process rather than the costs included in the revised program costs of $63.5 million.

27.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.1, pp. 27, 17, 22; Appendix G, pp. 2-3; Exhibit B-5, BCOAPO IR 6.1, 10.3; Exhibit B-4, BCUC IR 3.6, 3.7, 8.10, 9.2
Maintenance savings

On page 27 of the Application, BC Hydro states that the average value of estimated operational and maintenance savings is $1.2 million since LEDs have a longer lifespan and lower failure rate compared to HPS light bulbs.

On page 8 of the Business Case, included in response to BCOAPO IR 6.1, BC Hydro states, "[w]hen comparing to steady state annual costs, annual OMA [operation and maintenance] Expenditure on Lighting Maintenance Programs will be reduced by an estimated $2.7M on average."

2.27.1 Please reconcile the difference in the estimated average maintenance savings as stated on page 27 of the Application and on page 8 of the Business Case.

RESPONSE:

The two numbers – $2.7 million from the Structured Decision Making Model in the business case and $1.2 million from the Marginal Cost Model in the Rate Application – were calculated at different times and for different purposes. The former was an input into the alternatives analysis to enable an investment decision, and the latter was used as an input into the rate model for the rates application.

First, the $2.7 million value (excludes inflation) is from the Street Light Replacement Program's business case and was one input used in the evaluation of the Program's alternatives. This value was calculated based on the forecasted annual maintenance expense that would be required to continue maintaining HPS street lights (based on steady state failure rates) under the assumption that BC Hydro would not implement LED street lights. Therefore, if BC Hydro were to implement LED street lights, and the replacement cost of failed LED street lights are capitalized; then, there would be on average, a $2.7 million savings in annual OMA (operation and maintenance) expense for repairing failed street lights.

Whereas, the $1.2 million value (includes inflation) was calculated more recently and was used in the Marginal Cost Model of the Rate Application. This value is the average estimated operational and maintenance savings over the 20-year rate design period which is calculated as: the budget for HPS maintenance costs minus the ongoing costs associated with LED streetlights (including amortization of spot failure replacement cost, spot failure dismantling cost and LED street light washing cost).

27.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.1, pp. 27, 17, 22; Appendix G, pp. 2-3; Exhibit B-5, BCOAPO IR 6.1, 10.3; Exhibit B-4, BCUC IR 3.6, 3.7, 8.10, 9.2
Maintenance savings

In response to BCOAPO IR 10.3, BC Hydro states:

> The Maintenance Savings reported for each year in Table G-5 were determined by comparing the High Pressure Sodium (HPS) street light historical maintenance budget average with the LED street lights ongoing costs. The LED street light ongoing costs include amortization of LED failure replacement, dismantling cost of failed LED street lights and allowance to clean all LED street lights after 10 years of ownership.

BC Hydro provides working Excel spreadsheets of the calculations included in Table G-3 and Table G-5 in response to BCUC IR 8.10. The worksheet titled "Input 6 (Maintenance Savings)" shows the following:

- Amortization of LED Spot Failure Replacement Costs: estimated annual cost increases steadily from $0.1 million in F2032 to $0.4 million in F2040. There are no estimated costs in F2021 to F2031.
- LED Spot Failure Replacement Dismantling Costs: estimated annual cost is $0.1 million from F2034 to F0240. There are no estimated costs in F2021 to F2033.
- LED Street Light Washing Costs (OMA): the estimated annual cost is $0.7 million in F0231, $1.3 million F2032, $1.2 million in F2033, and $0.1 million F2034. There are no estimated costs in F2021 to F2030 and F2035 to F2040, respectively.

In response to BCUC IR 3.6, BC Hydro states, "BC Hydro has negotiated a 10-year repair or replacement warranty with our street light vendor for both the luminaires and photocells."

In response to BCUC IR 3.7, BC Hydro states:

> Table G-5 and Table G-6 of Appendix G both reflect the assumption that BC Hydro is returning all failed LED luminaires and photocells to the street light vendor in the first 10 years of ownership for repair or replacement at the vendor's cost, and that <u>BC Hydro is paying for the replacement of failed LED luminaires and photocells experienced on the system beyond 10 years</u>. [*emphasis added*]

On page 17 of the Application, BC Hydro states that in 2016 and 2017, it installed 195 LED street lights as part of its LED pilot studies. BC Hydro states the purpose of the pilot included assessing the following:

- "LED performance compared to HPS luminaires"
- "Crew feedback regarding ease of installation, ease of cleaning the luminaire and replacing the components, build-up of dirt/ debris in the luminaire;" and
- "The number of luminaires that break, burn out or fail."

2.27.2 For clarity, please explain what is meant by "Amortization of LED Spot Failure Replacement Costs." Is this related to the amortization cost of replacement LED street lights after LED street lights installed in the Replacement Program have failed?

RESPONSE:

Yes, the "Amortization of LED Spot Failure Replacement Costs" is related to the amortization cost of replacement LED street lights after LED street lights installed in the Replacement Program have failed. The calculation of the "Amortization of LED Spot Failure Replacement Costs" is based on each year's replacement costs of failed LED street lights amortized over 20 years.

27.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.1, pp. 27, 17, 22; Appendix G, pp. 2-3; Exhibit B-5, BCOAPO IR 6.1, 10.3; Exhibit B-4, BCUC IR 3.6, 3.7, 8.10, 9.2
Maintenance savings

In response to BCOAPO IR 10.3, BC Hydro states:

> The Maintenance Savings reported for each year in Table G-5 were determined by comparing the High Pressure Sodium (HPS) street light historical maintenance budget average with the LED street lights ongoing costs. The LED street light ongoing costs include amortization of LED failure replacement, dismantling cost of failed LED street lights and allowance to clean all LED street lights after 10 years of ownership.

BC Hydro provides working Excel spreadsheets of the calculations included in Table G-3 and Table G-5 in response to BCUC IR 8.10. The worksheet titled "Input 6 (Maintenance Savings)" shows the following:

- Amortization of LED Spot Failure Replacement Costs: estimated annual cost increases steadily from $0.1 million in F2032 to $0.4 million in F2040. There are no estimated costs in F2021 to F2031.
- LED Spot Failure Replacement Dismantling Costs: estimated annual cost is $0.1 million from F2034 to F0240. There are no estimated costs in F2021 to F2033.
- LED Street Light Washing Costs (OMA): the estimated annual cost is $0.7 million in F0231, $1.3 million F2032, $1.2 million in F2033, and $0.1 million F2034. There are no estimated costs in F2021 to F2030 and F2035 to F2040, respectively.

In response to BCUC IR 3.6, BC Hydro states, "BC Hydro has negotiated a 10-year repair or replacement warranty with our street light vendor for both the luminaires and photocells."

In response to BCUC IR 3.7, BC Hydro states:

> Table G-5 and Table G-6 of Appendix G both reflect the assumption that BC Hydro is returning all failed LED luminaires and photocells to the street light vendor in the first 10 years of ownership for repair or replacement at the vendor's cost, and that <u>BC Hydro is paying for the replacement of failed LED luminaires and photocells experienced on the system beyond 10 years</u>. [*emphasis added*]

On page 17 of the Application, BC Hydro states that in 2016 and 2017, it installed 195 LED street lights as part of its LED pilot studies. BC Hydro states the purpose of the pilot included assessing the following:

- "LED performance compared to HPS luminaires"
- "Crew feedback regarding ease of installation, ease of cleaning the luminaire and replacing the components, build-up of dirt/ debris in the luminaire;" and
- "The number of luminaires that break, burn out or fail."

2.27.3 Please explain why the expected timing for when the "Amortization of LED Spot Failure Replacement Costs" will begin (i.e., F2032) is two years before the expecting timing for when "LED Spot Failure Replacement Dismantling Costs" will begin (i.e., F2034). In your response, please explain why the expected timing of these two costs does not coincide.

RESPONSE:

Both the "Amortization of LED Spot Failure Replacement Costs" and the "LED Spot Failure Replacement Dismantling Costs" begin in fiscal 2021. Due to the magnitude of the amounts in certain years, they are not visible when the worksheet titled "Input 6 (Maintenance Savings)" are presented in $M with one decimal point.

The table below is the "Input 6 (Maintenance Savings)" worksheet presented in $M with four decimal points.

Fiscal Year	Amortization of LED Spot Failure Replacement ($M)	LED Spot Failure Replacement Dismantling Costs ($M)	LED Street Light Washing Costs ($M)	Budget of HPS Maintenance Costs ($M)	Change ($M)
2021	0.0004	0.0026	0.0000	0.5040	-0.5010
2022	0.0020	0.0074	0.0000	1.2823	-1.2729
2023	0.0051	0.0119	0.0000	1.3080	-1.2910
2024	0.0089	0.0125	0.0000	1.3341	-1.3127
2025	0.0129	0.0127	0.0000	1.3608	-1.3352
2026	0.0170	0.0130	0.0000	1.3880	-1.3581
2027	0.0212	0.0132	0.0000	1.4158	-1.3814
2028	0.0254	0.0135	0.0000	1.4441	-1.4052
2029	0.0297	0.0138	0.0000	1.4730	-1.4295
2030	0.0341	0.0140	0.0000	1.5024	-1.4543
2031	0.0399	0.0175	0.7104	1.5325	-0.7647
2032	0.0523	0.0300	1.3205	1.5631	-0.1603
2033	0.0785	0.0478	1.2133	1.5944	-0.2548
2034	0.1187	0.0601	0.0875	1.6263	-1.3600
2035	0.1658	0.0620	0.0000	1.6588	-1.4310
2036	0.2141	0.0633	0.0000	1.6920	-1.4146
2037	0.2635	0.0645	0.0000	1.7258	-1.3978
2038	0.3138	0.0658	0.0000	1.7604	-1.3807
2039	0.3651	0.0672	0.0000	1.7956	-1.3633
2040	0.4175	0.0685	0.0000	1.8315	-1.3455

27.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.1, pp. 27, 17, 22; Appendix G, pp. 2-3; Exhibit B-5, BCOAPO IR 6.1, 10.3; Exhibit B-4, BCUC IR 3.6, 3.7, 8.10, 9.2
Maintenance savings

In response to BCOAPO IR 10.3, BC Hydro states:

> The Maintenance Savings reported for each year in Table G-5 were determined by comparing the High Pressure Sodium (HPS) street light historical maintenance budget average with the LED street lights ongoing costs. The LED street light ongoing costs include amortization of LED failure replacement, dismantling cost of failed LED street lights and allowance to clean all LED street lights after 10 years of ownership.

BC Hydro provides working Excel spreadsheets of the calculations included in Table G-3 and Table G-5 in response to BCUC IR 8.10. The worksheet titled "Input 6 (Maintenance Savings)" shows the following:

- Amortization of LED Spot Failure Replacement Costs: estimated annual cost increases steadily from $0.1 million in F2032 to $0.4 million in F2040. There are no estimated costs in F2021 to F2031.
- LED Spot Failure Replacement Dismantling Costs: estimated annual cost is $0.1 million from F2034 to F0240. There are no estimated costs in F2021 to F2033.
- LED Street Light Washing Costs (OMA): the estimated annual cost is $0.7 million in F0231, $1.3 million F2032, $1.2 million in F2033, and $0.1 million F2034. There are no estimated costs in F2021 to F2030 and F2035 to F2040, respectively.

In response to BCUC IR 3.6, BC Hydro states, "BC Hydro has negotiated a 10-year repair or replacement warranty with our street light vendor for both the luminaires and photocells."

In response to BCUC IR 3.7, BC Hydro states:

> Table G-5 and Table G-6 of Appendix G both reflect the assumption that BC Hydro is returning all failed LED luminaires and photocells to the street light vendor in the first 10 years of ownership for repair or replacement at the vendor's cost, and that <u>BC Hydro is paying for the replacement of failed LED luminaires and photocells experienced on the system beyond 10 years</u>. [*emphasis added*]

On page 17 of the Application, BC Hydro states that in 2016 and 2017, it installed 195 LED street lights as part of its LED pilot studies. BC Hydro states the purpose of the pilot included assessing the following:

- "LED performance compared to HPS luminaires"
- "Crew feedback regarding ease of installation, ease of cleaning the luminaire and replacing the components, build-up of dirt/ debris in the luminaire;" and
- "The number of luminaires that break, burn out or fail."

2.27.4 Please explain how BC Hydro estimated the annual cost of each LED street light ongoing cost (e.g., Amortization of LED Spot Failure Replacement Costs, LED Spot Failure Replacement Dismantling Costs and LED Street Light Washing Costs). In your response, please provide all assumptions and cost estimates, explaining considerations from the results of the 2016 and 2017 pilot studies, if any, for (i) the estimate of future failure rates from the time BC Hydro is responsible for the replacement of failed LED luminaires and photocells; (ii) the unit cost of dismantling (labour) and replacement (materials); and (iii) the estimated cost and schedule for luminaire cleaning.

RESPONSE:

The assumptions for the LED street light ongoing costs include:

1. **Spot failure units in each year = number of installed LED street lights per deployment year x forecasted failure rates in the table below. The forecasted failure rates are estimate values based upon data received from the procurement events.**

Failure Rates	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
LED Luminaire	0.9%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.9%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%
Photocell	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%

   a. **Spot failure units are further broken down into "under warranty" and "not under warranty" based on the assumption that materials (luminaire and photocell) are covered under warranty in the first 10 years.**

2. **Replacement labour and material unit costs.**

Cost Type	Cost Description	Unit Cost ($)	Applied to Spot Failure Units
Material	LED Luminaire	$ 231	"not under warranty" after 10 years
Material	Photocell	$ 19	"not under warranty" after 10 years
Labour	Installation	$ 162	"under warranty" and "not under warranty"
Labour	Dismantling	$ 29	"under warranty" and "not under warranty"

3. LED street light washing.

a. Labour cost = $29/unit.

b. Frequency = once every 10 years for LED street lights installed in each deployment year.

4. Other Assumptions.

a. Capital Overhead Rate = 12 per cent.

b. Inflation Rate for fiscal 2021 is 2.5 per cent, and for fiscal 2022 and onwards is 2 per cent per annum.

The cost estimates for each of the LED street light ongoing costs are:

1. Amortization of LED Spot Failure Replacement Costs = sum of each year's spot failure replacement costs amortized over 20 years.

a. Each year's spot failure replacement costs = spot failure units x installation labour and material unit costs x capital overhead rate x inflation factor.

2. LED Spot Failure Replacement Dismantling Costs = spot failure units x dismantling labour unit cost x inflation factor.

3. LED Street Light Washing Costs = number of installed LED street lights in each deployment year x labour unit cost x inflation factor.

27.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.1, pp. 27, 17, 22; Appendix G, pp. 2-3; Exhibit B-5, BCOAPO IR 6.1, 10.3; Exhibit B-4, BCUC IR 3.6, 3.7, 8.10, 9.2
Maintenance savings

On page 2 of Appendix G to the Application, Table G-1 shows the five-year average maintenance budget for existing RS 1701 street lights is $1.25 million as follows:

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

On page 22 of the Application, BC Hydro provides the following table showing the preliminary installation schedule for LED street lights and the number of lights replaced per quarter:

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

In response to BCUC IR 8.10, BC Hydro provides working Excel spreadsheets of the calculations included in Table G-3 and Table G-5. Column E in the worksheet titled “Input 6 (Maintenance Savings)” shows the “Budget of HPS maintenance costs” for F2021 to F2040, which is compared to estimated LED street lights ongoing costs.

2.27.5 Please explain how the amounts in Column E in the worksheet titled “Input 6 (Maintenance Savings)” can be reconciled to the five-year average maintenance budget for existing RS 1701 street lights of $1.25 million in Table G-1 and the preliminary installation schedule for LED street lights in Table 4.

RESPONSE:

In the worksheet titled "Input 6 (Maintenance Savings)" in the Excel file that BC Hydro provided as an Attachment to BC Hydro's response to BCUC IR 1.8.10, the budget of HPS maintenance costs in column E are estimated as follows:

- **For fiscal 2021, it is the maintenance budget included in Fiscal 2020 to Fiscal 2021 Revenue Requirements Application; and**
- **For years after fiscal 2021, the budget of HPS maintenance costs was estimated as the five-year average of maintenance budget of $1.25 million (Table G-1) escalated by CPI.**

The budget costs are the estimation of HPS maintenance costs if there was no street lighting replacement program. Therefore, these budget costs of HPS are valid comparison to the maintenance cost of LED street lights during the 20-year period, including the installation years of the program.

27.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.1, pp. 27, 17, 22; Appendix G, pp. 2-3; Exhibit B-5, BCOAPO IR 6.1, 10.3; Exhibit B-4, BCUC IR 3.6, 3.7, 8.10, 9.2
Maintenance savings

On page 2 of Appendix G to the Application, Table G-1 shows the five-year average maintenance budget for existing RS 1701 street lights is $1.25 million as follows:

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

On page 22 of the Application, BC Hydro provides the following table showing the preliminary installation schedule for LED street lights and the number of lights replaced per quarter:

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

In response to BCUC IR 8.10, BC Hydro provides working Excel spreadsheets of the calculations included in Table G-3 and Table G-5. Column E in the worksheet titled “Input 6 (Maintenance Savings)” shows the “Budget of HPS maintenance costs” for F2021 to F2040, which is compared to estimated LED street lights ongoing costs.

2.27.5.1 Specifically, please explain how amounts during the installation period (i.e., in each year of F2021 to F2024) are estimated, including any inflation assumptions in those fiscal years.

