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June 28, 2019

GHG Reduction (Clean Energy) Regulation Reporting
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Ministry of Energy, Mines and Petroleum Resources
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British Columbia Utilities Commission
GHG Reduction (Clean Energy)
Regulation Reporting

Email: commission.secretary@bcuc.com

RE: Ministry of Energy, Mines and Petroleum Resources (MEMPR or Ministry)
British Columbia Hydro and Power Authority (BC Hydro)
Greenhouse Gas Reduction (Clean Energy) Regulation Reporting
Fiscal 2019 Annual Report

BC Hydro writes to submit the Business Information and Declaration (Attachment 1), the Fiscal 2019 Greenhouse Gas Reduction Regulation (**GGRR**) Annual Report (**Report**) (Attachment 2) and LCE Program Results in an excel format (Attachment 3). The Report includes results for the period from April 1, 2018 to March 31, 2019 (**Fiscal 2019**) for BC Hydro's prescribed undertakings as defined in section 4 of the GGRR.

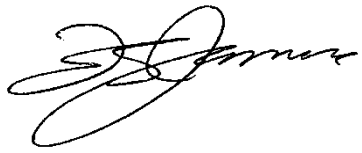
Under section 18 of the *Clean Energy Act*, a public utility implementing prescribed undertakings defined in the GGRR, must submit to the MEMPR a report respecting the prescribed undertaking. Specifically, section 18(5) states that "a report to be submitted under section (4) must include the information the minister specifies and be submitted in the form and by the time the minister specifies."

In April 2018, Ministry staff issued the GGRR reporting requirements. The reporting requirements state that an annual report is due by June 30 of each year and prescribed the form of the report.

BC Hydro is redacting customer-specific information in this version of the Report. An un-redacted version of the Report is being filed with the Ministry and BCUC only under separate cover.

For further information, please contact Geoff Higgins at 604-623-4121 or by email at bchydroregulatorygroup@bchydro.com.

Yours sincerely,



Fred James
Chief Regulatory Officer

cu/ma

Enclosures (3)

BC Hydro
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Greenhouse Gas Reduction (Clean Energy) Regulation Reporting

Attachment 1

Business Information and Declaration

Business Information and Declaration

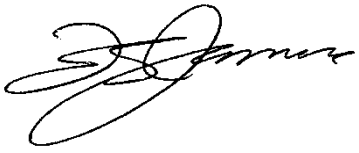
Full Legal and Operating Name	Address Including Postal Code and Email	Telephone
British Columbia Hydro and Power Authority	333 Dunsmuir Street, Vancouver BC V6B 5R3	604-623-4046
Reporting Period:	April 1, 2018 to March 31, 2019 (Fiscal 2019)	

I understand that the information in this report is collected for the purposes of administering the Greenhouse Gas Reduction (Clean Energy) Regulation under the authority of the *Clean Energy Act* and section 26 of the *Freedom of Information and Protection of Privacy Act*.

I certify that records evidencing each matter reported under the Greenhouse Gas Reduction (Clean Energy) Regulation (the Regulation) Reporting Requirements are available on request.

I certify that a record evidencing my authority to submit this report on behalf of the public utility is available on request.

I certify that the information in this report is true and complete to the best of my knowledge and I understand that I may be required to provide to the Ministry of Energy, Mines and Petroleum Resources or the Commission records evidencing the truth of that information.

Signature of Authorized Signing Authority	Name and Title of Authorized Signing Authority (please print)	Date Signed YYYY/MM/DD
	Fred James Chief Regulatory Officer	June 28, 2019

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Greenhouse Gas Reduction (Clean Energy) Regulation Reporting

Attachment 2

Fiscal 2019 Annual Report No. 2

April 2018 to March 2019

PUBLIC

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1 Executive Summary

This is BC Hydro's second annual report regarding its programs and projects that are "prescribed undertakings" as defined in the Greenhouse Gas Reduction (Clean Energy) Regulation (**GGRR**) for the purposes of section 18 of the *Clean Energy Act* (**CEA**). It is provided in response to the December 2018 “British Columbia Greenhouse Gas Reduction (Clean Energy) Regulation Reporting Requirements” (**Reporting Requirements**) provided to BC Hydro by the Ministry of Energy, Mines and Petroleum Resources. The report covers the annual period from April 1, 2018 to March 31, 2019 (**Fiscal 2019**).

In Fiscal 2019, BC Hydro provided supporting resources for two new Low Carbon Electrification (**LCE**) studies and two new LCE projects as further described in section 3.2 below. In addition to these studies and projects, BC Hydro undertook public awareness campaign activities that are also undertakings prescribed under section 4(3)(a) of the GGRR. Collectively, BC Hydro refers to these undertaking activities that fall within a class of undertakings prescribed under sections 4(3)(a)(i), 4(3)(a)(ii), 4(3)(b)(i), 4(3)(b)(ii), 4(3)(c) and 4(3)(d) of the GGRR as LCE Programs. The expenditure for the LCE Programs in Fiscal 2019 is $7.1 million.

BC Hydro also made significant progress on the Peace Region Electricity Supply (**PRES**) Project, which is an undertaking under section 4(2) of the GGRR. In Fiscal 2019, actual expenditure on the PRES Project was $48.4 million, with a cumulative cost of $69.9 million as of the end of the reporting period. It is premature to report any avoided greenhouse gas emissions for the PRES Project as it is not in-service. Total expenditures of $1.6 million were incurred in Fiscal 2019 with respect to a [redacted] generation agreement BC Hydro entered into with [redacted] to ensure the provision of reliable electricity service from the transmission system [redacted] until the PRES Project is placed in service. This is also an undertaking under section 4(2) of the GGRR.

2 State of the Market and Program Planning

2.1 Background

In December 2018, the Government of B.C. launched the CleanBC Plan, which set out a pathway to enable the government to meet its 2030 greenhouse gas (**GHG**) emission targets. The CleanBC Plan calls for BC Hydro to continue to make investments in our transmission system to make it easier for large industrial operations to access clean electricity.

In February 2019, the Minister's Mandate Letter to BC Hydro included an expectation for BC Hydro to continue to provide leadership in advancing the government's climate action strategies, including through electrification, fuel switching, and energy efficiency initiatives in the built environment, transportation, oil and gas, and other sectors.

Section 18(1) of the CEA empowers the Lieutenant Governor in Council to prescribe, by regulation, classes of undertakings for the purpose of reducing GHG emissions. Public utilities that choose to engage in undertakings that are within one or more prescribed class of undertaking are assured of being able to recover the costs of the undertaking in their rates, and may not be prevented by the British Columbia Utilities Commission from engaging in the undertaking. The GGRR was first issued in 2012, and amended in 2017 to include eight new classes of electrification undertakings. Together, CEA section 18 and the GGRR provide one of the statutory pillars of the Government of B.C.'s GHG emission reduction policy.

The eight new classes of electrification undertaking prescribed by GGRR section 4 can be divided into two broad categories: (i) those that are program based, similar to BC Hydro's demand-side management programs;[1] and (ii) those that are infrastructure based.[2] BC Hydro refers to its undertakings that fall within one of the classes in the former category as LCE Programs, and to its undertakings that fall within one of the classes in the latter category as LCE Infrastructure Projects. This nomenclature corresponds to the "Electrification Programs" referred to in subsection 6.8 of the GGRR Reporting Requirements, and "Transmission, Distribution and Generation" referred to in subsection 6.9 of the GGRR Reporting Requirements, respectively.

As noted, one of the legal consequences of the public utility program or project being a "prescribed undertaking" is that the public utility is entitled to recover the costs of the program or project in its rates. That legal consequence is meaningful only if the costs associated with particular programs and projects that are prescribed undertakings can be identified and thus are accounted for by the public utility.[3] Accordingly, the prescribed undertakings described in this Fiscal 2019 GGRR Annual Report are those programs and projects with recorded costs in Fiscal 2019.

2.2 State of the Market Discussion

This section presents an overview of the LCE market with respect to BC Hydro's activities in Fiscal 2019. Detailed information on the LCE Programs and LCE Infrastructure Projects is set out in section 3 and section 4 respectively below.

[1] Being the classes of undertaking prescribed by subsections 4(3)(a)(i), 4(3)(a)(ii), 4(3)(b)(i), 4(3)(b)(ii), 4(3)(c) and 4(3)(d) of the GGRR. Under section 4(3)(c) and (d) of the GGRR, undertakings can be both projects or programs. For simplicity, BC Hydro may refer to projects under these sections as programs as well or use projects/program interchangeably.

[2] Being the classes of undertaking prescribed by subsections 4(2) and 4(3)(e) of the GGRR.

[3] BC Hydro notes that the costs it incurs with regard to its LCE programs are all deferred to the DSM Regulatory Account, pursuant to Order in Council No. 100, issued March 1, 2017. Generally, the costs it incurs in regard to its LCE Infrastructure Projects are capitalized.

BC Hydro is forecast to be in an energy surplus position for an extended period of time. During this surplus period, the LCE-driven incremental electricity sales will increase BC Hydro's revenues and can make rates lower than they otherwise would have been to the extent there is a positive differential between domestic electricity rates and forecast export prices. Such incremental electricity sales are also expected to reduce GHG emissions from what they otherwise would have been, thus having an environmental benefit.

Pursuant to the Reporting Requirements, a report by a Fairness Advisor must be provided on the competitiveness of any call process held during the reporting period. BC Hydro confirms that in Fiscal 2019 it did not hold any call processes in regard to its LCE Programs or its LCE Infrastructure Projects. Accordingly, no Fairness Advisor report is required.

2.3 Government Program

In Fiscal 2019, BC Hydro became responsible for delivering the CleanBC Better Buildings program (initially called EfficiencyBC) on behalf of the Government of B.C. The CleanBC Better Buildings program is a $24 million program funded by the provincial and federal governments that provides financial incentives to help households and businesses save energy and reduce GHG emissions by switching to high efficiency heating equipment and making building envelope improvements. BC Hydro is delivering the component of the CleanBC Better Buildings program that helps customers switch from fossil fuels to clean electricity. While activities under this program are funded by the Government of B.C. and are not part of BC Hydro's LCE Programs, the CleanBC program influences what programs BC Hydro funds as it seeks to align with the programs and projects funded by the CleanBC program. BC Hydro's programs that complement the CleanBC Better Buildings program are discussed in section 3 below.