RESPONSE:

Please refer to BC Hydro’s response to BCUC IR 2.27.5.

27.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.1, pp. 27, 17, 22; Appendix G, pp. 2-3; Exhibit B-5, BCOAPO IR 6.1, 10.3; Exhibit B-4, BCUC IR 3.6, 3.7, 8.10, 9.2
Maintenance savings

On page 2 of Appendix G to the Application, Table G-1 shows the five-year average maintenance budget for existing RS 1701 street lights is $1.25 million as follows:

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

On page 22 of the Application, BC Hydro provides the following table showing the preliminary installation schedule for LED street lights and the number of lights replaced per quarter:

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

In response to BCUC IR 8.10, BC Hydro provides working Excel spreadsheets of the calculations included in Table G-3 and Table G-5. Column E in the worksheet titled “Input 6 (Maintenance Savings)” shows the “Budget of HPS maintenance costs” for F2021 to F2040, which is compared to estimated LED street lights ongoing costs.

2.27.6 Please explain why the maintenance budget for existing RS 1701 street lights in F2020 was less than the five-year average of $1.25 million.

RESPONSE:

The F2020 Maintenance Budget was reduced in anticipation of the implementation of the Street Light Replacement Program beginning in the same fiscal year. Implementation was delayed for various reasons and is now proceeding in fiscal 2021.

27.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.1, pp. 27, 17, 22; Appendix G, pp. 2–3; Exhibit B-5, BCOAPO IR 6.1, 10.3; Exhibit B-4, BCUC IR 3.6, 3.7, 8.10, 9.2
Maintenance savings

On page 2 of Appendix G to the Application, Table G-1 shows the five-year average maintenance budget for existing RS 1701 street lights is $1.25 million as follows:

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

On page 22 of the Application, BC Hydro provides the following table showing the preliminary installation schedule for LED street lights and the number of lights replaced per quarter:

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

In response to BCUC IR 8.10, BC Hydro provides working Excel spreadsheets of the calculations included in Table G-3 and Table G-5. Column E in the worksheet titled “Input 6 (Maintenance Savings)” shows the “Budget of HPS maintenance costs” for F2021 to F2040, which is compared to estimated LED street lights ongoing costs.

2.27.7 Please explain why the maintenance budgets for existing RS 1701 street lights in F2018 and F2019, respectively, were higher than the five-year average of $1.25 million.

RESPONSE:

For fiscal 2018 and fiscal 2019, BC Hydro anticipated that the number of spot repairs was increasing as installed lamps were aging. BC Hydro, therefore, increased maintenance budgets for street lights above the average of $1.25 million.

27.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.1, pp. 27, 17, 22; Appendix G, pp. 2-3; Exhibit B-5, BCOAPO IR 6.1, 10.3; Exhibit B-4, BCUC IR 3.6, 3.7, 8.10, 9.2
Maintenance savings

On pages 2 to 3 of Appendix G to the Application, BC Hydro claims that it examined valuing the maintenance savings using actual maintenance expenditures to maintain existing street lighting technology. BC Hydro states "[t]he 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 costs outcomes as being or suitable [sic] for use as an input to the rate design."

2.27.8 Please elaborate on the concerns and implications with the approach of using actual maintenance expenditures.

RESPONSE:

BC Hydro views budget maintenance cost as being appropriate for the purpose of calculating the Proposed Rates for the reasons described in Appendix G.

The use of historic actual maintenance cost may over-forecast the expected maintenance savings arising from the Replacement Program because historic maintenance costs were driven up by unplanned re-lamping costs. Over-forecasting the expected maintenance savings could result in BC Hydro not collecting enough revenue from RS 1701 customers to cover the costs of the Replacement Program and thereby not achieving the objective of avoiding impacting rates for other ratepayers.

27.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.1, pp. 27, 17, 22; Appendix G, pp. 2-3; Exhibit B-5, BCOAPO IR 6.1, 10.3; Exhibit B-4, BCUC IR 3.6, 3.7, 8.10, 9.2
Maintenance savings

In response to BCUC IR 9.2, BC Hydro provides a working Pricing Model Excel spreadsheet as Attachment 1. BC Hydro states that the "PricingModel" Tab of the model performs the calculations and the results are linked to the "AppTables" and "AppxG" Tabs of the model. The "AppxG" Tab includes the results as presented in Table G-6.

In Cell L49 of the "PricingModel" Tab, BC Hydro shows the total maintenance cost is $10,883,870.

2.27.9 Please explain how the total maintenance cost in Cell L49 of the "PricingModel" Tab corresponds to the maintenance savings calculations provided in response to BCUC IR 8.10.

RESPONSE:

The total maintenance cost in cell L49 of the "Pricing_Model" tab of $10.9 million consists of three components: (i) the LED spot failure replacement capital expenditures; (ii) the spot failure replacement dismantling cost; and (iii) the street light washing costs. Together, these are the LED ongoing costs.

The maintenance savings calculation provided in BC Hydro's response to BCUC IR 1.8.10 is based on the difference between LED ongoing costs and the budget of HPS maintenance costs over the rate design period of fiscal 2021 to fiscal 2040.

Since there are projected spot failures in each of the street light useful years, the LED spot failure replacement capital expenditures are expected to incur from fiscal 2021 to fiscal 2044 (i.e., after the planned deployment schedule of fiscal 2021 to fiscal 2024 is accounted for). These capital expenditures will be amortized over the period of fiscal 2021 to fiscal 2064 as the capital expenditures in fiscal 2044 will be not be fully amortized until fiscal 2064.

Only the amortization of the first 20 years (i.e., the rate design period) are included in the calculation of the maintenance savings in order to derive the planned revenues after savings for rate design purpose.

28.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-4, BCUC IR 9.2
Shared costs

In response to BCUC IR 9.2, BC Hydro provides a working Pricing Model Excel spreadsheet as Attachment 1. BC Hydro states that the "PricingModel" Tab of the model performs the calculations and the results are linked to the "AppTables" and "AppxG" Tabs of the model. The "AppxG" Tab includes the results as presented in Table G-6.

In Excel Row 68 of the "PricingModel" Tab, BC Hydro provides the calculation "Shared Costs (customer etc.)."

2.28.1 Please explain the calculation in Excel Row 68, including the source data for the figures in the "Control Panel" for this calculation (which is shown in Columns K to M of Rows 67 to 71).

RESPONSE:

Excel row 68 of the "Pricing_Model" Tab provided as Attachment 1 to BC Hydro's response to BCUC IR 1.9.2 is required so that the bottom-up calculation of the Average Rate in the "Pricing_Model" Tab matches the average rate required to recover the revenue calculated from the marginal cost model shown in Table G-3 of the Application.

Row 68 represents costs that are included in BC Hydro's fully allocated cost of service studies but not in the bottom-up calculation of pricing components, such as customer-related costs. These amounts are assumed not to vary with street light wattage so are set equal for all categories of street lights when the variation in pricing from the average price is calculated for the different wattage categories.

29.0 B RATE DESIGN

Reference: Rate Design
Exhibit B-1, p. 2; Exhibit B-5, BCSEA IR 1.2, 1.4, 1.5, 1.6, 1.11; F2019 FACOS Study, p. 11; BC Hydro 2015 Rate Design Application, Section 1.1.3, pp. 1–4
Rate design principles and proposed changes

On page 11 of the F2019 FACOS study, BC Hydro includes an F2019 Actual Revenue to Cost Ratio of 211.9% for the rate class called "Street Lighting, BC Hydro Owned."

In response to BCSEA IR 1.4 and 1.5, BC Hydro states that it "acknowledges that the revenue received from RS 1701 exceeds the costs allocated to it in BC Hydro's fully allocated cost of service studies." However, BC Hydro "is not intended to change the revenue to cost ratio for the purpose of rate rebalancing."

In response to BCSEA IR 1.6, BC Hydro also states that it:

> …acknowledges that the revenue to cost ratio for the BC Hydro Owned Street Lighting Rate Class indicates that BC Hydro collects more revenue from this rate class than our cost of service to them, as indicated by a revenue to cost ratio that exceeds unity. The revenue to cost ratio for the BC Hydro owned street light rate class has exceeded unity since this rate class was defined in 2016…

In the 2015 Rate Design Application, BC Hydro sought the division of its existing street lighting rate class into two new rate classes: customer-owned street lighting and BC Hydro Owned Street Lighting. This segmentation was approved by Order G-47-16 for the Negotiated Settlement Process.

2.29.1 Please provide the revenue to cost ratios for BC Hydro's Street Lighting rate class prior to the segmentation in 2015.

RESPONSE:

BC Hydro's F2014 Fully Allocated Cost of Service (FACOS) Study was the last such study conducted prior to segmenting the Street Lighting Rate Class into two separate rate classes, one for BC Hydro owned street lighting and one for customer owned street lighting.

BC Hydro's F2014 FACOS study was filed with the BCUC on April 30, 2015 and included the revenue-to-cost ratio for the Street Lighting Rate Class of 129.4 per cent.

29.0 B RATE DESIGN

Reference: Rate Design
Exhibit B-1, p. 2; Exhibit B-5, BCSEA IR 1.2, 1.4, 1.5, 1.6, 1.11; F2019 FACOS Study, p. 11; BC Hydro 2015 Rate Design Application, Section 1.1.3, pp. 1–4
Rate design principles and proposed changes

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In response to BCSEA IR 1.4 and 1.5, BC Hydro states that it "acknowledges that the revenue received from RS 1701 exceeds the costs allocated to it in BC Hydro's fully allocated cost of service studies." However, BC Hydro "is not intended to change the revenue to cost ratio for the purpose of rate rebalancing."

In response to BCSEA IR 1.6, BC Hydro also states that it:

> …acknowledges that the revenue to cost ratio for the BC Hydro Owned Street Lighting Rate Class indicates that BC Hydro collects more revenue from this rate class than our cost of service to them, as indicated by a revenue to cost ratio that exceeds unity. The revenue to cost ratio for the BC Hydro owned street light rate class has exceeded unity since this rate class was defined in 2016…

In the 2015 Rate Design Application, BC Hydro sought the division of its existing street lighting rate class into two new rate classes: customer-owned street lighting and BC Hydro Owned Street Lighting. This segmentation was approved by Order G-47-16 for the Negotiated Settlement Process.

2.29.2 Please provide the F2020 revenue to cost ratio for BC Hydro's Street Lighting rate class, if available. If not available, please clarify when the F2020 FACOS Study will be available to be filed to the BCUC.

RESPONSE:

BC Hydro's F2020 Fully Allocated Cost of Service Study was filed with the BCUC on February 11, 2021. The revenue to cost ratio for the BC Hydro Owned Street Lighting Rate Class in fiscal 2020 was 200.2 per cent.

BC Hydro's F2020 Fully Allocated Cost of Service Study is available at: https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/regulatory-planning-documents/regulatory-filings/facos/00-2021-02-11-bchydro-facos-f2020.pdf

29.0 B RATE DESIGN

Reference: Rate Design
Exhibit B-1, p. 2; Exhibit B-5, BCSEA IR 1.2, 1.4, 1.5, 1.6, 1.11; F2019 FACOS Study, p. 11; BC Hydro 2015 Rate Design Application, Section 1.1.3, pp. 1–4
Rate design principles and proposed changes

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In response to BCSEA IR 1.4 and 1.5, BC Hydro states that it "acknowledges that the revenue received from RS 1701 exceeds the costs allocated to it in BC Hydro's fully allocated cost of service studies." However, BC Hydro "is not intended to change the revenue to cost ratio for the purpose of rate rebalancing."

In response to BCSEA IR 1.6, BC Hydro also states that it:

> …acknowledges that the revenue to cost ratio for the BC Hydro Owned Street Lighting Rate Class indicates that BC Hydro collects more revenue from this rate class than our cost of service to them, as indicated by a revenue to cost ratio that exceeds unity. The revenue to cost ratio for the BC Hydro owned street light rate class has exceeded unity since this rate class was defined in 2016…

In the 2015 Rate Design Application, BC Hydro sought the division of its existing street lighting rate class into two new rate classes: customer-owned street lighting and BC Hydro Owned Street Lighting. This segmentation was approved by Order G-47-16 for the Negotiated Settlement Process.

2.29.3 Please discuss the factors which have caused the revenue to cost ratio for BC Hydro Owned Street Lighting rate class to significantly exceed unity since 2016.

RESPONSE:

BC Hydro's analysis, summarized below, shows that the revenue-to-cost ratio for the BC Hydro Owned Street Lighting Rate Class would have exceeded unity prior to 2016, if it had been treated as a separate rate class. In other words, the difference between fully allocated costs and revenues for BC Hydro-owned street lighting service predates 2016.

In fiscal 2020, the combined revenues and costs of BC Hydro-owned and customer owned street lighting were $40.2 million and $32.3 million, respectively.

Therefore, the revenue to cost ratio would be 124.3 per cent in fiscal 2020 if the two street lighting rate classes were not segmented. This combined revenue to cost ratio is slightly lower than the 129.4 per cent ratio in fiscal 2014, which was shown in BC Hydro's response to BCUC IR 2.29.1. This drop is explained by the revenue reduction caused by following reasons:

1. **Customer owned street lights being upgraded to energy efficient LED technology;**
2. **Attrition from Rate Schedule 1755; and**
3. **A one-time back billing due to the adjustment of the number of street lights for a customer of RS 1701 in fiscal 2020.**

BC Hydro believes that one reason that the revenue to cost ratio is high for the BC Hydro Owned Street Lighting rate class is that, over the longer-term, BC Hydro's total revenue requirements have increased driven in part by increases in load and associated costs to provide service to our major rate classes such as Residential service. In comparison, BC Hydro Owned Street Lighting service load has been relatively stable with little change in either the load or cost to serve. This means that overall rate increases, which are applied as an equal percentage to all rates, has increased BC Hydro Owned Street Lighting revenue more so than the increase in the cost of service for the rate class.

For clarity, BC Hydro notes that revenue to cost ratios differ from unity for several of our rate classes. Addressing this would be the subject of an application by BC Hydro to change the revenue to cost ratios, i.e., rate rebalancing, which goes beyond the scope of the current Application.

29.0 B RATE DESIGN

Reference: Rate Design
Exhibit B-1, p. 2; Exhibit B-5, BCSEA IR 1.2, 1.4, 1.5, 1.6, 1.11; F2019 FACOS Study, p. 11; BC Hydro 2015 Rate Design Application, Section 1.1.3, pp. 1–4
Rate design principles and proposed changes

In response to BCSEA IR 1.2, BC Hydro provides a link to the F2019 FACOS Study. The following table is an excerpt from the BC Hydro F2019 FACOS Study at that link:[1]

	Revenue to Cost Ratios						
Rate Class	**F2016 Forecast (%)**	**F2016 Actual (%)**	**F2017 Actual (%)**	**F2018 Actual (%)**	**F2019 Actual (%)**	**Percentage Point Change (F2018 Actual to F2019 Actual) (%)**	**Percentage of Energy at Customer Meter in F2019 (%)**
Residential	93.3	90.8	93.2	93.8	94.6	0.8	34.5
GS < 35 Kw	111.9	122.6	123.6	121.3	120.9	-0.4	7.7
MGS	117.2	123.5	115.1	114.3	115.1	0.8	6.7
LGS	101.3	103.9	103.9	102.9	102.4	-0.5	22.1
Irrigation	87.6	95.1	89.5	72.0	83.4	11.4	0.2
Street Lighting – BC Hydro Owned	173.6	183.6	198.4	210.5	211.9	1.4	0.1
Street Lighting – Customer Owned	104.8	101.8	95.1	92.8	88.4	-4.4	0.3
Transmission	102.6	98.8	95.4	96.1	94.9	-1.2	28.4
Total BC Hydro							**100.0**

2.29.4 Given that BC Hydro has stated that a revenue to cost ratio which exceeds unity means that BC Hydro has collected and/or is collecting more revenue from the "Street Lighting – BC Hydro Owned" rate class approved by Order G-47-16 than its cost of service, please confirm that for rate classes that are below unity,

[1] 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

this means that BC Hydro is not collecting enough revenues from these rate classes to cover its cost of service.

RESPONSE:

BC Hydro confirms that for any given rate class, a revenue-to-cost ratio above unity indicates that BC Hydro's revenues are greater than our fully allocated cost of service, and that a revenue to cost ratio below unity indicates that BC Hydro's revenues are less than our fully allocated cost of service.