3 LCE Programs

3.1 Overview

In Fiscal 2019, BC Hydro spent $7.1 million for its LCE Programs, including two new studies under section 4(3)(c) of the GGRR, two new projects under section 4(3)(a) of the GGRR, and public awareness campaign activities under section 4(3)(a) of the GGRR. These LCE undertakings are discussed in section 3.2.

In Fiscal 2019, there were a further five individual LCE projects for which BC Hydro made new funding commitments of approximately $1.3 million, but there are no expenditures in BC Hydro's financial reporting for Fiscal 2019 for these projects. Similarly, funding commitments of $22.7 million made in the previous reporting period (Fiscal 2018) are not expected to have expenditures until after the Fiscal 2019 reporting period. As such, all of these expenditures will not be reported in this document and will be detailed in future GGRR reports.

In Fiscal 2019, as mentioned above, the government established the CleanBC Better Buildings program and BC Hydro delivers that program on behalf of the government. To complement the government's program, in Fiscal 2019, BC Hydro developed and advanced a new multi-year BC Hydro funded LCE program which was designed to reach customers and to enable opportunities not covered by GHG emissions reduction programs funded by the provincial government and/or federal government.[4] BC Hydro approved expenditures of $16.6 million for this multi-year program, focusing on opportunities in industrial process, transportation, and new construction. BC Hydro is currently working with government to determine if we should make adjustments to the multi-year BC Hydro LCE Program to support government initiatives being planned as part of CleanBC. As part of this multi-year program, in Fiscal 2019, BC Hydro undertook public awareness campaign activities

[4] This multi-year program may sometimes be referred to as "BC Hydro LCE Program" to distinguish it from the government-funded program.

which are defined as prescribed undertakings under section 4(3)(a) of the GGRR, and an LCE study (Wild Sight) which is defined as a prescribed undertaking under section 4(3)(c) of the GGRR. These undertakings are discussed in section 3.2 below.

3.2 Fiscal 2019 LCE Programs

The following provides details on individual projects and activities within the LCE Programs that incurred expenditures in Fiscal 2019.

(i) [redacted] (Project 3 in Table 2): This project is interconnected to BC Hydro transmission line [redacted] in Northeastern B.C. It is an undertaking within the class of prescribed undertakings set out in section 4(3)(a) of the GGRR. There are multiple project phases. The first phase achieved Facility Commercial Operation Date (**COD**)[5] in Fiscal 2019 pursuant to the terms of the LCE Incentive Agreement. Other project phases are expected to achieve Facility COD in subsequent fiscal years. The purpose of the supporting funds from BC Hydro is to assist [redacted] in the acquisition, installation, and use of equipment that will use BC Hydro's electricity instead of natural gas to power natural gas extraction, processing and production operations.

[redacted] (Project 4 in Table 2): BC Hydro also has an LCE Incentive Agreement for the [redacted] site. This project is interconnected to BC Hydro transmission line [redacted] in Northeastern B.C. There are two project phases. Similar to Project 3, this project is an undertaking within the class of prescribed undertakings set out in section 4(3)(a) of the GGRR. Project 4 was energized in Fiscal 2019, but has not yet achieved Facility COD in accordance with the LCE Incentive Agreement. Accordingly, no supporting funds were provided

[5] Under the Incentive Agreement, Facility COD is required before an incentive fund payment can be made to the customer.

to the customer in Fiscal 2019. For this reason, Table 2 recognizes Project 4, but does not include any incentive expenditure, energy, demand, or GHG emission reduction values. Results of both phases will be provided in future reports when incentive funding is paid to the customer.

(ii) Thompson Rivers University Project: This project was carried out at the customer site in Kamloops, B.C. The supporting funds were used by Thompson Rivers University in the acquisition, installation, and use of equipment that uses electric boilers in place of natural gas boilers in a new building. The Thompson Rivers University Project is an undertaking within the class of prescribed undertakings set out in section 4(3)(a) of the GGRR.

(iii) Copper Mountain Project: This is one of the studies carried out by the customer in Fiscal 2019. BC Hydro provided funding to enable the customer to complete research to compare two material waste handling options for its operations in Southern B.C. The status quo option of using diesel-fueled trucking was compared to options that would utilize electric conveying technology for waste haul. The objective of the study was to determine the economic value of pursuing the conveyor option beyond the conceptual stage. The study determined that there were no 'Life of Mine' economic advantages in electrification of the waste rock transportation by conveyor from the pit to the waste rock dump. This study scope did not include measuring the impact of utilizing electric conveying technology on ore haulage which may be investigated in a future study. The Copper Mountain Project is an undertaking within the class of prescribed undertakings set out in section 4(3)(c) of the GGRR.

(iv) Wild Sight Project (with support from Columbia Basin Trust): BC Hydro provided supporting funds for a study to examine the feasibility of conducting a truck stop electrification pilot project in the town of Golden in Southeastern B.C. Truck stop electrification (**TSE**) technology allows those in the long haul

trucking industry the opportunity to connect to the electrical grid rather than idle their truck engines while stopped or 'overnighting'. Idle time reduction saves significant diesel fuel combustion, therefore avoiding CO_2 emissions. This study was part of the multi-year BC Hydro LCE Program discussed in section 3.1. Fiscal 2019 expenditures for this study are reflected in the BC Hydro LCE Program No. 2 line in Table 2. The Wild Sight project is an undertaking within the class of prescribed undertakings set out in section 4(3)(c) of the GGRR.

(v) Public Awareness Campaign: Also as part of the multi-year BC Hydro LCE Program, in Fiscal 2019, we implemented a public awareness campaign program to help make the concept of LCE, in particular with respect to owning and using an electric vehicle (**EV**), more tangible to our customers. Fiscal 2019 expenditures for this public awareness campaign are reflected in the BC Hydro LCE Program No. 1 line in Table 2. This included tools to help customers understand the cost of owning an EV in B.C. and displays and materials to support BC Hydro's community outreach team in educating customers on the EV as part of community and retail events. The public awareness campaign program is an undertaking within the class of prescribed undertakings set out in section 4(3)(a) of the GGRR.

Ratepayer impacts and estimated GHG emission reductions respecting these undertakings are shown in Table 2 below.

3.3 Methodology and Verification Methods

Depending on individual projects or programs within the LCE Programs, there can be up to four distinct activities that BC Hydro may use to review and verify estimates of incremental electrical load and emission reductions arising from electrification. These are: (i) technical review; (ii) site inspection; (iii) measurement and verification; and (iv) evaluation. Results from each area may be used in project or program management to ensure that BC Hydro receives the expected benefits. BC Hydro will be selective in the use of these processes, and focus its efforts where warranted to

improve the accuracy of estimates and reduce exposure to risk. This approach mirrors BC Hydro's current approach to demand-side management electricity savings, and provides estimates for both additional electricity demand and greenhouse-gas emission reductions.

The GHG emission reduction estimates are developed as part of the technical review for each project or program application and may be adjusted based on the outcome of site inspections and the electricity demand findings resulting from the measurement and verification activities.

The methodology BC Hydro has used to estimate GHG emission reductions involves developing engineering estimates of the amount of carbon-based fuel that will be offset by electricity, and quantifying the associated GHG emission reductions using the 2017 B.C. Best Practices Methodology for Quantifying Greenhouse Gas Emissions. The calculation nets out the GHG emissions associated with BC Hydro's electricity, which are also quantified using the 2017 B.C. Best Practices Methodology for Quantifying Greenhouse Gas Emissions.

BC Hydro notes that this estimate may differ from actual GHG emission reductions as determined by the customer and which are specific to their unique electrification project(s). Where an actual value has been provided to BC Hydro by the customer, or reported by the customer to the government through an Industrial Emissions Report, BC Hydro will show the customer-reported value in Column H of Table 2.

BC Hydro may also conduct a technical review of baselines, calculations, and assumptions used to determine the GHG reductions in the Industrial Emissions Report. Any changes to the value reported in a previous reporting period will be reflected in the cumulative values in Column H (ii) of Table 2.

The methodology used for typical electrical energy impact calculations for LCE projects is as follows: The total annual energy consumption = facility baseline electricity consumption + incremental LCE electricity consumption +/- baseline

energy adjustments. The total average monthly electrical demand = baseline average monthly electrical demand + incremental LCE average monthly electrical demand +/- baseline demand adjustments. Baseline adjustments are determined based on any net baseline energy consumption impacts that may be a result of the LCE project.

The two LCE projects (Project 3 and Thompson River University Project) completed in Fiscal 2019 have gone through a technical review and had a site specific measurement and verification plan for the estimated additional electricity consumption and demand. The plan was developed and included as part of the funding agreement between BC Hydro and the recipient. The respective methodology used for these two projects is as follows:

- Project 3: The measurement and verification approach applied to this project generally follows Option B, Retrofit Isolation: All Parameter Measurement, as set out in the International Performance Measurement & Verification Protocol (IPMVP) – Core Concepts October 2016 EVO 10000 – 1:2016; and
- Thompson Rivers University Project: The measurement and verification approach applied to this project generally follows Option D, Calibrated Simulation, as set out in the International Performance Measurement & Verification Protocol (IPMVP) - Core Concepts, October 2016 EVO 10000 - 1:2016.

3.4 Performance Metrics

BC Hydro outlines separately the different performance metrics used for the projects, studies, and public awareness campaigns described in section 3.2 above.

3.4.1 LCE Projects

For the two projects (Project 3 and the Thompson Rivers University project) completed in Fiscal 2019, using above mentioned methodologies for electricity

consumption, demand and GHG emission reductions, BC Hydro will consider the following to verify project performance:

1. Project completion – has the project progressed as described in the application?;
2. Electrical energy consumption – did the project consume the amount of electrical energy as described in the LCE Agreement?; and
3. GHG emission reduction – was fossil fuel consumption replaced with BC Hydro electricity? Was an associated GHG emission reduction realized?

Measurement and verification activities for the projects are underway.

3.4.2 LCE Studies

As discussed in section 3.2 above, BC Hydro provided funding to support two studies, the Copper Mountain project and the Wild Sight project. BC Hydro supported studies are critical in enabling customers to build the business case for project implementation as well as providing key inputs on barriers, costs, and benefits into program development and design.