29.0 B RATE DESIGN

Reference: Rate Design
Exhibit B-1, p. 2; Exhibit B-5, BCSEA IR 1.2, 1.4, 1.5, 1.6, 1.11; F2019 FACOS Study, p. 11; BC Hydro 2015 Rate Design Application, Section 1.1.3, pp. 1–4
Rate design principles and proposed changes

In response to BCSEA IR 1.2, BC Hydro provides a link to the F2019 FACOS Study. The following table is an excerpt from the BC Hydro F2019 FACOS Study at that link:[1]

	Revenue to Cost Ratios						
Rate Class	**F2016 Forecast** (%)	**F2016 Actual** (%)	**F2017 Actual** (%)	**F2018 Actual** (%)	**F2019 Actual** (%)	**Percentage Point Change (F2018 Actual to F2019 Actual)** (%)	**Percentage of Energy at Customer Meter in F2019** (%)
Residential	93.3	90.8	93.2	93.8	94.6	0.8	34.5
GS < 35 Kw	111.9	122.6	123.6	121.3	120.9	-0.4	7.7
MGS	117.2	123.5	115.1	114.3	115.1	0.8	6.7
LGS	101.3	103.9	103.9	102.9	102.4	-0.5	22.1
Irrigation	87.6	95.1	89.5	72.0	83.4	11.4	0.2
Street Lighting – BC Hydro Owned	173.6	183.6	198.4	210.5	211.9	1.4	0.1
Street Lighting – Customer Owned	104.8	101.8	95.1	92.8	88.4	-4.4	0.3
Transmission	102.6	98.8	95.4	96.1	94.9	-1.2	28.4
Total BC Hydro							**100.0**

2.29.4 Given that BC Hydro has stated that a revenue to cost ratio which exceeds unity means that BC Hydro has collected and/or is collecting more revenue from the "Street Lighting – BC Hydro Owned" rate class approved by Order G-47-16 than its cost of service, please confirm that for rate classes that are below unity,

[1] 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

this means that BC Hydro is not collecting enough revenues from these rate classes to cover its cost of service.

2.29.4.1 If yes, please explain whether this equates to a level of cross-subsidization between rate classes (rate classes that are higher than 100 percent are subsidizing rate classes that are lower than 100 percent).

RESPONSE:

BC Hydro confirms that revenue-to-cost ratios may be interpreted as providing an indicator of cross-subsidization.

29.0 B RATE DESIGN

Reference: Rate Design
Exhibit B-1, p. 2; Exhibit B-5, BCSEA IR 1.2, 1.4, 1.5, 1.6, 1.11; F2019 FACOS Study, p. 11; BC Hydro 2015 Rate Design Application, Section 1.1.3, pp. 1–4
Rate design principles and proposed changes

In response to BCSEA IR 1.6, BC Hydro states that "[a]djusting the revenue to cost ratio would require BC Hydro to file an application for rate rebalancing to the BCUC. Such an application would impact all ratepayers and goes beyond the scope of this street light rate application."

2.29.5 Please clarify whether it is possible to adjust the revenue to cost ratio between the two streetlighting classes.

RESPONSE:

While it is theoretically possible to change rates for two utility rate classes, such as the Street Lighting BC Hydro Owned rate class and the Street Lighting Customer Owned rate classes in a manner that impacts the revenue-to-cost ratios for these customer rate classes, BC Hydro can identify no basis for doing so.

For clarity, BC Hydro notes that changes to the revenue-to-cost ratios are typically done as a result of a rate rebalancing application which intends to align costs and revenues across all of a utility's rate classes. Rate rebalancing considers all the utility's rate classes, not just a subset.

29.0 B RATE DESIGN

Reference: Rate Design
Exhibit B-1, p. 2; Exhibit B-5, BCSEA IR 1.2, 1.4, 1.5, 1.6, 1.11; F2019 FACOS Study, p. 11; BC Hydro 2015 Rate Design Application, Section 1.1.3, pp. 1–4
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2.29.6 Please discuss the revenue to cost ratio threshold which would trigger BC Hydro to file a rate rebalancing application.

RESPONSE:

BC Hydro does not have a revenue-to-cost ratio threshold which would trigger the filing of a rate rebalancing application.

30.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.2, pp. 28-29; Section 3.4, p. 16;
Exhibit B-4, BCUC IR 5.2.1, 7.6.1; Exhibit B-5, BCSEA IR 1.4, 1.6. 1.7
Temporary supplemental charge alternatives

On page 28 and 29 of the Application, BC Hydro estimates that a total of $6.55 million would be unrecovered depreciation of the existing street lights that needs to be recovered through a supplemental charge. BC Hydro calculates the supplemental charge to be $2.06/month/street light.

In response to BCUC IR 5.2.1, BC Hydro states:

> If a RS 1701 street light is removed prior to its full depreciation, in most cases the undepreciated value is currently not recovered from the customer requesting the removal. These asset write-offs are forecast in BC Hydro's revenue requirements and these forecast amounts are currently recovered from all ratepayers.
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> To the extent that total actual asset write-offs in a given fiscal year differs from the forecast amounts included in BC Hydro's revenue requirements, these variances are not eligible for deferral to a regulatory account under existing orders; therefore, these variances are to the account of the shareholder.
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> [emphasis added]

In BCUC IR 7.6.1, the BCUC asks how utilities in other jurisdictions treat the unrecovered depreciation amount for street lights replaced as a result of the Federal PCB Regulation. In response, BC Hydro states it contacted SaskPower, Manitoba Hydro and Hydro Québec and found the following:

- SaskPower wrote off the undepreciated value which meant the cost was borne by the shareholder;
- Manitoba Hydro recorded the undepreciated value in a regulatory deferral account along with other annual asset retirement gains and losses. The cost was borne by ratepayers; and
- Hydro Quebec only replaces street lights when their lifetime is expired. There is no consideration of the undepreciated value of lights.

On page 16 of the Application, Table 3 shows that there are seven Canadian electricity utilities that are converting their street lights to LEDs: Manitoba Hydro, Hydro Québec, Newfoundland Power, Newfoundland & Labrador Hydro, SaskPower, Nova Scotia Power and New Brunswick Power.

2.30.1 Please confirm, or explain otherwise, that SaskPower, Manitoba Hydro and Hydro Québec are Crown corporations owned by the provincial government of each respective province.

RESPONSE:

Based on publicly available information on each utility's website, it appears that each of SaskPower, Manitoba Hydro and Hydro Quebec is owned by their respective provincial government.

30.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.2, pp. 28-29; Section 3.4, p. 16; Exhibit B-4, BCUC IR 5.2.1, 7.6.1; Exhibit B-5, BCSEA IR 1.4, 1.6. 1.7
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2.30.1.1 Was the treatment for unrecovered depreciation for street lights directed or mandated by the provincial government of each respective province? Please discuss.

RESPONSE:

The Government of B.C. has not issued a direction or mandate in respect of BC Hydro's unrecovered depreciation for street lights.

BC Hydro is unaware of whether the treatment for depreciation of street lights was directed or mandated by the provincial governments of the provinces in which Manitoba Hydro, Hydro Québec, Newfoundland Power, Newfoundland & Labrador Hydro, SaskPower, Nova Scotia Power and New Brunswick Power operate.

30.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.2, pp. 28-29; Section 3.4, p. 16;
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On page 16 of the Application, Table 3 shows that there are seven Canadian electricity utilities that are converting their street lights to LEDs: Manitoba Hydro, Hydro Québec, Newfoundland Power, Newfoundland & Labrador Hydro, SaskPower, Nova Scotia Power and New Brunswick Power.

2.30.2 Please explain why BC Hydro did not contact the other four Canadian electricity utilities noted in Table 3 (i.e., Newfoundland Power, Newfoundland & Labrador Hydro, Nova Scotia Power and New Brunswick Power) in responding to BCUC IR 7.6.1.

RESPONSE:

BC Hydro's rate design jurisdictional reviews do not typically include other utilities' internal business decisions and accounting treatments. To respond to BCUC IR 1.7.6.1, BC Hydro selected a few representative utilities across the country and contacted them to gather information.

BC Hydro does not believe it is appropriate to directly compare other utilities' treatments of retired assets to BC Hydro's proposed treatment. Utilities might have different drivers for their LED street light replacement decisions and different regulatory and operational environments. In addition, they might have conducted their LED replacements differently than BC Hydro's Street Light Replacement Program.

30.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.2, pp. 28-29; Section 3.4, p. 16; Exhibit B-4, BCUC IR 5.2.1, 7.6.1; Exhibit B-5, BCSEA IR 1.4, 1.6. 1.7
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- SaskPower wrote off the undepreciated value which meant the cost was borne by the shareholder;
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On page 16 of the Application, Table 3 shows that there are seven Canadian electricity utilities that are converting their street lights to LEDs: Manitoba Hydro, Hydro Québec, Newfoundland Power, Newfoundland & Labrador Hydro, SaskPower, Nova Scotia Power and New Brunswick Power.

2.30.2 Please explain why BC Hydro did not contact the other four Canadian electricity utilities noted in Table 3 (i.e., Newfoundland Power, Newfoundland & Labrador Hydro, Nova Scotia Power and New Brunswick Power) in responding to BCUC IR 7.6.1.

2.30.2.1 If possible, please provide a description of how these utilities treat the unrecovered depreciation amount for street lights replaced as a result of the Federal PCB Regulation.

RESPONSE:

In the time provided to respond to this information request, BC Hydro was able to confirm only with New Brunswick Power. New Brunswick Power indicated that existing assets were written off to all ratepayers during the year of removal.

30.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.2, pp. 28-29; Section 3.4, p. 16;
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In BCUC IR 7.6.1, the BCUC asks how utilities in other jurisdictions treat the unrecovered depreciation amount for street lights replaced as a result of the Federal PCB Regulation. In response, BC Hydro states it contacted SaskPower, Manitoba Hydro and Hydro Québec and found the following:

- SaskPower wrote off the undepreciated value which meant the cost was borne by the shareholder;
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On page 16 of the Application, Table 3 shows that there are seven Canadian electricity utilities that are converting their street lights to LEDs: Manitoba Hydro, Hydro Québec, Newfoundland Power, Newfoundland & Labrador Hydro, SaskPower, Nova Scotia Power and New Brunswick Power.

2.30.3 If possible, please provide a description of how FortisBC Inc. treats the unrecovered depreciation amount for street lights replaced pursuant to BCUC Order G-102-18 dated June 4, 2018.

RESPONSE:

BC Hydro contacted FortisBC and reviewed the publicly available information related to the BCUC's approval of FortisBC's Application for Amendment to Electric Tariff Rate Schedule 50 Lighting (FortisBC Application) under Order No. G-102-18.

Please refer to FortisBC's response to BCUC IR 1.4.4.1 of the FortisBC Application where FortisBC explained that it planned to recover the costs of its LED Retrofit Program from all general customers through the approved capital spending formula under its Performance Based Ratemaking plan. FortisBC further clarified to BC Hydro that the write-offs of undepreciated luminaires were included in the LED Retrofit Program costs, therefore were also recovered from all general customers.

30.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.2, pp. 28-29; Section 3.4, p. 16;
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In BCUC IR 7.6.1, the BCUC asks how utilities in other jurisdictions treat the unrecovered depreciation amount for street lights replaced as a result of the Federal PCB Regulation. In response, BC Hydro states it contacted SaskPower, Manitoba Hydro and Hydro Québec and found the following:

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On page 16 of the Application, Table 3 shows that there are seven Canadian electricity utilities that are converting their street lights to LEDs: Manitoba Hydro, Hydro Québec, Newfoundland Power, Newfoundland & Labrador Hydro, SaskPower, Nova Scotia Power and New Brunswick Power.

2.30.4 Please provide the forecast and actual amount in BC Hydro's revenue requirement related to the write-off of "RS 1701 street lights removed prior to its full depreciation" for the last five years.

RESPONSE:

The table below shows the forecast and actual amount in BC Hydro's revenue requirement related to the write-off of "RS 1701 street lights removed prior to its full depreciation" for the last five years:

$ thousands	F2016	F2017	F2018	F2019	F2020
RRA Plan	101	42	63	78	331
Actual	123	177	103	124	167

30.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.2, pp. 28-29; Section 3.4, p. 16; Exhibit B-4, BCUC IR 5.2.1, 7.6.1; Exhibit B-5, BCSEA IR 1.4, 1.6. 1.7
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In BCUC IR 7.6.1, the BCUC asks how utilities in other jurisdictions treat the unrecovered depreciation amount for street lights replaced as a result of the Federal PCB Regulation. In response, BC Hydro states it contacted SaskPower, Manitoba Hydro and Hydro Québec and found the following:

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On page 16 of the Application, Table 3 shows that there are seven Canadian electricity utilities that are converting their street lights to LEDs: Manitoba Hydro, Hydro Québec, Newfoundland Power, Newfoundland & Labrador Hydro, SaskPower, Nova Scotia Power and New Brunswick Power.

2.30.5 Please discuss the pros and cons of BC Hydro adopting the methods of unrecovered depreciation amounts used by SaskPower, Manitoba Hydro and Hydro Québec. In your response, please discuss why BC amenable to adopting each approach and provide the appropriate recovery period and carrying cost for BC Hydro in the case of the Manitoba Hydro approach.

RESPONSE:

BC Hydro is unable to adopt the approach taken by Hydro Quebec of waiting for the asset to fully depreciate before its removal, as we must remove street lights prior to the end of their useful life in order to comply with the PCB Regulation coming into effect.

BC Hydro does not support adopting the approach taken by Manitoba Hydro for two reasons. First, it would require BC Hydro to seek BCUC approval for a new regulatory account and, second, it would result in costs being recovered from all ratepayers, including those who do not take service or obtain any benefits from Rate Schedule 1701.

Notwithstanding the above, if BC Hydro were directed to adopt the approach taken by Manitoba Hydro and establish a new regulatory account through which the costs would be recovered from all ratepayers, BC Hydro would propose to recover the costs deferred to the new regulatory account over the next test period and apply interest to the balance in the account based on BC Hydro's weighted average cost of debt for its current fiscal year, consistent with BC Hydro's other cash variance accounts. Please refer to BC Hydro's response to BCUC IR 1.7.5, where BC Hydro explains why we consider that recovery from all ratepayers is not appropriate and that this approach would not align with the Bonbright criteria regarding fair allocation of costs.

BC Hydro is unable to comment on the acceptability of the approach taken by SaskPower as it would impact the Government of B.C., and by extension B.C. taxpayers. The Government of B.C. has issued no mandate or direction in this application indicating support for such an approach. BC Hydro considers that recovering these costs from RS 1701 customers is appropriate as these costs are directly and only associated with and required for service to RS 1701 customers.

30.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
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On page 16 of the Application, Table 3 shows that there are seven Canadian electricity utilities that are converting their street lights to LEDs: Manitoba Hydro, Hydro Québec, Newfoundland Power, Newfoundland & Labrador Hydro, SaskPower, Nova Scotia Power and New Brunswick Power.

2.30.5.1 Given that the undepreciated value of removed RS 1701 street lights is currently recovered from all ratepayers, please explain why BC Hydro now proposes to recover the undepreciated amount for street lights replaced from RS 1701 customers only.

RESPONSE:

BC Hydro clarifies that prior to the commencement of the Replacement Program, BC Hydro was not removing street lights prior to their end of life, except upon request by a customer or in rare cases where RS 1701 service could not be continued.

As described in BC Hydro's response to BCSEA IR 1.5.3, approximately 0.3 per cent of the street lights were removed in a given year from 2018 through 2020, therefore the costs associated with undepreciated value of removed RS 1701 street lights were minimal. In addition, as described in BC Hydro's response to BCUC IR 1.7.4, BC Hydro owned street lights are treated as mass assets in BC Hydro asset database and BC Hydro does not currently have a methodology to determine the undepreciated value of a specific street light.

The Replacement Program started December 2020 and will result in the removal of one hundred per cent of the RS 1701 street lights, and the undepreciated value of all street lighting assets in the asset database is calculable. As of May 1, 2021, BC Hydro will commence recovering the undepreciated value of removed RS 1701 street lights from RS 1701 customers, on an interim basis, as approved by Commission Order No. G-43-21.

The Replacement Program is the reason why BC Hydro needs to remove street lights before the end of their useful life, thereby resulting in unrecovered depreciation. The Replacement Program is undertaken solely to allow BC Hydro to continue to provide service under RS 1701 and it is therefore reasonable and justified that RS 1701 customers bear the costs and receive the benefits of the Replacement Program. One of the Replacement Program costs is the cost of the unrecovered depreciation arising from early removal of street lights.

30.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.2, pp. 28-29; Section 3.4, p. 16; Exhibit B-4, BCUC IR 5.2.1, 7.6.1; Exhibit B-5, BCSEA IR 1.4, 1.6. 1.7
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2.30.5.2 Please explain the rationale for the current practice of recovering the undepreciated value of removed RS 1701 street lights from all ratepayers.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.30.5.1.

30.0 B RATE DESIGN

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Exhibit B-1, Section 5.2.2, pp. 28-29; Section 3.4, p. 16; Exhibit B-4, BCUC IR 5.2.1, 7.6.1; Exhibit B-5, BCSEA IR 1.4, 1.6. 1.7
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On page 16 of the Application, Table 3 shows that there are seven Canadian electricity utilities that are converting their street lights to LEDs: Manitoba Hydro, Hydro Québec, Newfoundland Power, Newfoundland & Labrador Hydro, SaskPower, Nova Scotia Power and New Brunswick Power.

2.30.5.3 Please provide a calculation of the impact of recovering the estimated Net Book Value (NBV) of removed HPS street lights of $6.55 million from all ratepayers through the current practice of asset write-offs.

RESPONSE:

The estimated Net Book Value of removed HPS street lights will be recovered from street light ratepayers through the supplemental charge. If the supplemental charge is not approved, the impact to all ratepayers are as follows:

	F2022	F2023	F2024
Increase in Revenue Requirements ($ million)	**2.1**	**2.2**	**2.2**
Rate Impact (%)	**0.04**	**0.04**	**0.04**

30.0 B RATE DESIGN

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Exhibit B-4, BCUC IR 5.2.1, 7.6.1; Exhibit B-5, BCSEA IR 1.4, 1.6. 1.7
Temporary supplemental charge alternatives

In response to BCSEA IR 1.4, BC Hydro states, "BC Hydro acknowledges that the revenue received from RS 1701 exceeds the costs allocated to it in BC Hydro's fully allocated cost of service studies."