Performance metrics for LCE studies consider whether the study/project may yield the following information, such as

1. information which could inform and improve accuracy of the project modeling assumptions;
2. information which could inform and improve understanding of market barriers and customer drivers;
3. site specific investigation and engineering analysis at a level sufficient to determine if advancing the project would provide tangible benefits that would make business sense for the customer and BC Hydro to continue supporting the project; and

4. learnings that may inform future BC Hydro programs and customer opportunities.

The two studies completed in Fiscal 2019 met their performance metrics.

3.4.3 Public Awareness Campaign

For public awareness campaigns, BC Hydro may track the performance of awareness activities through measures such as:

- Reach measures that are volume-based and support building awareness through impressions (TV, out of home advertising, online), video views, and media pickups;
- Traction measures that are sentiment-based and support receptiveness such as favourability, likability, changes pre to post; and
- Action measures that drive participation through clicks, sessions, contest entries, social engagement, and customer intercepts at events or program participation.

3.5 Cost-Effectiveness

As required under section 4(4) of the GGRR, undertakings are in the class of undertakings prescribed by sections 4(3)(a) to 4(3)(b) of the GGRR only if they satisfy a cost-effectiveness test. That cost-effectiveness test is defined in section 4(1) of the GGRR and requires that each undertaking that is an undertaking within the class of undertakings prescribed by subsections 4(3)(a) or 4(3)(b) of the GGRR have a positive net present value (**NPV**), with the measure of a program's NPV being that of all of the programs that fall within the class of undertakings described in subsections 4(3)(a) and 4(3)(b) of the GGRR. The GGRR cost-effectiveness test is measured only at the time BC Hydro decides to carry out the program.

Table 2 shows the GGRR NPV of LCE projects/programs prescribed under section 4(3)(a) and 4(3)(b) of the GGRR. The total GGRR NPV of these undertakings is $134.7 million which includes actual and committed expenditures and benefits from past, current, and future reporting periods. The GGRR NPV indicates that these undertakings are cost-effective.

3.6 Results Table - Explanation of Terms

Table 1 includes a description of the information provided in Table 2 below with regard to the LCE Programs.

Table 1 LCE Programs Results Table: Explanation of Terms

Column	Heading	Descriptions
A	GGRR	Applicable section of the GGRR
B	Project / Program/Contract / Expenditure	Low-carbon electrification activities to encourage or enable the use of electricity in place of other sources of energy that produce more greenhouse gas emissions.
$C_{(i)}$	Actual Expenditure ($ million)	Costs incurred at the end of the current reporting fiscal year
$C_{(ii)}$	Cumulative: Actual Expenditures ($ million)	The sum of successive costs incurred as at the end of the reporting fiscal year.
D	Cost Effectiveness ($ million): NPV to 2030 (Fiscal 2031)	The present value of the costs and benefits are determined using a discount rate equal to BC Hydro's weighted average cost of capital. The present value of the costs are subtracted from the present value of the benefits from the project start year to last year in the calculation period (Fiscal 2031) to determine the net present value for the project.
E	Cost Effectiveness ($ million): GGRR NPV to 2030 (Fiscal 2031)	The calculation of the GGRR NPV is based on costs and benefits as defined in the GGRR as of Fiscal 2018. Per that definition, benefits mean all revenues BC Hydro expects to earn as a result of implementing LCE programs falling under subsections 4(3)(a) or 4(3)(b), less revenues that would have been earned from the sale of that electricity to export markets. Costs mean all the costs BC Hydro expects to incur to implement LCE programs falling under subsections 4(3)(a) or 4(3)(b), including development and administration costs. For clarity, costs includes historic and future cost, committed expenditures and benefits from past, current and future reporting periods.
$F_{(i)}$	Actual: Additional Energy Consumption (MWh/year)	The average annual additional energy consumption estimated to be delivered from the project in the current reporting fiscal period.
$F_{(ii)}$	Cumulative: Additional Energy Consumption (MWh/year)	The sum of the successive average annual additional energy consumption estimated to be delivered from the project as at the end of the reporting fiscal period.
$G_{(i)}$	Actual: Additional Capacity Demand (MW)	The total energy demand added
$G_{(ii)}$	Cumulative: Additional Capacity Demand (MW)	Sum of the successive energy demand addition
$H_{(i)}$	Actual: Estimated GHG Emission Reductions (tonnes CO_2e/year)	The average annual tonnes per year of carbon dioxide equivalent reductions from the project in the current reporting fiscal period.
$H_{(ii)}$	Cumulative: Estimated GHG Emission Reductions (tonnes CO_2e/year)	The sum of the successive additional average annual tonnes per year of carbon dioxide equivalent reductions from the project as at the end of the reporting fiscal period.

3.7 Results Table

Table 2 summarizes information regarding the LCE Programs that are undertakings prescribed by sections 4(3)(a)(i), 4(3)(a)(ii), 4(3)(b)(i), 4(3)(b)(ii), 4(3)(c) and 4(3)(d) of the GGRR. The indications of "n/a" in Table 2 are due to: (1) the nature of the project, study or program, such that requested information cannot be obtained; or (2) the project, study, or program are prescribed by sections 4(3)(c) and 4(3)(d) of the GGRR and thus the cost-effectiveness test does not apply. BC Hydro provides as Attachment 3 an excel spreadsheet with annual expenditures, in total and by project/study/program, as outlined in the Reporting Requirements.