BC Hydro further states in response to BCUC IR 1.6:

> BC Hydro acknowledges that the revenue to cost ratio for the BC Hydro Owned Street Lighting Rate Class indicates that BC Hydro collects more revenue from this rate class than our cost of service to them, as indicated by a revenue to cost ratio that exceeds unity. The revenue to cost ratio for the BC Hydro owned street light rate class has exceeded unity since this rate class was defined in 2016, and this situation is independent of the LED street light conversion program [*emphasis added*]

2.30.6 Given that the revenue to cost ratio for the BC Hydro owned street light rate class indicates that BC Hydro has collected more revenue from RS 1701 ratepayers than the cost to service them, has BC Hydro considered recovering the $6.55 million from the shareholder and refunding that amount to RS 1701 ratepayers on account of the over-collection of RS 1701 revenue? Please explain why or why not.

RESPONSE:

BC Hydro has not considered recovering the $6.55 million from the shareholder and refunding that amount to RS 1701 ratepayers. BC Hydro does not have the authority or mandate to implement such a transaction. That is because, in part, final rates determined by the BCUC under the *Utilities Commission Act* are deemed to be "just and reasonable" and so by implication are non-refundable.

30.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.2, pp. 28-29; Section 3.4, p. 16;
Exhibit B-4, BCUC IR 5.2.1, 7.6.1; Exhibit B-5, BCSEA IR 1.4, 1.6. 1.7
Temporary supplemental charge alternatives

In response to BCSEA IR 1.4, BC Hydro states, "BC Hydro acknowledges that the revenue received from RS 1701 exceeds the costs allocated to it in BC Hydro's fully allocated cost of service studies."

BC Hydro further states in response to BCUC IR 1.6:

> BC Hydro acknowledges that the revenue to cost ratio for the BC Hydro Owned Street Lighting Rate Class indicates that BC Hydro collects more revenue from this rate class than our cost of service to them, as indicated by a revenue to cost ratio that exceeds unity. The revenue to cost ratio for the BC Hydro owned street light rate class has exceeded unity since this rate class was defined in 2016, and this situation is independent of the LED street light conversion program [*emphasis added*]

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2.30.6.1 Please discuss the implications of this hypothetical scenario.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.30.6.

30.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.2, pp. 28-29; Section 3.4, p. 16; Exhibit B-4, BCUC IR 5.2.1, 7.6.1; Exhibit B-5, BCSEA IR 1.4, 1.6. 1.7
Temporary supplemental charge alternatives

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2.30.7 Without filing an application for rate rebalancing for all rate classes, has BC Hydro considered recovering the $6.55 million from only those customer classes that are below unity. Why or why not?

RESPONSE:

BC Hydro has not considered collecting $6.55 million from only those rate classes with a revenue-to-cost ratio below unity.

Collecting $6.55 million from only those rate classes with a revenue-to-cost ratio below unity would require BC Hydro to make an application to the BCUC for rate rebalancing (if the incremental revenue was used to reduce the rate of those rate classes with a revenue-to-cost ratio above unity) or would result in a shareholder windfall (if the incremental revenue was not used to reduce the rate of those rate classes with a revenue-to-cost ratio above unity).

If the $6.55 million collected from those rate classes with a revenue-to-cost ratio below unity were refunded to those customer classes with a revenue-to-cost ratio above unity, that would be rate rebalancing.

30.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.2, pp. 28-29; Section 3.4, p. 16; Exhibit B-4, BCUC IR 5.2.1, 7.6.1; Exhibit B-5, BCSEA IR 1.4, 1.6. 1.7
Temporary supplemental charge alternatives

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2.30.7 Without filing an application for rate rebalancing for all rate classes, has BC Hydro considered recovering the $6.55 million from only those customer classes that are below unity. Why or why not?

2.30.7.1 Please discuss the implications (e.g., financial, operational, other) of this hypothetical scenario.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.30.7.

30.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.2, pp. 28-29; Section 3.4, p. 16; Exhibit B-4, BCUC IR 5.2.1, 7.6.1; Exhibit B-5, BCSEA IR 1.4, 1.6. 1.7
Temporary supplemental charge alternatives

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> BC Hydro acknowledges that the revenue to cost ratio for the BC Hydro Owned Street Lighting Rate Class indicates that BC Hydro collects more revenue from this rate class than our cost of service to them, as indicated by a revenue to cost ratio that exceeds unity. The revenue to cost ratio for the BC Hydro owned street light rate class has exceeded unity since this rate class was defined in 2016, and this situation is independent of the LED street light conversion program [*emphasis added*]

2.30.7 Without filing an application for rate rebalancing for all rate classes, has BC Hydro considered recovering the $6.55 million from only those customer classes that are below unity. Why or why not?

2.30.7.2 Please calculate the supplemental charge rider per month per street light, if the $6.55 million unrecovered depreciation is to be charged to all other customer classes where the F2019 revenue to cost ratio is below unity.

RESPONSE:

BC Hydro interprets this information request to be asking what would be the charge to customers in rate classes with a revenue-to-cost ratio below unity, if $6.55 million were collected from such customers. A "rider per month per street light" as described in the information request cannot reasonably be calculated for ratepayers who are not street lighting customers as such customers do not have street lights.

BC Hydro's view is that collecting $6.55 million from customers in rate classes with a revenue-to-cost ratio below unity is not a permissible outcome of the Street Light Rates Application, as further discussed in our response to BCUC IR 2.30.7.

Nonetheless to be responsive, we estimate that if $6.55 million were collected from the approximately 1.9 million BC Hydro accounts that are included in rate classes with a revenue-to-cost ratio below unity in fiscal 2019 (Residential being by far the largest of these), the one time charge per account would be approximately $3.50 per account.

30.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.2, pp. 28-29; Section 3.4, p. 16;
Exhibit B-4, BCUC IR 5.2.1, 7.6.1; Exhibit B-5, BCSEA IR 1.4, 1.6. 1.7
Temporary supplemental charge alternatives

In response to BCSEA IR 1.4, BC Hydro states, "BC Hydro acknowledges that the revenue received from RS 1701 exceeds the costs allocated to it in BC Hydro's fully allocated cost of service studies."

BC Hydro further states in response to BCUC IR 1.6:

> BC Hydro acknowledges that the revenue to cost ratio for the BC Hydro Owned Street Lighting Rate Class indicates that BC Hydro collects more revenue from this rate class than our cost of service to them, as indicated by a revenue to cost ratio that exceeds unity. The revenue to cost ratio for the BC Hydro owned street light rate class has exceeded unity since this rate class was defined in 2016, and this situation is independent of the LED street light conversion program [*emphasis added*]

2.30.8 Please provide a calculation of the supplemental charge rider per month per street light, if the $6.55 million unrecovered depreciation was charged to the "Street Lighting – Customer Owned" rate class approved by Order G-47-16 instead.

RESPONSE:

BC Hydro can identify no regulatory justification for collecting $6.55 million from customers in the street lighting – customer owned rate class. Please refer to BC Hydro's response to BCUC IR 2.30.7 for additional discussion of why seeking to shift costs to other rate classes for the purpose of changing the revenue-to-cost ratio of that class constitutes rate rebalancing.

Please refer to BC Hydro's response to BCAC IR 1.3.1 which shows that the "Street Lighting – Customer Owned" rate class is comprised of 6,113 accounts taking service under RS 1702, RS 1703 and RS 1704. The response also states that BC Hydro does not have information on customer owned street lighting connected behind metered services and as a result, BC Hydro does not know the number of street lights in the "Street Lighting – Customer Owned" rate class because many of these lights are on metered circuits.

To be responsive, we have considered two hypothetical scenarios to collect $6.55 million from the "Street Lighting – Customer Owned" rate class:

1. **Based on number of accounts. If $6.55 million were collected equally from the 6,113 accounts that were identified in BC Hydro's response to BCAC IR 1.3.1, a charge of approximately $31/ month per account for 35 months or $370 per year per account would be required; and**

2. **Based on Account revenue. If $6.55 million were collected based on a percentage of revenue from the "Street Lighting – Customer Owned" rate class as identified in BC Hydro's response to BCAC IR 1.3.1 over 35 months, the estimated charge would result in a bill increase of approximately 11.3 per cent.**

30.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.2, pp. 28-29; Section 3.4, p. 16; Exhibit B-4, BCUC IR 5.2.1, 7.6.1; Exhibit B-5, BCSEA IR 1.4, 1.6. 1.7
Temporary supplemental charge alternatives

In response to BCSEA IR 1.4, BC Hydro states, "BC Hydro acknowledges that the revenue received from RS 1701 exceeds the costs allocated to it in BC Hydro's fully allocated cost of service studies."

BC Hydro further states in response to BCUC IR 1.6:

> BC Hydro acknowledges that the revenue to cost ratio for the BC Hydro Owned Street Lighting Rate Class indicates that BC Hydro collects more revenue from this rate class than our cost of service to them, as indicated by a revenue to cost ratio that exceeds unity. The revenue to cost ratio for the BC Hydro owned street light rate class has exceeded unity since this rate class was defined in 2016, and this situation is independent of the LED street light conversion program [*emphasis added*]

2.30.8 Please provide a calculation of the supplemental charge rider per month per street light, if the $6.55 million unrecovered depreciation was charged to the "Street Lighting – Customer Owned" rate class approved by Order G-47-16 instead.

2.30.8.1 Please discuss the implications (e.g., financial, operational, other) of this hypothetical scenario.

RESPONSE:

Please refer to BC Hydro's responses to BCUC IRs 2.30.7 and 2.30.8.

30.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.2, pp. 28-29; Section 3.4, p. 16; Exhibit B-4, BCUC IR 5.2.1, 7.6.1; Exhibit B-5, BCSEA IR 1.4, 1.6. 1.7
Temporary supplemental charge alternatives

In response to BCSEA IR 1.4, BC Hydro states, "BC Hydro acknowledges that the revenue received from RS 1701 exceeds the costs allocated to it in BC Hydro's fully allocated cost of service studies."

BC Hydro further states in response to BCUC IR 1.6:

> BC Hydro acknowledges that the revenue to cost ratio for the BC Hydro Owned Street Lighting Rate Class indicates that BC Hydro collects more revenue from this rate class than our cost of service to them, as indicated by a revenue to cost ratio that exceeds unity. The revenue to cost ratio for the BC Hydro owned street light rate class has exceeded unity since this rate class was defined in 2016, and this situation is independent of the LED street light conversion program [*emphasis added*]

2.30.9 Please discuss whether the hypothetical scenarios in the preceding questions equate to rate rebalancing. Why or why not?

RESPONSE:

BC Hydro assumes the reference to the "hypothetical scenarios in the preceding questions" is referring to those scenarios specified in BCUC IRs 2.30.6 and 2.30.7.

Please refer to BC Hydro's responses to BCUC IRs 2.30.6 and 2.30.7 where BC Hydro explains that allocating costs to the shareholder does not amount to rate rebalancing, but the scenario set out in BCUC IR 2.30.7 does amount to rate rebalancing.

30.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.2, pp. 28-29; Section 3.4, p. 16; Exhibit B-4, BCUC IR 5.2.1, 7.6.1; Exhibit B-5, BCSEA IR 1.4, 1.6. 1.7
Temporary supplemental charge alternatives

In response to BCSEA IR 1.4, BC Hydro states, "BC Hydro acknowledges that the revenue received from RS 1701 exceeds the costs allocated to it in BC Hydro's fully allocated cost of service studies."

BC Hydro further states in response to BCUC IR 1.6:

> BC Hydro acknowledges that the revenue to cost ratio for the BC Hydro Owned Street Lighting Rate Class indicates that BC Hydro collects more revenue from this rate class than our cost of service to them, as indicated by a revenue to cost ratio that exceeds unity. The revenue to cost ratio for the BC Hydro owned street light rate class has exceeded unity since this rate class was defined in 2016, and this situation is independent of the LED street light conversion program [*emphasis added*]

2.30.10 To the extent possible, please provide an estimate of the total amount which has been over collected from RS 1701 as indicated by BC Hydro's fully allocated cost of service studies.

RESPONSE:

BC Hydro's fully allocated cost of service study does not provide an estimate of allocated cost specifically for RS 1701. BC Hydro owned street lighting customer class includes both RS 1701 and RS 1755.

Based on the schedule 4.0 of BC Hydro's F2020 Fully Allocated Cost of Service Study filed with the BCUC February 11, 2021, the estimated fully allocated cost of service to the BC Hydro owned street lighting customer class in fiscal 2020 was $11 million, and the revenue collected was $22.1 million. It is therefore estimated that revenues exceeded fully allocated cost of service by $11.1 million in fiscal 2020.

30.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.2, pp. 28-29; Section 3.4, p. 16; Exhibit B-4, BCUC IR 5.2.1, 7.6.1; Exhibit B-5, BCSEA IR 1.4, 1.6. 1.7
Temporary supplemental charge alternatives

In response to BCSEA IR 1.7, BC Hydro states:

> The Bonbright principles do not apply only to marginal costs, and would normally be used to assess a proposed rate on an embedded cost basis. However, given that BC Hydro is not applying to rebalance its rates, and given section 58.1(7) of the Utilities Commission Act, it would not be appropriate to assess the proposed rates from an embedded cost basis in this proceeding.

2.30.11 Please clarify why it would not be appropriate to assess the proposed rates from an embedded cost, as it relates section 58.1(7) of the Utilities Commission Act.

RESPONSE:

Section 58.1 (7) of the *Utilities Commission Act* 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.

Section 58.1 (7) of the *Utilities Commission Act* does not apply to the Application as the Application is not for the purpose of changing the revenue-cost ratio for a class of customers.

30.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.2, pp. 28-29; Section 3.4, p. 16; Exhibit B-4, BCUC IR 5.2.1, 7.6.1; Exhibit B-5, BCSEA IR 1.4, 1.6. 1.7
Temporary supplemental charge alternatives

In response to BCSEA IR 1.7, BC Hydro states:

> The Bonbright principles do not apply only to marginal costs, and would normally be used to assess a proposed rate on an embedded cost basis. However, given that BC Hydro is not applying to rebalance its rates, and given section 58.1(7) of the Utilities Commission Act, it would not be appropriate to assess the proposed rates from an embedded cost basis in this proceeding.

2.30.12 Please discuss the implication of using embedded costs versus marginal costs. What is the directional impact to rates and why?

RESPONSE:

A goal of the RS 1701 rate design was to contain the financial cost and savings of the Replacement Program to RS 1701 customers without impacting other ratepayers. The use of marginal costs provides a transparent and precise framework to meet this goal, as it applies the costs and savings associated with the Replacement Program to the existing RS 1701 revenue, thereby not impacting revenues and costs unrelated to the Replacement Program.

Conceptually, applying the marginal costs and savings of the Replacement Program to the existing RS 1701 revenue should result in similar rates as the alternative approach of recalculating RS 1701 revenues using the embedded cost approach assuming no rate rebalancing.

To demonstrate this, below BC Hydro estimates the revenue-to-cost ratio of the proposed RS 1701 rates using the embedded cost of service approach, for a forecast year of fiscal 2031 which is ten years after the Replacement Program commenced. As shown the estimated revenue cost ratio from this study is 208 per cent, which is within the range observed over the past number of years for the Customer Owned Street Lighting Rate Class.[1] The lack of a meaningful change to the revenue-to-cost ratio indicates that directionally, there is no impact on the RS 1701 LED rates of using the marginal cost approach relative to using the embedded cost approach, holding all else equal and assuming no rate rebalancing.

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[1] **The BC Hydro Owned Street Lighting Rate Class revenue to cost ratio was 184, 199, 211, 212, and 200 per cent in each year from fiscal 2016 to fiscal 2020 respectively.**

This table presented here was conducted based on BC Hydro's F2019 Fully Allocated Cost of Service Study (FACOS). For the purpose of the study, the loads of all rate classes aside from BC Hydro owned street lighting were held constant at fiscal 2019 levels.

The embedded cost approach uses both allocation and direct assignment of costs. According to embedded cost of service study principles, costs were first direct assigned when it is possible. The direct assigned costs included amortization costs of Replacement Program (i.e., the one-time investment Replacement Program costs), the depreciation of assets that were not replaced at the time of Replacement Program deployment (e.g., some arms), and the maintenance cost of the LED lights. These costs were escalated by the Consumer Price Index (CPI) for years after fiscal 2019. Then the not directly assigned costs were allocated to the customer group based on the energy, demand and number accounts within a rate class. For the purpose of this study, energy and demand related cost allocations were adjusted to reflect the reduction in demand and energy associated with converting from HPS to LED lights. Customer related costs were allocated as per the F2019 FACOS methodology without change.

Revenues were calculated by applying the RS 1701 LED Rates escalated by revenue requirement application escalator during fiscal 2022 to fiscal 2024 and 2 per cent CPI after fiscal 2024, assuming no changes to RS 1701 customers. As the study was completed for fiscal 2031, neither the supplemental charge or the unrecovered depreciation of HPS lights were considered applicable.

Allocated Costs	**($M)**
Energy and demand related costs	**2.4**
Customer related costs	**6.3**
Direct Assigned Cost	
Depreciation	**0.6**
Amortization of the Replacement Program one-time Investment costs	**3.0**
Ongoing Maintenance Cost of LED Lights	**0.8**
Total Cost	**13.1**
Total Revenue	**27.3**
Revenue-to-cost ratio	**208%**

BC Hydro's view is that the marginal cost approach used in the Application is appropriate as it provides a transparent and precise analysis of the impacts of the Replacement Program, without impacting costs and revenues unrelated to the Replacement Program.

30.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, Section 5.2.2, pp. 28-29; Section 3.4, p. 16; Exhibit B-4, BCUC IR 5.2.1, 7.6.1; Exhibit B-5, BCSEA IR 1.4, 1.6. 1.7
Temporary supplemental charge alternatives

On page 29 of the Application, BC Hydro states:

> Under International Financial Reporting Standards (IFRS),…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.
>
> …
>
> BC Hydro calculates the supplemental charge to be $2.06 /month /street light.

2.30.13 Please discuss whether the expensing rules under IFRS still apply if a deferral treatment is approved by the regulator for rate smoothing purposes.

RESPONSE:

Under IFRS, the expensing rules would still apply if a deferral treatment were approved by the regulator in that the expense would be recorded in the year the street light is replaced, however the expense would be offset by a regulatory transfer on the income statement. As a result, there would be no impact on BC Hydro's net income and a regulatory asset would be created/increased for the amount of the expense.

31.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-4, BCUC IR 5.2, 7.2; Exhibit B-5, CEC IR 4.1;
BC Hydro Fiscal 2020-Fiscal 2021 RRA, Exhibit B-1,
Section 8.2.2, p. 8-7
Temporary supplemental charge balance to be recovered

In response to BCUC IR 7.2, BC Hydro provides the following calculation of the $6.55 million unrecovered deprecation:

Item		Amount ($K)
Total undepreciated value of BC Hydro owned street lighting assets under RS 1701 as of November 1, 2020.	A	$21,590
Proportion of undepreciated value attributable to the luminaire and a small fraction of arms portion of HPS assets to be replaced.	B	33.28%
Undepreciated value of HPS RS 1701 street lighting assets to be replaced under the Replacement Program as of November 1, 2020.	C = A x B	$7,185
On-going depreciation of RS 1701 HPS street lighting assets to be replaced during the Replacement Program.	D	$633
Total undepreciated value of BC Hydro owned street lighting assets to be replaced under RS 1701 as of the fiscal year-end of the date they are planned to be removed from service under the Replacement Program	E = C - D	$6,552

In response to CEC IR 4.1, BC Hydro states:

> There is no single remaining time period over which the street lights would have been fully depreciated because the street lights were originally installed or replaced at different times on a continual basis and have different vintages for depreciation purposes. Some HPS luminaires are nearly fully depreciated while some have been recently installed, for example to complete spot repairs in 2020, and these lights won't fully depreciate for up to 20 years.

On page 8-7 of the BC Hydro Fiscal 2020-Fiscal 2021 RRA, BC Hydro states:

> BC Hydro-owned street light assets currently have high-pressure sodium (HPS) lights (luminaires). BC Hydro will be replacing the HPS luminaires with LED units in future years. Currently, the street lights (including the luminaires) are included in one asset class and the cost of replacing luminaries is expensed. The luminaire is essentially a light bulb which is low cost and has a short life. [*emphasis added*]

In response to BCUC IR 5.2, BC Hydro states that it uses a composite depreciation rate of 2.44 percent for all removed distribution equipment, including RS 1701 street lights, when a customer requests a new light fixture to replace an existing fixture.

2.31.1 Please clarify whether the cost of replacement HPS luminaires are capitalized as stated in response to CEC IR 4.1 or expensed as stated on page 8-7 of the BC Hydro Fiscal 2020-Fiscal 2021 RRA.

RESPONSE:

When HPS street lights (entire street light assembly, luminaire, photocell, arm, and wiring) are initially installed on the distribution system for a customer, these costs are capitalized. When HPS luminaires are replaced during maintenance activities they are expensed.

Please refer to BC Hydro's response to BCOAPO IR 2.28.2.

31.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-4, BCUC IR 5.2, 7.2; Exhibit B-5, CEC IR 4.1;
BC Hydro Fiscal 2020-Fiscal 2021 RRA, Exhibit B-1,
Section 8.2.2, p. 8-7
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In response to BCUC IR 5.2, BC Hydro states that it uses a composite depreciation rate of 2.44 percent for all removed distribution equipment, including RS 1701 street lights, when a customer requests a new light fixture to replace an existing fixture.

2.31.2 Please explain how BC Hydro estimated the ongoing depreciation of RS 1701 street lighting assets of $633,000 in response to BCUC IR 7.2. For clarity, please confirm whether the composite depreciation rate of 2.44 percent noted in response to BCUC IR 5.2 is used or if some other rate is used.

RESPONSE:

The 2.44 per cent composite depreciation rate was not used to estimate the ongoing depreciation of RS 1701 street lighting assets of $633,000. Instead, BC Hydro estimated the depreciation during the deployment of the Replacement Program using the expected installation plan as included in section 4.1 of the Application and continuing to depreciate the existing assets being replaced on a straight line basis from November 1, 2020 until the end of the deployment using a 40-year expected life.

31.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-4, BCUC IR 5.2, 7.2; Exhibit B-5, CEC IR 4.1;
BC Hydro Fiscal 2020-Fiscal 2021 RRA, Exhibit B-1,
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Total undepreciated value of BC Hydro owned street lighting assets to be replaced under RS 1701 as of the fiscal year-end of the date they are planned to be removed from service under the Replacement Program	E = C - D	$6,552

In response to CEC IR 4.1, BC Hydro states:

> There is no single remaining time period over which the street lights would have been fully depreciated because the street lights were originally installed or replaced at different times on a continual basis and have different vintages for depreciation purposes. Some HPS luminaires are nearly fully depreciated while some have been recently installed, for example to complete spot repairs in 2020, and these lights won't fully depreciate for up to 20 years.

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2.31.2 Please explain how BC Hydro estimated the ongoing depreciation of RS 1701 street lighting assets of $633,000 in response to BCUC IR 7.2. For clarity, please confirm whether the composite depreciation rate of 2.44 percent noted in response to BCUC IR 5.2 is used or if some other rate is used.

2.31.2.1 In a hypothetical scenario where no new assets are added to existing RS 1701 street lighting assets and the existing assets continue to be depreciated at current rate(s), how long would it take for existing assets to be fully depreciated?

RESPONSE:

Please refer to BC Hydro's response to CEC IR 1.4.1 where we state that there is no single remaining time period over which the street lights would be fully depreciated and that all street lights won't fully depreciate for up to 20 years.

31.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-4, BCUC IR 5.2, 7.2; Exhibit B-5, CEC IR 4.1;
BC Hydro Fiscal 2020-Fiscal 2021 RRA, Exhibit B-1,
Section 8.2.2, p. 8-7
Temporary supplemental charge balance to be recovered

In response to BCUC IR 7.2, BC Hydro provides the following calculation of the $6.55 million unrecovered deprecation:

Item		Amount ($K)
Total undepreciated value of BC Hydro owned street lighting assets under RS 1701 as of November 1, 2020.	A	$21,590
Proportion of undepreciated value attributable to the luminaire and a small fraction of arms portion of HPS assets to be replaced.	B	33.28%
Undepreciated value of HPS RS 1701 street lighting assets to be replaced under the Replacement Program as of November 1, 2020.	C = A x B	$7,185
On-going depreciation of RS 1701 HPS street lighting assets to be replaced during the Replacement Program.	D	$633
Total undepreciated value of BC Hydro owned street lighting assets to be replaced under RS 1701 as of the fiscal year-end of the date they are planned to be removed from service under the Replacement Program	E = C - D	$6,552

In response to CEC IR 4.1, BC Hydro states:

> There is no single remaining time period over which the street lights would have been fully depreciated because the street lights were originally installed or replaced at different times on a continual basis and have different vintages for depreciation purposes. Some HPS luminaires are nearly fully depreciated while some have been recently installed, for example to complete spot repairs in 2020, and these lights won't fully depreciate for up to 20 years.

On page 8-7 of the BC Hydro Fiscal 2020-Fiscal 2021 RRA, BC Hydro states:

> BC Hydro-owned street light assets currently have high-pressure sodium (HPS) lights (luminaires). BC Hydro will be replacing the HPS luminaires with LED units in future years. Currently, the street lights (including the luminaires) are included in one asset class and the cost of replacing luminaries is expensed. The luminaire is essentially a light bulb which is low cost and has a short life. [*emphasis added*]

In response to BCUC IR 5.2, BC Hydro states that it uses a composite depreciation rate of 2.44 percent for all removed distribution equipment, including RS 1701 street lights, when a customer requests a new light fixture to replace an existing fixture.

2.31.3 Please clarify whether the current failure rate of HPS assets to be replaced has been taken into consideration in the calculation of the $6.55 million unrecovered deprecation.

RESPONSE:

The current failure rate has been taken into consideration but is not material to the calculation of the $6.55 million unrecovered depreciation in any event. The majority of street lights will be converted to LED proactively through the planned deployment, however some street lights will be converted to LED reactively through unplanned deployment as street lights fail during the deployment period but before they are scheduled to be converted.

31.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-4, BCUC IR 5.2, 7.2; Exhibit B-5, CEC IR 4.1;
BC Hydro Fiscal 2020-Fiscal 2021 RRA, Exhibit B-1,
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In response to BCUC IR 5.2, BC Hydro states that it uses a composite depreciation rate of 2.44 percent for all removed distribution equipment, including RS 1701 street lights, when a customer requests a new light fixture to replace an existing fixture.

2.31.3 Please clarify whether the current failure rate of HPS assets to be replaced has been taken into consideration in the calculation of the $6.55 million unrecovered deprecation.

2.31.3.1 If not, please explain why this adjustment would not be appropriate.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.31.3.

31.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-4, BCUC IR 5.2, 7.2; Exhibit B-5, CEC IR 4.1;
BC Hydro Fiscal 2020-Fiscal 2021 RRA, Exhibit B-1,
Section 8.2.2, p. 8-7
Temporary supplemental charge balance to be recovered

In response to BCUC IR 7.2, BC Hydro provides the following calculation of the $6.55 million unrecovered deprecation:

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In response to CEC IR 4.1, BC Hydro states:

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In response to BCUC IR 5.2, BC Hydro states that it uses a composite depreciation rate of 2.44 percent for all removed distribution equipment, including RS 1701 street lights, when a customer requests a new light fixture to replace an existing fixture.

2.31.3 Please clarify whether the current failure rate of HPS assets to be replaced has been taken into consideration in the calculation of the $6.55 million unrecovered deprecation.

2.31.3.2 If yes, please explain the adjustment.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.31.3.

32.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, pp. 1, 29; Appendix G, p. 17
Temporary supplemental charge amortization period

On page 1 of the Application, BC Hydro states, "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." [*emphasis added*]

On page 17 of Appendix G to the Application, BC Hydro states that the supplemental charge is calculated to recover the undepreciated value of replaced street lighting equipment over the implementation period of the Replacement Program. This period is May 1, 2021 to March 31, 2024 (35 months) as stated on page 29 of the Application.

2.32.1 Please calculate the supplemental charge for RS 1701 under the scenario of amortizing the $6.55 million unrecovered depreciation over each of four years, five years, six years, seven years, eight years, nine years and 10 years.

RESPONSE:

The monthly supplemental charge is calculated as follows for each of the scenarios as well as for the scenario described in BCUC IR 2.32.1.1 (May 1, 2021 to December 31, 2025 = 56 months).

Calculation of Supplemental Charge		
Years	**Months**	**$/mo/Light**
4	**48**	**1.50**
4.7	**56**	**1.29**
5	**60**	**1.20**
6	**72**	**1.00**
7	**84**	**0.86**
8	**96**	**0.75**
9	**108**	**0.67**
10	**120**	**0.60**

32.0 B RATE DESIGN

Reference: PROPOSED RS 1701 RATE
Exhibit B-1, pp. 1, 29; Appendix G, p. 17
Temporary supplemental charge amortization period

On page 1 of the Application, BC Hydro states, "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." [*emphasis added*]

On page 17 of Appendix G to the Application, BC Hydro states that the supplemental charge is calculated to recover the undepreciated value of replaced street lighting equipment over the implementation period of the Replacement Program. This period is May 1, 2021 to March 31, 2024 (35 months) as stated on page 29 of the Application.

2.32.1.1 Please also provide the above calculation under the scenario of amortizing the $6.55 million over the period May 1, 2021 to December 31, 2025.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.32.1, which includes the requested information.

33.0 B RATE DESIGN

Reference: BILL IMPACTS
Exhibit B-4, BCUC IR 10.1
RS 1701 billing

In response to BCUC IR 10.1, BC Hydro states:

> Regarding customer awareness of potential bill impacts, BC Hydro sent an email to RS 1701 customers on December 7, 2020 advising them of the interim LED rates under RS 1701, which the BCUC approved on November 30, 2020. Once the final rates are approved by the BCUC, another email will be sent to customers advising of them of the details of the final rate and, if applicable, any adjustments related to the period for which they were charged the interim rates.

2.33.1 Please indicate what consultation occurred with customers regarding overall bill impact. Please indicate how this feedback impacted the final billing amount if at all.

RESPONSE:

BC Hydro presented illustrative bill impacts to RS 1701 customers in the August 12, 2020 customer engagement session. The final pricing was slightly different from the illustrative rates presented during the session for the following reasons:

- **The project costs and BC Hydro's cost of service were further refined; and**
- **Customers indicated that they prefer the supplemental charge to start later, which resulted in an increase of the supplemental charge because BC Hydro must recover the same undepreciated value within a shorter period of time.**

33.0 B RATE DESIGN

Reference: BILL IMPACTS
Exhibit B-4, BCUC IR 10.1
RS 1701 billing

In response to BCUC IR 10.1, BC Hydro states:

> Regarding customer awareness of potential bill impacts, BC Hydro sent an email to RS 1701 customers on December 7, 2020 advising them of the interim LED rates under RS 1701, which the BCUC approved on November 30, 2020. Once the final rates are approved by the BCUC, another email will be sent to customers advising of them of the details of the final rate and, if applicable, any adjustments related to the period for which they were charged the interim rates.

2.33.2 Please indicate if any additional feedback was received from customers after the December 7, 2021 email. If yes, please provide a summary of the feedback received.

RESPONSE:

BC Hydro assumes the year 2021 in the IR was a typo and 2020 was meant.

Since the December 7, 2020 email, BC Hydro has received additional feedback on the proposed RS 1701 rates from 32 customers. Feedback has been summarized in the following table and is categorized into three groups:

- **Bill Impact to Account – inquires about the estimated bill impacts to customers' specific accounts;**
- **Explanation about the Rate – inquires for what the proposed rates are, an explanation of the supplemental charge, and how the rates are derived; and**
- **General – inquires about the regulatory proceeding, street light replacement costs, and whether colour temperature is a component of the rate.**

	Bill Impact to Account	Explanation about the Rate	General	Total
Email	**10**	**10**	**5**	**25**
Letter	**0**	**0**	**1**	**1**
Phone	**0**	**4**	**0**	**4**
Meeting	**0**	**2**	**0**	**2**

BC Hydro notes that the customer comments summarized above do not include the ones the Commission received and that are already part of the evidentiary records.

As the Replacement Program is now underway, BC Hydro has also had numerous discussions with customers regarding LED street light deployment details and street light selections. For clarity, these operational discussions have not been included in the above table.

34.0 C. RATE SCHEDULE 1755

Reference: AVAILABILITY AND APPLICABILITY
Exhibit B-4, BCUC IR 12.1, 12.3
RS 1755 Migration to RS 1701

In response to BCUC IR 12.1, BC Hydro states:

> Following the BCUC's decision, BC Hydro will provide RS 1755 Group 2 customers with information that includes:
>
> - Details of the Commission's decision
> - Guidelines of the RS 1701 migration eligibility
> - Timelines for RS 1755 termination and Group 2 migration to RS 1701
> - Information regarding lighting options available for customers eligible for migration to RS 1701
> - Support available for customers that wish to install their own outdoor lighting

In response to BCUC IR 12.3, BC Hydro states:

> … 1755 Group 2 customers that do not have services suitable for transition to RS 1701 will need to provide their own lights and poles if they would like to continue to have the outdoor lighting at the current location. BC Hydro will then provide electrical service to the customer's lights under the applicable rate schedule, in the same manner we would serve any existing customer installing lighting on their private property.

2.34.1 Please discuss the type of support available for customers who wish to install their own lighting and who provides this support.

RESPONSE:

BC Hydro believes the primary barrier for most customers to install their own lighting is awareness of lighting options and services available in their area. To reduce this barrier, BC Hydro will support customers by establishing a referral network through its Alliance of Energy Professionals to provide customers with information on lighting consultants and contractors in their area, as well as lighting products. As each customer's lighting requirement is unique, the consultants and contactors will work directly with the customer to assess needs, provide quotes, and supply and install the lighting.

Although most customers will pay less in the longer term by installing their own lighting, BC Hydro recognizes that some customers may face a financial barrier

because of the upfront cost they will incur. BC Hydro is currently working with lighting distributors to identify financing options that may be provided to customers by the distributors, with the aim of allowing customers to pay for the purchase and installation of their new lighting over time and in amounts similar to their current RS 1755 charges.

In addition, BC Hydro has proposed that it waive the Minimum Connection Charge when it is necessary to install a new connection for the customer's lighting.