The GGRR Reporting Requirements also request graphical depictions (e.g., pie charts or bar charts) of the distribution by region in the Province and the distribution by customer sector where possible. Given that the Fiscal 2019 LCE Programs volume consisted of four completed projects, it was determined that a graphical depiction may not be meaningful and as such was not included in this report.

Table 2 LCE Programs Results for Year Ending March 31, 2019

	A	B	C		D	E	F		G		H	
	GGRR	**Project/Program/Contract/Expenditure**	**Expenditure ($ million)**		**Cost Effectiveness ($ million)**		**Additional Energy Consumption[2] (MWh/year)**		**Additional Demand (MW)**		**GHG Emission Reductions (tonnes CO_2e/year)**	
			Actual (i)	**Cumulative (ii)**	**NPV to 2030 (Fiscal 2031)**	**GGRR NPV to 2030 (Fiscal 2031)[1]**	**Actual (i)**	**Cumulative (ii)**	**Actual (i)**	**Cumulative (ii)**	**Actual (i)**	**Cumulative (ii)**
1	4(3)(c)	Vancouver Fraser Port Authority	0.00	0.07	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2	4(3)(c)	[redacted] (Project 1)[4]	0.00	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
3	4(3)(c)	[redacted] (Project 2)	0.00	0.01	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
4	4(3)(c)	BC Hydro Program Staff Labour	0.00	0.12	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
5	4(3)(a)	[redacted] (Project 3)	6.35	6.35	64.3	64.3	104,244	104,244	14.0	14.0	62,329[3]	62,329
6	4(3)(a)	[redacted] (Project 4)	0.00	0.00	45.9	110.2	n/a	n/a	n/a	n/a	n/a	n/a
7	4(3)(a)	Thompson Rivers University	0.28	0.28	0.3	110.5	2,737	2,737	0.0	0.0	562	562
8	4(3)(c)	Copper Mountain Mine	0.07	0.07	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
9	4(3)(c)	Translink	0.00	0.00	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
10	4(3)(a)	BC Hydro LCE Program No.1	0.41	0.41	24.2	134.7	0	0	0.0	0.0	0	0
11	4(3)(c)	BC Hydro LCE Program No. 2	0.00	0.00	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		Total	**7.11**	**7.32**	**134.7**	**134.7**	**106,981**	**106,981**	**14.0**	**14.0**	**62,891**	**62,891**

[1] Where a project/program has no actual or cumulative expenditures, but has an NPV, this means that the decision to go ahead with that project/program was made in this (or previous) reporting periods, but that the project/program is not expected to be implemented until a future year.

[2] Values reported in column F represent the 'run rate' or annualized rate of additional energy consumption.

[3] The GHG emission reductions shown are associated with the electrification of Project 3 and they represent estimates based on engineering calculations at the time BC Hydro made the decision to carry out offering incentive funding to the project. The GHG emission reductions associated with this project are also referenced in section 4 - LCE Infrastructure Projects of this report.

[4] Project 1 and 2 were described in the Fiscal 2018 Annual Report.

REDACTED in PUBLIC VERSION

4 LCE Infrastructure Projects

4.1 Overview

In this section 4, we describe the LCE Infrastructure Projects (i.e., being projects within the classes of undertaking prescribed by subsections 4(2) or 4(3)(e) of the GGRR) and available evaluation results.

Northeast British Columbia is forecasted to experience a significant increase in natural gas production and processing capacity, primarily in the Montney region. In the absence of adequate electricity supply, much of this development will be powered by natural-gas fired production processes. Meanwhile, BC Hydro's transmission system in this region is constrained. Further, the transmission system's ability to supply new loads in the South Peace region at all, even with a reduced level of reliability, is expected to be exceeded in summer 2021. Accordingly, BC Hydro will construct and operate new transmission and distribution facilities, and/or provide for [redacted] generation until such system upgrades are completed. These LCE Infrastructure Projects will enable the provision of reliable electricity service as a power supply alternative to carbon-based fuels. This will enable the reduction of existing GHG emissions or avoidance of future incremental GHG emissions.

4.2 Fiscal 2019 LCE Infrastructure Projects

In Fiscal 2019, BC Hydro incurred expenditures of $50.0 million in regard to two LCE Infrastructure Projects. Expenditures incurred and recorded in future fiscal years will be described in the applicable future GGRR annual report.

4.2.1 Peace Region Electricity Supply (PRES) Project

The PRES Project was introduced in Fiscal 2018 GGRR Annual Report. As explained in the Fiscal 2018 report, the PRES Project will enable natural gas producers and processors to electrify their existing and new operations, rather than

self-supplying with natural gas. This includes natural gas producers and processors as defined in GGRR paragraphs 4(2)(a)(i) and (ii). The PRES Project is expected to reduce GHG emissions in B.C. from any existing plant or from any prospective new plant that elects to take supply from BC Hydro rather than self-supply using natural gas.

The PRES Project was approved by BC Hydro's Board of Directors for implementation in June 2018. When BC Hydro's Board of Directors approved the PRES project, BC Hydro reasonably expected that the PRES project would have an in-service date no later than December 31, 2022. As of this report, the PRES Project has an expected in-service date of October 31, 2021. Therefore, the PRES Project is a prescribed undertaking pursuant to GGRR section 4(2).