As discussed in BC Hydro's response to BCUC IR 1.13.10, BC Hydro believes that financing programs will be available through lighting distributors. On March 8, 2021, BC Hydro issued a Request for Information to obtain further information from lighting providers in B.C. regarding products, services and financing options. The Request for Information closed on March 26, 2021 and we are currently reviewing the submissions. Once the reviews have been completed, we will assess if the vendor community is able to effectively support customers or if it will be necessary for BC Hydro to consider other forms of support.

Please also refer to the transition plan provided as Attachment 1 to BC Hydro's response to BCUC IR 1.13.8.

34.0 C. RATE SCHEDULE 1755

Reference: AVAILABILITY AND APPLICABILITY
Exhibit B-4, BCUC IR 12.1, 12.3
RS 1755 Migration to RS 1701

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> - Information regarding lighting options available for customers eligible for migration to RS 1701
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In response to BCUC IR 12.3, BC Hydro states:

> … 1755 Group 2 customers that do not have services suitable for transition to RS 1701 will need to provide their own lights and poles if they would like to continue to have the outdoor lighting at the current location. BC Hydro will then provide electrical service to the customer's lights under the applicable rate schedule, in the same manner we would serve any existing customer installing lighting on their private property.

2.34.2 Please explain BC Hydro's rationale for transitioning RS 1755 Group 2 customers to RS 1701 instead of providing electrical service to customers in the same manner it would serve any existing customer installing lighting on their private property.

RESPONSE:

In making this change, BC Hydro has sought to mitigate the impacts to RS 1755 customers of BC Hydro's service termination proposal. All RS 1755 customers have the option to install their own lighting to replace the existing RS 1755 service, including Group 2 customers. However, BC Hydro has also proposed the option for Group 2 customers to transition to RS 1701 service, provided the poles remain suitable for this use, because:

- **It reduces the level of effort required by these customers to continue illuminating their property, as it is unnecessary for them to find contractors and select products;**
- **It reduces financial barriers to some customers by avoiding the upfront cost to install their own lighting and pole;**
- **There are no operational impacts to BC Hydro because the poles are part of BC Hydro's distribution system and, therefore, accessible and the equipment used to provide RS 1701 service is the same as that used to illuminate roadways (i.e., the same luminaire is installed with a different orientation); and**
- **As stated in section 5.4.1 of the Application, the cost of providing this service is similar to the cost to provide RS 1701 public area street lighting as the street light is mounted on an existing BC Hydro distribution pole. There is a lower risk that BC Hydro will not recover its costs because its investment is limited to the luminaire and arm (i.e., no incremental investment is necessary for the pole, which is the largest cost incurred when installing lighting on private property).**

35.0 C. RATE SCHEDULE 1755

Reference: PROPOSED TERMINATION OF RS 1755
Exhibit B-1, Section 6.4.2, p. 51; Exhibit B-4, BCUC IR 13.2, 13.8, 13.10; Exhibit B-5, British Columbia Agriculture Council IR 1.4
Transition program

On page 51 of the Application, BC Hydro states:

> To assist customers with the search and installation of appropriate new lighting solutions, BC Hydro will recruit qualified outdoor lighting contractors from its Alliance of Energy Professionals network. Customers can contact BC Hydro for outdoor lighting contractor referrals. BC Hydro estimates that the cost to a customer of installing a replacement light could range from $1,000 to $7,000.

In response to British Columbia Agriculture Council (BCAC) IR 1.4, BC Hydro states:

> …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 and BC Hydro's view is that private sector organizations are better positioned than BC Hydro is to offer a competitive service to install outdoor lighting on private property.

In response to BCUC IR 13.2, BC Hydro states:

> Group 1 and 3 customers wishing to continue illuminating their property can install their own lighting behind an existing or new service connection and be billed for electricity consumption under the appropriate rate for the premises. This option also applies to RS 1755 Group 2 customers that do not choose to continue street lighting service under RS 1701, or where BC Hydro has determined that RS 1701 cannot be accommodated.

In response to BCUC IRs 13.8 and 13.10, BC Hydro states the following:

BC Hydro has investigated options for financing programs and determined that customers will be able to obtain financing through lighting distributors. BC Hydro has contacted several lighting distributors and confirmed their interest in providing financing for customers wishing to install their own lighting after termination of RS 1755.

BC Hydro intends to work with lighting distributors to introduce a financing program tentatively to be made available to customers in October 2021, which is one year prior to the start of RS 1755 lighting removal.

[…]

As identified in BC Hydro's response to BCUC IR 1.13.8, BC Hydro has identified that financing will be available through lighting distributors but has not yet worked with them to develop a program. Customers requiring a financing plan to install their own lighting will pay the lighting distributor in accordance with the financing program offered by the lighting distributor. Conceptually, the financing program would include costs of the material, labour and installation of the new light and pole, if required, as well as an interest charge.

[…]

There are 43 distributors registered with the Alliance that regularly carry and supply outdoor lighting. Out of these, ten have multiple branches throughout BC to service RS1755 customers. Remote product deliveries ensure that customers in any region of the province can be serviced through these Distributors.

2.35.1 Please provide the bill impact that current Group 1 and Group 3 RS 1755 customers will experience if they install their own lighting behind an existing or new service connection and are billed for electricity consumption under the appropriate rate for the premises.

RESPONSE:

If RS 1755 Group 1 and Group 3 customers install their own lighting, they will only need to pay BC Hydro for the electricity consumption under the appropriate rate for the premises. The table below shows a comparison of RS 1755 Group 1 and Group 3 monthly charges against the electricity charges under RS 1101 Residential Service rate (Step 1 and Step 2), RS 1300 Small General Service (SGS), RS 1500 Medium General Service (MGS) and RS 1600 Large General Service (LGS). Please note the following:

- **The analysis assumes the customer installs one LED equivalent light;**
- **The light is on for an average of 333 hours per month (dusk to dawn per RS 1300 unmetered lighting estimate);**
- **Under existing connection scenarios, the charges only include incremental energy charges and demand charges (only for MGS and LGS); under the new**

connection scenarios, a per-day basic charge is also incurred in addition to energy charges; and

- **The four rate schedules illustrated below are the default rates for the majority of RS 1755 customers. Some customers are serviced under other less common rate schedules such as Irrigation or E-Plus rates. Their new lighting consumption will be billed under the appropriate rate schedules.**

Rate Schedule	MV 175W / HPS 100 W ($)	MV 400W / HPS 150 W ($)
RS 1755 Group 1	18.07	31.15
RS 1755 Group 3	23.63	37.20
Existing Connection (lighting included in an existing account)		
Rate Schedule	LED 75 W	LED 114 W
RS 1101 Step 1	2.33	3.55
RS 1101 Step 2	3.48	5.29
RS 1300	3.08	4.68
RS 1500	2.78	4.36
RS 1600	2.40	3.96
New Connection (a standalone account for lighting)		
Rate Schedule	LED 75 W	LED 114 W
RS 1101 Step 1	8.50	9.71
RS 1101 Step 2	9.65	11.46
RS 1300	13.84	15.44

For RS 1755 customers' total estimated costs including the installation of new outdoor lighting, please refer to BC Hydro's responses to BCAC IR 1.12.9 and BCUC IR 2.35.5.2.

35.0 C. RATE SCHEDULE 1755

Reference: PROPOSED TERMINATION OF RS 1755
Exhibit B-1, Section 6.4.2, p. 51; Exhibit B-4, BCUC IR 13.2, 13.8, 13.10; Exhibit B-5, British Columbia Agriculture Council IR 1.4
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> To assist customers with the search and installation of appropriate new lighting solutions, BC Hydro will recruit qualified outdoor lighting contractors from its Alliance of Energy Professionals network. Customers can contact BC Hydro for outdoor lighting contractor referrals. BC Hydro estimates that the cost to a customer of installing a replacement light could range from $1,000 to $7,000.

In response to British Columbia Agriculture Council (BCAC) IR 1.4, BC Hydro states:

> …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 and BC Hydro's view is that private sector organizations are better positioned than BC Hydro is to offer a competitive service to install outdoor lighting on private property.

In response to BCUC IR 13.2, BC Hydro states:

> Group 1 and 3 customers wishing to continue illuminating their property can install their own lighting behind an existing or new service connection and be billed for electricity consumption under the appropriate rate for the premises. This option also applies to RS 1755 Group 2 customers that do not choose to continue street lighting service under RS 1701, or where BC Hydro has determined that RS 1701 cannot be accommodated.

In response to BCUC IRs 13.8 and 13.10, BC Hydro states the following:

BC Hydro has investigated options for financing programs and determined that customers will be able to obtain financing through lighting distributors. BC Hydro has contacted several lighting distributors and confirmed their interest in providing financing for customers wishing to install their own lighting after termination of RS 1755.

BC Hydro intends to work with lighting distributors to introduce a financing program tentatively to be made available to customers in October 2021, which is one year prior to the start of RS 1755 lighting removal.

[…]

As identified in BC Hydro's response to BCUC IR 1.13.8, BC Hydro has identified that financing will be available through lighting distributors but has not yet worked with them to develop a program. Customers requiring a financing plan to install their own lighting will pay the lighting distributor in accordance with the financing program offered by the lighting distributor. Conceptually, the financing program would include costs of the material, labour and installation of the new light and pole, if required, as well as an interest charge.

[…]

There are 43 distributors registered with the Alliance that regularly carry and supply outdoor lighting. Out of these, ten have multiple branches throughout BC to service RS1755 customers. Remote product deliveries ensure that customers in any region of the province can be serviced through these Distributors.

2.35.2 Please confirm, or explain otherwise, that the estimated replacement lighting installation costs apply to all RS 1755 customer types (e.g., residential, commercial, Indigenous, governmental and municipal).

RESPONSE:

Confirmed.

As explained in BC Hydro's response to BCUC IR 1.13.7, there are several factors that impact the cost of installing lighting for a specific location and purpose. BC Hydro believes the estimated replacement lighting installation costs reflect the costs that will be incurred by most customers to replace RS 1755 lighting with similar lighting (i.e., standard luminaire on a 20 to 30 foot tall wood pole). Customers may incur higher costs if they choose to install ornamental outdoor lighting, for instance.

35.0 C. RATE SCHEDULE 1755

Reference: PROPOSED TERMINATION OF RS 1755
Exhibit B-1, Section 6.4.2, p. 51; Exhibit B-4, BCUC IR 13.2, 13.8, 13.10; Exhibit B-5, British Columbia Agriculture Council IR 1.4
Transition program

On page 51 of the Application, BC Hydro states:

> To assist customers with the search and installation of appropriate new lighting solutions, BC Hydro will recruit qualified outdoor lighting contractors from its Alliance of Energy Professionals network. Customers can contact BC Hydro for outdoor lighting contractor referrals. BC Hydro estimates that the cost to a customer of installing a replacement light could range from $1,000 to $7,000.

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> …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 and BC Hydro's view is that private sector organizations are better positioned than BC Hydro is to offer a competitive service to install outdoor lighting on private property.

In response to BCUC IR 13.2, BC Hydro states:

> Group 1 and 3 customers wishing to continue illuminating their property can install their own lighting behind an existing or new service connection and be billed for electricity consumption under the appropriate rate for the premises. This option also applies to RS 1755 Group 2 customers that do not choose to continue street lighting service under RS 1701, or where BC Hydro has determined that RS 1701 cannot be accommodated.

In response to BCUC IRs 13.8 and 13.10, BC Hydro states the following:

BC Hydro has investigated options for financing programs and determined that customers will be able to obtain financing through lighting distributors. BC Hydro has contacted several lighting distributors and confirmed their interest in providing financing for customers wishing to install their own lighting after termination of RS 1755.

BC Hydro intends to work with lighting distributors to introduce a financing program tentatively to be made available to customers in October 2021, which is one year prior to the start of RS 1755 lighting removal.

[…]

As identified in BC Hydro's response to BCUC IR 1.13.8, BC Hydro has identified that financing will be available through lighting distributors but has not yet worked with them to develop a program. Customers requiring a financing plan to install their own lighting will pay the lighting distributor in accordance with the financing program offered by the lighting distributor. Conceptually, the financing program would include costs of the material, labour and installation of the new light and pole, if required, as well as an interest charge.

[…]

There are 43 distributors registered with the Alliance that regularly carry and supply outdoor lighting. Out of these, ten have multiple branches throughout BC to service RS1755 customers. Remote product deliveries ensure that customers in any region of the province can be serviced through these Distributors.

2.35.3 Given that Group 2 RS 1755 customers are currently serviced on public property, and on BC Hydro-owned poles, please explain the rationale in transitioning any RS 1755 customer outright to the applicable rate schedule.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.34.2 where BC Hydro explains the reasons to offer RS 1755 Group customers an option to transition to RS 1701.

RS 1755 Group 2 customers who do not choose to continue street lighting service under RS 1701, or who cannot continue to receive service due to a BC Hydro determination that RS 1701 cannot be accommodated, will have to install their own lighting and pole on their own private property. In that case, the new lighting will be serviced under the appropriate rate schedule through an existing connection or a new connection.

35.0 C. RATE SCHEDULE 1755

Reference: PROPOSED TERMINATION OF RS 1755
Exhibit B-1, Section 6.4.2, p. 51; Exhibit B-4, BCUC IR 13.2, 13.8, 13.10; Exhibit B-5, British Columbia Agriculture Council IR 1.4
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On page 51 of the Application, BC Hydro states:

> To assist customers with the search and installation of appropriate new lighting solutions, BC Hydro will recruit qualified outdoor lighting contractors from its Alliance of Energy Professionals network. Customers can contact BC Hydro for outdoor lighting contractor referrals. BC Hydro estimates that the cost to a customer of installing a replacement light could range from $1,000 to $7,000.

In response to British Columbia Agriculture Council (BCAC) IR 1.4, BC Hydro states:

> …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 and BC Hydro's view is that private sector organizations are better positioned than BC Hydro is to offer a competitive service to install outdoor lighting on private property.

In response to BCUC IR 13.2, BC Hydro states:

> Group 1 and 3 customers wishing to continue illuminating their property can install their own lighting behind an existing or new service connection and be billed for electricity consumption under the appropriate rate for the premises. This option also applies to RS 1755 Group 2 customers that do not choose to continue street lighting service under RS 1701, or where BC Hydro has determined that RS 1701 cannot be accommodated.

In response to BCUC IRs 13.8 and 13.10, BC Hydro states the following:

BC Hydro has investigated options for financing programs and determined that customers will be able to obtain financing through lighting distributors. BC Hydro has contacted several lighting distributors and confirmed their interest in providing financing for customers wishing to install their own lighting after termination of RS 1755.

BC Hydro intends to work with lighting distributors to introduce a financing program tentatively to be made available to customers in October 2021, which is one year prior to the start of RS 1755 lighting removal.

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There are 43 distributors registered with the Alliance that regularly carry and supply outdoor lighting. Out of these, ten have multiple branches throughout BC to service RS1755 customers. Remote product deliveries ensure that customers in any region of the province can be serviced through these Distributors.

2.35.3.1 Please discuss BC Hydro's rationale for providing transition assistance to RS 1755 customers when competitive private outdoor lighting services already exist.

RESPONSE:

BC Hydro notes that the only direct financial assistance BC Hydro proposes to offer to RS 1755 customers is the waiver of the Minimum Connection Charge when a new service connection is required for the new lighting. As discussed in BC Hydro's response to BCUC IR 1.13.11.1, the termination of RS 1755 will require RS 1755 customers to incur effort and cost to install replacement lighting for their private property. Therefore, BC Hydro believes it is appropriate to waive the Minimum Connection Charge for customers who require a new connection for their outdoor lighting.

Please also refer to BC Hydro's response to BCUC IR 2.34.1 which indicates the main transition assistance BC Hydro intends to offer is to help affected customers access competitive private outdoor lighting services. BC Hydro does not currently intend to provide customers direct financing assistance to replace lighting but will assess if additional support is necessary once it has received submissions to a Request for Information recently issued. BC Hydro believes these assistance measures do not incur incremental costs to ratepayers other than minimal administrative efforts and considers the assistance appropriate and required to support impacted RS 1755 customers.

35.0 C. RATE SCHEDULE 1755

Reference: PROPOSED TERMINATION OF RS 1755
Exhibit B-1, Section 6.4.2, p. 51; Exhibit B-4, BCUC IR 13.2, 13.8, 13.10; Exhibit B-5, British Columbia Agriculture Council IR 1.4
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There are 43 distributors registered with the Alliance that regularly carry and supply outdoor lighting. Out of these, ten have multiple branches throughout BC to service RS1755 customers. Remote product deliveries ensure that customers in any region of the province can be serviced through these Distributors.

2.35.3.2 Please explain why Group 2 RS 1755 customers will continue to receive unmetered service under RS 1701. In your response, please discuss how continuing service under RS 1701 on public property, given this service is not for public highway, streets and lanes is not considered "private" lighting.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.34.2 which explains it is appropriate to transition RS 1755 Group 2 customers to RS 1701 because the cost to continue the service is similar to RS 1701 and there is no operational impact to BC Hydro.

BC Hydro's response to CEC IR 1.2.2 explains unmetered service is appropriate for RS 1701 because it is not feasible to install a meter for each street light. In addition, street lights have stable and predictable electricity use and therefore can be billed with reasonable certainty on an unmetered basis.

BC Hydro does consider the transitioned Group 2 lighting "private" lighting, thus has proposed amendments to the Availability of RS 1701 to include lighting of private property. Please refer to section 5.4.1 and Appendix B of the Application.