The PRES Project is currently in the Implementation Phase and has an estimated total capital cost of $285 million. As of the end of Fiscal 2019, BC Hydro has incurred $69.9 million in total capital expenditures on developing the PRES Project, of which $48.4 million was incurred in Fiscal 2019.

During Fiscal 2019, BC Hydro made progress on the detailed design work for the PRES Project, and started material and equipment procurement. BC Hydro also secured the required licences and permits to be able to advance the PRES Project to the construction stage, started clearing and access road construction for the new transmission line right-of-way, and have started construction work.

BC Hydro will report on performance metrics and environmental benefits of undertaking the PRES Project when it is in-service, and existing and new natural gas producing or processing plant operations are connected to the BC Hydro's system.

4.2.2 [redacted] Generation Agreement

As reported in the Fiscal 2018 GGRR Annual Report, BC Hydro entered into a Generation Agreement with [redacted] to provide [redacted] generation as a [redacted] mechanism until the PRES Project is in service.

During periods of actual or anticipated system constraint, under the Generation Agreement, BC Hydro has the right to direct [redacted] to [redacted] its facilities in Northeast B.C. ([redacted] and [redacted]) from the grid and self-supply with electricity produced by [redacted] on-site generating units. BC Hydro treats [redacted] generation as a system resource, such that any self-generated electricity temporarily replaces electricity that would otherwise be provided from the BC Hydro transmission system. The Generation Agreement achieves the purpose of providing reliable electricity supply to electrified [redacted] facilities during events of system constraint until the PRES Project comes into service.

The total forecast nominal value of the Agreement is $12.0 million. Total expenditures incurred in Fiscal 2019 with respect to this [redacted] agreement are $1.6 million.[6]

4.3 Quantitative Data – Methodology & Assumptions

BC Hydro has developed criteria to qualify customer loads for inclusion in its estimates for GHG emissions reduced or avoided due to the PRES Project.

For the customer load to be included:

- Must be a new natural gas processing plant (including associated gas gathering and wellpad facilities) or existing plant converting to take grid service which

[6] An additional expenditure of $0.3 million was incurred for [redacted] generation dispatched as an energy resource over 11 days in March 2019. BC Hydro does not consider the associated dispatch costs to be reportable GGRR costs because they were incurred for a purpose ancillary to proving reliable network service.

takes, or commits to take, electricity service from BC Hydro in Fiscal 2018 or later;

- Would have used natural gas for power supply in the absence of BC Hydro's commitment to construct and operate new facilities; and
- Will be served by the PRES Project once it is placed in service.

These criteria thus include: (i) existing "brownfield" loads which fuel-switch from carbon-based fuel to grid electricity; and (ii) new "greenfield" loads that make the investment decision to take grid electricity as an alternative to carbon-based fuels for power supply.

BC Hydro notes that these criteria differ from the current British Columbia Greenhouse Gas Offset Protocol (*Fuel Switch Version 1.0, dated August 16, 2018*) which is specific to the replacement of existing gas-powered turbines with electrical grid power. Under the current protocol, GHG emission reductions would only arise where an existing customer facility fuel switches from a carbon-based fuel (such as natural gas) to low-carbon grid electricity and would not apply to any new plant that elects to be served with grid electricity in the first instance.

4.4 Performance Metrics

The GGRR performance metrics for the PRES Project are listed in Table 3 below.

Table 3 PRES Project: GGRR Performance Metrics

Type of Facility	Project(s)	Performance Metrics
Transmission & Distribution	PRES Project	1. New load served 2. GHG emissions reduction
[redacted] Generation	[redacted] Generation Agreement	3. New load served 4. GHG emissions reduction

A key purpose of the PRES Project is to provide a clean, reliable source of electrical power supply to existing and new natural gas processing operations. In the absence of the PRES Project, there would be no grid service alternative. These plant

operations would otherwise need to use natural gas (or other fossil fuels) for power supply. Since greenhouse gases are emitted when fossil fuels are burned to create power, the PRES Project will reduce GHG emissions in British Columbia for any existing plant that elects to take grid service rather than self-supply using natural gas.

GHG Emission Reduction Methodology

BC Hydro will estimate the impact the PRES Project will have on GHG emission reductions in British Columbia based on the assumptions and methodology set out in section 3.3 of this report. BC Hydro will apply these same assumptions and methodology to estimate the impact that temporary generation will have on GHG emission reductions in British Columbia until the PRES Project is in-service. For Fiscal 2019, the GHG emissions intensity factors determined in accordance with this methodology are listed below for convenience:

- Average emissions intensity factor for natural gas turbine: [redacted].[7]
- Less emissions intensity factor for BC Hydro grid electricity: [redacted].[8]
- Net emissions intensity factor for electrified loads: [redacted].

Determination of Eligible Loads for GHG Emission Reduction

In Fiscal 2019, certain [redacted] facilities were electrified pursuant to the support provided through the Generation Agreement (to ensure reliable electricity supply) and the Incentive Agreement (to provide supporting funds for investment in electrical infrastructure) described in the previous sections. Absent these agreements,

[7] The efficiency assumption of 29.5 per cent for gas turbines was developed by calculating the weighted average efficiency from metered data of two customer operated gas turbine electrical generation units.