35.0 C. RATE SCHEDULE 1755

Reference: PROPOSED TERMINATION OF RS 1755
Exhibit B-1, Section 6.4.2, p. 51; Exhibit B-4, BCUC IR 13.2, 13.8, 13.10; Exhibit B-5, British Columbia Agriculture Council IR 1.4
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There are 43 distributors registered with the Alliance that regularly carry and supply outdoor lighting. Out of these, ten have multiple branches throughout BC to service RS1755 customers. Remote product deliveries ensure that customers in any region of the province can be serviced through these Distributors.

2.35.4 Please confirm, or explain otherwise, if all 43 lighting distributors and/or vendors will offer financing options through the Transition Program.

RESPONSE:

BC Hydro cannot confirm that all lighting distributors and/or vendors will offer financing options for the installation of private lighting.

Please refer to BC Hydro's response to BCUC IR 2.34.1 which identifies that BC Hydro has recently issued a Request for Information to obtain more information from distributors, vendors and contractors regarding the availability of products and financing.

35.0 C. RATE SCHEDULE 1755

Reference: PROPOSED TERMINATION OF RS 1755
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2.35.5 Please discuss how BC Hydro concluded that the private outdoor lighting market is a competitive service. In your response, please include the approximate number of vendors and/or installation contractors that offer private outdoor lighting services.

RESPONSE:

BC Hydro considers that the private outdoor lighting market is a competitive service for the following reasons:

- **Customers have been required to purchase and install lighting for their properties since BC Hydro closed private outdoor lighting to new customers in 1975; and**
- **Outdoor lighting products are readily available from distributors and retailers throughout B.C., as well as online.**

In addition, while BC Hydro does not know the number of suppliers and installation contractors that offer private outdoor lighting services in this market, BC Hydro suggests there is a broad availability of resources throughout the province based on the following:

- **Forty-three suppliers and 487 installation contractors are registered as part of BC Hydro's Alliance of Energy Professionals;**

- **During the procurement process for BC Hydro's province-wide Street Light Replacement Program, five pre-qualified companies submitted proposals to supply LED luminaires and twelve companies submitted proposals for implementation services;**
- **According to Work BC, over 13,000 people are employed as electricians in B.C.;[1] and**
- **A search for "electrician" through the Better Business Bureau found listings for 1,188 electricians/electrical contractors in Vancouver, 30 in Prince George, 189 in Kamloops, 1,122 in Victoria, 81 in Campbell River and 16 in Fort Saint John.[2]**

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1 https://www.workbc.ca/Jobs-Careers/Explore-Careers/Browse-Career-Profile/7241#workforce-and-employment-statistics. **Site accessed March 12, 2021.**

2 www.bbb.org. **Search performed March 12, 2021.**

35.0 C. RATE SCHEDULE 1755

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2.35.5.1 Please explain how BC Hydro has ensured that the lighting distributors and/or vendors can sufficiently meet the demand of transitioning RS 1755 customers across the province.

RESPONSE:

Given our market scan, BC Hydro believes that lighting distributors and vendors will be able to meet the demand of transitioning RS 1755 customers. At most there will be 4,848 RS 1755 lights to transition because of the termination of RS 1755; the actual number is expected to be less because some RS 1755 Group 2 lighting may be migrated to RS 1701 and some customers may reassess their lighting needs. This compares with over 90,000 luminaires being replaced as part of the Street Light Replacement Program.

As identified in BC Hydro's response to BCUC IR 2.34.1, BC Hydro has recently issued a Request for Information to obtain further information from lighting providers. The submissions received through the Request for Information will provide additional about the capacity of the vendor community.

35.0 C. RATE SCHEDULE 1755

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2.35.5.2 Please discuss whether the private sector offering of outdoor lighting services provide transitioning customers with fair value compared with comparable services provided on a rate regulated basis.

RESPONSE:

Please refer to BC Hydro's response to BCAC IR 1.12.9 which indicates that the typical cost of ownership of new customer-owned lighting is expected to be around $15 per month for the equivalent to a 100 W HPS light, including installation of a new pole. In comparison, the current RS 1755 rates for 100 W HPS lights are $18.07 for Group 1 and $23.63 for Group 3. This indicates that most customers will save money over time by installing their own lighting, particularly when considering the likelihood for increased rates following investments to replace BC Hydro-owned poles that are at or nearing end of life.

Customers will also have a wider range of options for luminaires and poles available through the vendor community than if replacements for RS 1755 lighting were to be installed by BC Hydro. This is because BC Hydro would use the same lighting products being installed for the Street Light Replacement Program, thereby only giving customers the option of roadway-style lighting with a limited number of wattage and colour temperature options.

Please also refer to BC Hydro's response to BCUC IR 2.34.1 which indicates that BC Hydro issued a Request for Information on March 8, 2021 to obtain further information regarding products, services, and financing options. Pricing provided through this process will provide further assurance that customers will receive fair value from private sector companies.

35.0 C. RATE SCHEDULE 1755

Reference: PROPOSED TERMINATION OF RS 1755
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2.35.6 Compared to residential RS 1755 customers, please explain if commercial RS 1755 customers are subject to different terms and conditions of the available financing options offered through the Transition Program.

RESPONSE:

BC Hydro has not yet worked with lighting distributors to understand the details of financing options that may be available to customers, and so cannot comment on the terms and conditions provided to residential or commercial customers.

Please refer to BC Hydro's response to BCUC IR 2.34.1 which indicates that BC Hydro issued a Request for Information on March 8, 2021 which will provide further information regarding products, services, and financing options.

35.0 C. RATE SCHEDULE 1755

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2.35.6.1 If available, please provide the interest rate(s) that will be available to RS 1755 customers seeking financing assistance from the financing options through the Transition Program.

RESPONSE:

BC Hydro does not currently have insight into the interest rates that may be available to RS 1755 customers that require financing options.

Please refer to BC Hydro's response to BCUC IR 2.34.1 which indicates that BC Hydro issued a Request for Information on March 8, 2021 to provide further information regarding products, services, and financing options. The Request for Information closed on March 26, 2021 and vendor submissions are currently being assessed.

35.0 C. RATE SCHEDULE 1755

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2.35.6.1.1 Please confirm if interest rates will be consistent across all lighting distributors offering financing options to RS 1755 customers.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.35.6.1.

36.0 C. RATE SCHEDULE 1755

Reference: PROPOSED TERMINATION OF RS 1755
Exhibit B-4, BCUC IR 13.6
RS 1755 migration

In response to BCUC IR 13.6, BC Hydro states:

> Exceptions to customers illuminating their properties under metered service are:
>
> - RS 1755 Group 2 customers that migrate their service to RS 1701, which is an unmetered rate; and
> - Under rare circumstances, through a new unmetered, Small General Service connection. This could occur when the configuration of the service connection makes it impractical or very costly for a customer to install a new metered service connection. Unmetered service is not permitted under Residential service.

2.36.1 Please confirm, or explain otherwise, that the new unmetered Small General Service connection stated above is associated with a new rate schedule yet to be introduced.

RESPONSE:

Not confirmed. Existing Small General Service (SGS) rate schedules RS 1300, RS 1301, RS 1310, RS 1311 and RS 1234 have provisions for unmetered services in the Special Conditions. BC Hydro was referring to these existing SGS rate schedules in our response to BCUC IR 1.13.6.

36.0 C. RATE SCHEDULE 1755

Reference: PROPOSED TERMINATION OF RS 1755
Exhibit B-4, BCUC IR 13.6
RS 1755 migration

In response to BCUC IR 13.6, BC Hydro states:

> Exceptions to customers illuminating their properties under metered service are:
>
> - RS 1755 Group 2 customers that migrate their service to RS 1701, which is an unmetered rate; and
> - Under rare circumstances, through a new unmetered, Small General Service connection. This could occur when the configuration of the service connection makes it impractical or very costly for a customer to install a new metered service connection. Unmetered service is not permitted under Residential service.

2.36.1 Please confirm, or explain otherwise, that the new unmetered Small General Service connection stated above is associated with a new rate schedule yet to be introduced.

2.36.1.1 If confirmed, please discuss if BC Hydro intends to file a tariff application with the BCUC for changes to the Electric Tariff. In your response, please provide an anticipated application filing date.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.36.1 which indicates BC Hydro does not need to file a new rate application as existing Small General Service (SGS) rate schedules RS 1300, RS 1301, RS 1310, RS 1311 and RS 1234 have provisions for unmetered services in the Special Conditions.

36.0 C. RATE SCHEDULE 1755

Reference: PROPOSED TERMINATION OF RS 1755
Exhibit B-4, BCUC IR 13.6
RS 1755 migration

In response to BCUC IR 13.6, BC Hydro states:

> Exceptions to customers illuminating their properties under metered service are:
>
> - RS 1755 Group 2 customers that migrate their service to RS 1701, which is an unmetered rate; and
> - Under rare circumstances, through a new unmetered, Small General Service connection. This could occur when the configuration of the service connection makes it impractical or very costly for a customer to install a new metered service connection. Unmetered service is not permitted under Residential service.

2.36.1 Please confirm, or explain otherwise, that the new unmetered Small General Service connection stated above is associated with a new rate schedule yet to be introduced.

2.36.1.2 If not confirmed, please clarify which Small General Service rate schedule would be applicable in this circumstance (e.g., RS 1234, RS 1300, RS 1301, RS 1310 or RS 1311).

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.36.1 which indicates that all existing Small General Service (SGS) rate schedules have provisions for unmetered services in the Special Conditions.

The rate schedule applicable to RS 1755 customers taking a new unmetered SGS connection would depend on the location of the service:

- **If the customer is located in Rate Zone I or IB, RS 1300 would apply; and**
- **If the customer is located in Rate Zone II, RS 1234 would apply.**

36.0 C. RATE SCHEDULE 1755

Reference: PROPOSED TERMINATION OF RS 1755
Exhibit B-4, BCUC IR 13.6
RS 1755 migration

In response to BCUC IR 13.6, BC Hydro states:

> Exceptions to customers illuminating their properties under metered service are:
>
> - RS 1755 Group 2 customers that migrate their service to RS 1701, which is an unmetered rate; and
> - Under rare circumstances, through a new unmetered, Small General Service connection. This could occur when the configuration of the service connection makes it impractical or very costly for a customer to install a new metered service connection. Unmetered service is not permitted under Residential service.

2.36.1.2.1 Please confirm if there are any current RS 1755 customers receiving service under any of the above Small General Service rate schedules.

RESPONSE:

Confirmed. For customers who receive dual services (i.e., the RS 1755 charge is included in the account of the main premises), there are customers receiving service under RS 1300 and RS 1234. BC Hydro notes these customers' RS 1300 or RS 1234 services are metered.

37.0 D. PROPOSED BACK BILLING AMENDMENTS

Reference: PROPOSED ELECTRIC TARIFF AMENDMENTS FOR BACK-BILLING OF UNMETERED SERVICES
Exhibit B-4, BCUC IR 15.1, 15.2, 15.6
Under-billing & unmetered billing reviews

In response to BCUC IRs 15.1 and 15.6, BC Hydro states:

> Other than field investigations triggered by the reviews described above, BC Hydro has not had a field audit program in which we have routinely sampled connections to customer-owned street lights or unmetered accounts to determine the accuracy of billing. This reflects the cost of such a program relative to the revenue perceived to be at-risk given the size of the individual loads and the nature of the customers with unmetered services (e.g., municipalities, large corporations).
>
> […]
>
> In preparation for the Street Light Replacement Program, BC Hydro has been working with customers to confirm and update records of unmetered street lights, both BC Hydro-owned and customer-owned. We have also identified gaps in our processes that, for example, led to discrepancies between our asset inventories of BC Hydro-owned street lights and RS 1701 bills being issued. Additional control processes have been implemented and technology upgrades are underway to minimize the potential for such discrepancies, as well as to allow for discrepancies to be identified sooner should they occur. BC Hydro observes that some customers have similar challenges managing their field asset inventory records. [*emphasis added*]
>
> BC Hydro has recently been working with a company with a very large number of unmetered Small General Service (SGS) connections to reconcile billing records and confirm the accounts are being appropriately billed. We have jointly developed processes and plans for ongoing audits/sampling to ensure accurate billing. BC Hydro intends to develop similar processes with other organizations with large numbers of unmetered SGS and street lighting connections.
>
> […]
>
> On September 11, 2020, BC Hydro met individually with Shaw Communications Inc., the customer with the largest number of unmetered SGS services, to explain our proposed amendments and gather their feedback.

2.37.1 Please explain the additional control processes and technology that have been implemented to minimize asset discrepancies between BC Hydro-owned and customer-owned street lights.

RESPONSE:

As explained in section 7.2 of the Application, BC Hydro has more control over BC Hydro-owned street light asset records than Customer-owned street lights. Therefore, the process and technology controls explored and implemented for the two groups are different as outlined below:

BC Hydro-owned street lights (RS 1701)

RS 1701 lighting asset records are stored in BC Hydro's GIS system. Asset records can change as the result of customers' addition, modification or removal requests, generally through the Street Lighting Information Management system (SLIM), or from BC Hydro-initiated work such as pole replacement programs. Billing accuracy relies upon the GIS having an accurate record of lighting as-installed, as well as having the SAP billing records being accurately updated.

In its preparation for the Replacement Program, BC Hydro identified that incomplete or incorrect data entry could result in some asset records missing attributes such as customer ID, wattage, light type and lens type. In addition, the updating of lighting records from GIS to SAP is not fully automated and relies upon manual steps, which creates the potential for human errors.

To address these issues, BC Hydro has initiated a technology enhancement project to directly link GIS records to SAP such that changes in RS 1701 lighting will be automatically reflected in SAP, without the need for manual intervention. New reports are being developed to improve visibility into changes to RS 1701 inventories to allow for continual reconciliation of asset and billing records. Additional measures are also being explored such as applying restrictions on street light data fields in GIS to minimize data entry errors.

To a lesser degree, asset and billing discrepancies also resulted from errors made by billing clerks when making manual entries and adjustments in SAP. Where possible, billing entries and adjustments have been automated to improve efficiency and reduce human errors.

BC Hydro has initiated a change management plan as part of the Replacement Program to ensure frontline staff understands the new LED street lights, new processes and new technologies being implemented to manage the RS 1701 service and its billing.

BC Hydro anticipates the street light asset records will continue to be corrected during the Replacement Program as installation crews will physically attend every RS 1701 street light in the province. BC Hydro will have the most up-to-date and accurate asset and billing records by the end of the Replacement Program and will make our best effort to maintain the accuracy of these records in the future through the business improvement measures mentioned above.

Customer-owned street lights (RS 1702, RS 1703, and RS 1704) and customer-owned, unmetered Small General Service accounts

Section 7 of the Application and BC Hydro's response to BCUC IR 1.15.1 outlined BC Hydro's challenges in managing the billing accuracy of customer owned street lights, traffic signals and other unmetered equipment because we do not have visibility into customers' assets.

BC Hydro has reached out to several RS 1702 customers to reconcile their street light asset records against BC Hydro's billing records; some billing reconciliation results were included in BC Hydro's response to BCUC IR 1.15.2. Please also refer to BC Hydro's response to BCUC IR 2.37.2 which describes the processes developed to improve ongoing billing accuracy with one customer that has a large number of unmetered Small General Service accounts.

These improvements notwithstanding, BC Hydro remains dependent upon timely and accurate notification from customers of additions, removals or modifications of customer-owned unmetered lighting and equipment.

37.0 D. PROPOSED BACK BILLING AMENDMENTS

Reference: PROPOSED ELECTRIC TARIFF AMENDMENTS FOR BACK-BILLING OF UNMETERED SERVICES
Exhibit B-4, BCUC IR 15.1, 15.2, 15.6
Under-billing & unmetered billing reviews

In response to BCUC IRs 15.1 and 15.6, BC Hydro states:

> Other than field investigations triggered by the reviews described above, BC Hydro has not had a field audit program in which we have routinely sampled connections to customer-owned street lights or unmetered accounts to determine the accuracy of billing. This reflects the cost of such a program relative to the revenue perceived to be at-risk given the size of the individual loads and the nature of the customers with unmetered services (e.g., municipalities, large corporations).
>
> […]
>
> In preparation for the Street Light Replacement Program, BC Hydro has been working with customers to confirm and update records of unmetered street lights, both BC Hydro-owned and customer-owned. We have also identified gaps in our processes that, for example, led to discrepancies between our asset inventories of BC Hydro-owned street lights and RS 1701 bills being issued. Additional control processes have been implemented and technology upgrades are underway to minimize the potential for such discrepancies, as well as to allow for discrepancies to be identified sooner should they occur. BC Hydro observes that some customers have similar challenges managing their field asset inventory records. [*emphasis added*]
>
> BC Hydro has recently been working with a company with a very large number of unmetered Small General Service (SGS) connections to reconcile billing records and confirm the accounts are being appropriately billed. We have jointly developed processes and plans for ongoing audits/sampling to ensure accurate billing. BC Hydro intends to develop similar processes with other organizations with large numbers of unmetered SGS and street lighting connections.
>
> […]
>
> On September 11, 2020, BC Hydro met individually with Shaw Communications Inc., the customer with the largest number of unmetered SGS services, to explain our proposed amendments and gather their feedback.

2.37.2 Please expand on the processes and plans that were jointly developed between BC Hydro and Shaw Communications Inc.

RESPONSE:

With respect to the preamble to this request, a linkage appears to have been drawn between the customer that BC Hydro referenced working with to confirm account deficiencies and our consultation with Shaw Communications Inc. on our proposed tariff changes. BC Hydro has not confirmed the identity of the customer on the record and therefore notes that the response below is being provided on a generic basis and not in respect of Shaw specifically.

There were three primary gaps that led to inaccurate billing for the customer:

- **A failure by the customer to provide timely notification of changes to their unmetered equipment;**
- **Differences between the consumption estimates provided at the time of installation and actual consumption of specific devices based on use and type of equipment, which could change over time; and**
- **To a lesser degree, administrative errors by either organization that led to discrepancies between the customer's equipment inventory, actual equipment installed, and BC Hydro's billing records.**

To improve the accuracy of the customer's billing:

1. **BC Hydro and the customer reconciled asset and billing records to ensure an accurate listing of equipment to be billed;**
2. **The customer provided data from their equipment that included consumption measurements. While the equipment measurements do not meet Measurement Canada standards, they provided a baseline that could be used to estimate consumption more accurately;**
3. **BC Hydro initiated a sample measurement program to determine the accuracy of the equipment data, and then developed a process whereby the equipment's consumption data could be used to reasonably estimate consumption for billing purposes; and**
4. **Equipment with similar consumption was grouped into kWh "buckets" to simplify billing and consistency of declared kWh.**

In addition, the following steps have been adopted to maintain the accuracy of billing in the future:

1. **Annually, the customer will provide the equipment's consumption information, which will be analyzed to assess if equipment should be moved to higher or lower billing buckets;**

2. **BC Hydro's Revenue Assurance team will conduct periodic risk-based field inspections;**

3. **The customer will install metering on all new services above an estimated consumption level, as well as approximately 70 of its existing accounts above this level, and have those accounts billed as metered services;**

4. **Forms were updated and training was provided to the customer to reduce the risk of error in submission of new load requests; and**

5. **BC Hydro will conduct an annual reconciliation of equipment connection requests from the customer.**

38.0 E. PROPOSED TARIFF & HOUSEKEEPING AMENDMENTS

Reference: SPECIAL CONDITIONS
Exhibit B-1, Section 5.4.3, p. 37; Exhibit B-4, BCUC IR 5.1, 5.2, 5.2.1, 5.6.2, 5.11
RS 1701 proposed amendments

On page 37 of the Application, BC Hydro states:

> 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.

In response to BCUC IR 5.1, BC Hydro states:

> BC Hydro did not consult customers on the remaining proposed changes to RS 1701 Special Conditions. In BC Hydro's view, the remaining proposed changes are updates to further clarify or align tariff languages to current business practices, to reflect changes required due to the LED street light replacement, to accommodate the transition of RS 1755 Group 2 customers to RS 1701, or to make RS 1701 available to additional customers when suitable for lighting private property. There will be no significant impact to current customers arising from these remaining proposed changes.

In response to BCUC IR 5.2, BC Hydro states:

> The current Special Condition is not explicit regarding a customer request for an early removal of a street light. BC Hydro is not consistent in recovering the undepreciated value of RS 1701 street lights when a customer requests an early removal. In most cases, customers have not been charged for the undepreciated amount for an early removal unless the light is removed and replaced with another light (e.g., different wattage).

In response to BCUC IR 5.2.1, BC Hydro states:

> If a RS 1701 street light is removed prior to its full depreciation, in most cases the undepreciated value is currently not recovered from the customer requesting the removal. These asset write-offs are forecast in BC Hydro's revenue requirements and these forecast amounts are currently recovered from all ratepayers.

2.38.1 Please explain BC Hydro's rationale for not recovering the undepreciated value of RS 1701 street lights instead of continuing with its current practice of not charging its customers.

RESPONSE:

BC Hydro assumes there is a typo in the IR and interprets the question as follows:

2.38.1 Please explain BC Hydro's rationale for ~~not~~ recovering the undepreciated value of RS 1701 street lights instead of continuing with its current practice of not charging its customers.

BC Hydro believes the intent of the current RS 1701 Special Condition 3 is to avoid all ratepayers bearing the cost of undepreciated street lights when a RS 1701 customer requests an existing street light be replaced with a new light before the older light is fully depreciated. The same principle should apply when a customer requests a RS 1701 street light be removed prior to it being fully depreciated because the cost implications of removing a street light are identical whether or not the light is replaced, as stated in section 5.4.3 of the Application and BC Hydro's response to BCSEA IR 1.5.1.

The Street Light Replacement Program is replacing all RS 1701 street lights with new luminaires with a 20-year life expectancy, which will increase the value of street lighting assets. Without the proposed Special Condition, the high undepreciated value of the removed street lights would be borne by all ratepayers if, for example, a customer decides to convert an area to their own RS 1702 street lights and requests that BC Hydro remove a large number of the newly installed RS 1701 LED lights.

BC Hydro recognizes that some customers have plans to convert some areas from BC Hydro-owned RS 1701 street lights to customer-owned RS 1702 street lights in the near future. BC Hydro encourages customers to assess their investment plans to avoid unnecessary financial implications to both themselves and BC Hydro's ratepayers. BC Hydro will make its best effort to accommodate customers' RS 1702 investment plans providing the removal of existing RS 1701 HPS street lights can be completed prior to March 31, 2024 to allow BC Hydro time to ensure all HPS streets are removed by the December 31, 2025 Federal PCB Regulation deadline.

38.0 E. PROPOSED TARIFF & HOUSEKEEPING AMENDMENTS

Reference: SPECIAL CONDITIONS
Exhibit B-1, Section 5.4.3, p. 37; Exhibit B-4, BCUC IR 5.1, 5.2, 5.2.1, 5.6.2, 5.11
RS 1701 proposed amendments

On page 37 of the Application, BC Hydro states:

> 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.

In response to BCUC IR 5.1, BC Hydro states:

> BC Hydro did not consult customers on the remaining proposed changes to RS 1701 Special Conditions. In BC Hydro's view, the remaining proposed changes are updates to further clarify or align tariff languages to current business practices, to reflect changes required due to the LED street light replacement, to accommodate the transition of RS 1755 Group 2 customers to RS 1701, or to make RS 1701 available to additional customers when suitable for lighting private property. There will be no significant impact to current customers arising from these remaining proposed changes.

In response to BCUC IR 5.2, BC Hydro states:

> The current Special Condition is not explicit regarding a customer request for an early removal of a street light. BC Hydro is not consistent in recovering the undepreciated value of RS 1701 street lights when a customer requests an early removal. In most cases, customers have not been charged for the undepreciated amount for an early removal unless the light is removed and replaced with another light (e.g., different wattage).

In response to BCUC IR 5.2.1, BC Hydro states:

> If a RS 1701 street light is removed prior to its full depreciation, in most cases the undepreciated value is currently not recovered from the customer requesting the removal. These asset write-offs are forecast in BC Hydro's revenue requirements and these forecast amounts are currently recovered from all ratepayers.

2.38.2 Please explain why BC Hydro did not consult customers on the remaining proposed changes to RS 1701 Special Conditions when

the proposed amendments would result in deviation from current practices.

RESPONSE:

As explained in BC Hydro's response to BCUC IR 1.5.1, except for the proposed Early Removal Fee (proposed Special Condition 4), the remaining proposed changes to RS 1701 Special Conditions are:

- **To further clarify or align tariff languages to current business practices – Proposed Special Conditions 7, 8 and 10;**
- **BC Hydro notes that the proposed Special Condition 8 – Termination of Service replaces the current obsolete tariff language, as explained in section 5.4.3 of the Application and BC Hydro's response to BCUC IR 1.5.8. BC Hydro believes the proposed new language does not deviate significantly from its current service termination right. BC Hydro will provide ample notice and will make its best effort to accommodate the time customers require to source alternative street lighting when it decides to discontinue the RS 1701 service in an area;**
- **To reflect changes required due to the LED street light replacement – Proposed Special Conditions 2 and 6; and**
- **To accommodate the transition of RS 1755 Group 2 customers to RS 1701, or to make RS 1701 available to additional customers when suitable for lighting private property – Proposed Special Conditions 3, 4 and 9.**

In BC Hydro's view, these proposed changes do not have a material impact to current customers receiving RS 1701 service and, therefore, BC Hydro did not specifically consult with customers about these proposed changes prior to it submitting the Application.

38.0 E. PROPOSED TARIFF & HOUSEKEEPING AMENDMENTS

Reference: SPECIAL CONDITIONS
Exhibit B-1, Section 5.4.3, p. 37; Exhibit B-4, BCUC IR 5.1, 5.2, 5.2.1, 5.6.2, 5.11
RS 1701 proposed amendments

In response to BCUC IR 5.6.2, BC Hydro states:

> If discontinuation of service is required for the circumstances as listed in BC Hydro's response to BCUC IR 1.5.6, BC Hydro provides notice to the customer and works with them to offer the alternative of electricity service under RS 1702 for customer owned street lights.

2.38.3 Please explain what support BC Hydro provides customers while working with them to offer the alternative of electricity service under RS 1702 for customer owned street lights.

RESPONSE:

BC Hydro makes its best efforts to accommodate the time the customer requires to install their own street lighting to avoid risks to public safety. Also, BC Hydro's designers work with customers to identify practical solutions to establishing new electrical connections, as well as metering if applicable.

If the customer requires lighting design or installation service referrals, they can contact BC Hydro's Alliance of Energy Professions for a list of certified service providers in their area.

38.0 E. PROPOSED TARIFF & HOUSEKEEPING AMENDMENTS

Reference: SPECIAL CONDITIONS
Exhibit B-1, Section 5.4.3, p. 37; Exhibit B-4, BCUC IR 5.1, 5.2, 5.2.1, 5.6.2, 5.11
RS 1701 proposed amendments

In response to BCUC IR 5.11, BC Hydro states:

> The Customer is responsible for ensuring the lighting installed meets their purposes, illumination standards, and requirements. This includes vegetation maintenance around the street light required for illumination purposes; however, this is not currently stated in the Tariff.

2.38.4 Please explain how BC Hydro determines that the customer is responsible for ensuring the lighting installed meets their purposes, illumination standards and requirements including vegetation since it is not stated in the Tariff.

RESPONSE:

BC Hydro has long offered street lights on its distribution poles at different wattages (e.g., 100 W, 150 W), distributions (drop lens or flat glass), luminaire/bracket aims (north, east, etc.) and bracket lengths to customers as requested. Although the responsibility of lighting design is not specified in the tariff, BC Hydro and its street light customers have long understood and operated on the premise that customers are responsible for the selection of street lights and lighting designs that achieve the lighting levels needed in their communities.

Customers make selections in order to meet their lighting needs considering that the pole locations are offered "as-is" and achieving light levels and uniformities to recognized lighting standards may not be possible using BC Hydro street lights alone. Customers may have to install their own street lights that either supplement those provided by BC Hydro or provide the complete solution without the need of BC Hydro street lights. BC Hydro, therefore, only installs, modifies and removes individual RS 1701 street lights at the direction of the customer.

As the customers are responsible for the street lights and designs that achieve the lighting levels needed in their communities, including associated costs, the customer is therefore also responsible to remove any light obstruction to maintain the needed lighting levels, including vegetation. Hence, BC Hydro does not clear vegetation specifically to ensure its street lights provide the light to the targeted locations required by the customer. In practice, clearing of the vegetation by BC Hydro for BC Hydro overhead line clearances most often addresses the vegetation issues around street lights.

39.0 E. PROPOSED TARIFF & HOUSEKEEPING AMENDMENTS

Reference: BC HYDRO'S PROPOSED RS 1701 LED RATE
Exhibit B-1, Section 5.4.2, pp. 43–44; Exhibit B-5, BCSEA IR 5.3
Special Conditions

On page 37 of the Application, BC Hydro proposes the following amendment, among others, to the RS 1701 Special Conditions:

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

In response to BCSEA IR 5.3, BC Hydro states:

> BC Hydro cannot predict the number of future RS 1701 removal requests as street light removals are based on changing needs of RS 1701 customers. In addition, the financial implication depends on the age of the street lighting at time of the removal requests. However, for reference, the table below shows the RS 1701 street lights removal requests received in calendar years of 2018, 2019 and 2020.

Year Completed	Total
2018	236
2019	198
2020	351
Grand Total	820

> Customers are required to design their RS 1701 street lighting using the newly offered LED street lights prior to BC Hydro starting street light conversion in their area. We expect customers will take the opportunity to examine their current and future street lighting needs and encourage customers to remove street lights that are no longer needed. We expect to receive an increased number of removal requests, as well as additions and alterations, during the LED street light deployment period. These removal requests will not be subject to the Early Removal Fee as they will be completed before the new asset is installed.

2.39.1 Please confirm, or explain otherwise, that the total cost estimate for the scope of the LED Replacement Program considered the expected reduction in street light replacements that are required based on the historical trend in street light removal requests from the 2018 to 2020 calendar years.

RESPONSE:

Not confirmed. BC Hydro's cost estimate for the Street Light Replacement Program (Program) was based upon the count of BC Hydro owned street lights when the estimate was calculated. For the reasons provided in BC Hydro's response to BCUC IR 2.23.6.1, BC Hydro neither accounted for nor forecasted reductions in street light counts when calculating the total cost estimate for the Program.

40.0 E. PROPOSED TARIFF & HOUSEKEEPING AMENDMENTS

Reference: PROPOSED TARIFF AMENDMENTS
Exhibit B-4, BCUC IR 16.1, 16.4
General service

In response to BCUC IR 16.1, BC Hydro states:

> For customers who are converting existing unmetered services to metered services, both the street lighting and general service loads are typically small (e.g., telecommunications equipment attached to street light poles). These accounts are likely to be charged under the Small General Service (SGS) rate. Although the SGS energy charge is slightly higher than RS 1702 and RS 1704, customers can benefit from the lower metering, service connection and administrative costs

2.40.1 Please provide a comparison of the Small General Service rate with the current rates applicable to RS 1702 and RS 1704.

RESPONSE:

Please see the table below for the fiscal 2021 metered RS 1702, metered RS 1704 and RS 1300 rate comparison.

	Energy Charge (/kWh) ($)	**Basic Charge (/day) ($)**
RS 1702	**0.1114**	**-**
RS 1704	**0.1114**	**-**
RS 1300	**0.1233**	**0.3584**

BC Hydro notes that in addition to the slightly higher energy charge, RS 1300 also has a per day basic charge while RS 1702 and RS 1704 do not. However, if customers must separately meter their General Service load from the street lighting or traffic signal loads per the current tariff, they are subject to the General Service basic charge for the General Service portion of the load as well.

40.0 E. PROPOSED TARIFF & HOUSEKEEPING AMENDMENTS

Reference: PROPOSED TARIFF AMENDMENTS
Exhibit B-4, BCUC IR 16.1, 16.4
General service

In response to BCUC IR 16.4, BC Hydro states:

> The City of Vancouver is the only customer that has requested metering of mixed services that include street lighting and General Service load. BC Hydro consulted with the City of Vancouver on the proposed Electric Tariff amendments; the City of Vancouver's feedback is included as Attachment 1 to this response.
>
> BC Hydro did not consult with other interested parties about this proposed amendment. To date, no other customers have expressed interest or have submitted requests for metered mixed street light and General Service load. However, we anticipate that in the future additional municipal customers may be interested in this service and having it available to them would be beneficial. Further, as explained in BC Hydro's response to BCUC IRs 1.16.1 and 1.16.3, BC Hydro believes the proposals do not have negative revenue or cost impacts, and therefore do not have negative implications to other customers.

2.40.2 Have any other customers expressed an interest in metered mixed-use services? Please discuss.

RESPONSE:

As explained in BC Hydro's response to BCUC IR 1.16.4, BC Hydro has only received requests for metered mixed-service connections from the City of Vancouver. No other customer has expressed an interest in metered mixed-load services.

40.0 E. PROPOSED TARIFF & HOUSEKEEPING AMENDMENTS

Reference: PROPOSED TARIFF AMENDMENTS
Exhibit B-4, BCUC IR 16.1, 16.4
General service

In response to BCUC IR 16.4, BC Hydro states:

> The City of Vancouver is the only customer that has requested metering of mixed services that include street lighting and General Service load. BC Hydro consulted with the City of Vancouver on the proposed Electric Tariff amendments; the City of Vancouver's feedback is included as Attachment 1 to this response.
>
> BC Hydro did not consult with other interested parties about this proposed amendment. To date, no other customers have expressed interest or have submitted requests for metered mixed street light and General Service load. However, we anticipate that in the future additional municipal customers may be interested in this service and having it available to them would be beneficial. Further, as explained in BC Hydro's response to BCUC IRs 1.16.1 and 1.16.3, BC Hydro believes the proposals do not have negative revenue or cost impacts, and therefore do not have negative implications to other customers.

2.40.2 Have any other customers expressed an interest in metered mixed-use services? Please discuss.

2.40.2.1 If yes, please explain why BC Hydro did not consult with these parties about the proposed Electric Tariff amendments.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.40.2 which indicates BC Hydro has only received a request for metered mixed-service connections from the City of Vancouver.

BC Hydro did not consult with other parties about the proposed Electric Tariff amendments because only one customer has requested metered mixed-use service and because there is a favourable economic impact on all ratepayers, as is explained in BC Hydro's response to BCUC IR 1.16.1.