[8] *Source: British Columbia Government: 2017 B.C. Best Practices Methodology for Quantifying Greenhouse Gas Emissions, page 17.*

BC Hydro considers that the [redacted] loads would not have connected to the BC Hydro transmission system and taken grid service.

As discussed in section 3.2 above, [redacted] has two sites which are relevant to the prescribed undertakings, the [redacted] site and the [redacted] Site.

The [redacted] site was energized from the BC Hydro transmission system in April 2018. This site comprises three discrete load centres: two gas processing plants and one field/gathering system. The load from one of the gas plants is not eligible for GHG emission calculation because it was previously served from the BC Hydro distribution system. The other gas plant load and field/gathering system loads were new loads to the BC Hydro system in Fiscal 2019. For Fiscal 2019, total new load served by BC Hydro was 90,958 MWh, with an estimated GHG emission reduction of 54,393 tonnes CO_2e.

[redacted]

The [redacted] site was energized from the BC Hydro transmission system in September 2018. This site comprises two gas processing plants, one of which was operational in Fiscal 2019 while the other was under construction. For Fiscal 2019, total new load served by BC Hydro was 39,163 MWh, with an estimated GHG emission reduction of 23,420 tonnes CO_2e.

[redacted]

BC Hydro notes that for each site, electrical energy consumption arising from the electrification of new loads is used to determine associated GHG emission reductions pursuant to the methodology described in section 3.3. These values have been incorporated into Table 5.

4.5 Results Table - Explanation of Terms

Table 4 includes a description of the information provided in the results table for LCE Infrastructure Projects. The reason for the indications of "n/a's" is due to the nature of the PRES Project as of March 31, 2019, as described above.

Table 4 LCE Infrastructure Projects Results
Table: Explanation of Terms

Column	Heading	Descriptions
A	Prescribed Undertaking	Type of prescribed undertaking.
B	Name	Project, program, or customer name.
C (i)	Actual ($ million)	Actual costs in millions incurred at the end of the current reporting fiscal.
C (ii)	Cumulative Costs ($ million)	Cumulative actual costs in millions incurred from first year of expenditure to the end of the current reporting fiscal.
C (iii)	Forecast Total ($ million)	Approved Anticipated Total Capital Cost of Project
D	Capacity of Facility (MW)	Planned facility capacity in megawatts at N-1 and N-0.
E	Total Capacity Committed/Secured (MW)	Cumulative total capacity committed and secured until the end of the current fiscal year in megawatts.
F	Total Customer Load(s) Served (MW)	Cumulative total customer loads served as at the end of the current fiscal year in megawatts.
G	Total Energy Provided to Customers (MW/h)	Cumulative total energy provided to customers as at the end of the current fiscal year in megawatts per hour.
H (i)	Actual: GHG Emissions Reduction Estimates (tonnes CO_2e/year)	Actual GHG Emissions Reduction at the end of the current fiscal period in tonnes of carbon dioxide equivalent per year.
H (ii)	Cumulative: GHG Emissions Reduction Estimates (tonnes CO_2e/year)	Cumulative GHG Emissions Reduction as at the end of the current fiscal period in tonnes of carbon dioxide equivalent per year.
I (i)	Type: Fossil Fuel(s) Avoided Or Displaced	Type of fossil fuels avoided or displaced or likely to be avoided or displaced.
I (ii)	Amount: Fossil Fuel(s) Avoided Or Displaced	Amount of fossil fuels avoided or displaced or likely to be avoided or displaced.

4.6 Results Table

Table 5 provides the results for LCE Infrastructure Projects with expenditures in Fiscal 2019.

Table 5 LCE Infrastructure Projects Results for Year Ending March 31, 2019

	A	B	C			D	E	F	G	H		I	
	Prescribed Undertaking	**Name**	**Cost**			**Capacity of Facility (MW)**	**Total Capacity Committed/ Secured (MW)**	**Total Customer Load(s) Served (MW)**	**Total Energy[1] Provided to Customers (MW/h)**	**GHG Emissions Reduction Estimates[2] (tonnes CO_2e/ year)**		**Fossil Fuel(s) Avoided or Displaced**	
			Actual ($ million) (i)	**Cumulative ($ million) (ii)**	**Forecast Total ($ million) (iii)**					**Actual (i)**	**Cumulative (ii)**	**Type (i)**	**Amount (ii)**
1	T&D	PRES Project	48.4	69.9	285	800 - 950	24	n/a	n/a	n/a	n/a	n/a	n/a
2	[redacted] Generation	[redacted]	1.6	1.6	12	24	24	26	130,121	77,812	77,812	n/a	n/a

[1] Reflects total new facility load served from the BC Hydro transmission system in F2019. 118,252 MWh of load is from existing brownfield facilities that fuel-switched to grid power. 11,869 MWh of load is from new greenfield facilities that electrified.

[2] The GHG Emissions Reduction Estimates are specific to eligible [redacted] and [redacted] plant loads that were served by BC Hydro in Fiscal 2019 in place of natural gas-fired supply.

REFER TO LIVE SPREADSHEET MODEL

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