

BC Hydro 2018 Carbon Neutral Action Report

May 2019

 **BC Hydro**
Power smart

This Carbon Neutral Action Report for the period January 1, 2018 to December 31, 2018 summarizes our emissions profile, the total offsets to reach net-zero emissions, the actions we have taken in 2018 to reduce our greenhouse gas emissions and our plans to continue reducing emissions in 2018 and beyond.

By June 30, 2019 BC Hydro's final Carbon Neutral Action report will be posted to our website at www.bchydro.com.

Overview

BC Hydro's vision is to be the most trusted, innovative utility company in North America by being smart about power in all we do. We are one of the largest energy suppliers in Canada, generating and delivering electricity to 95% of the population of British Columbia. We operate an integrated system of generation, transmission and distribution infrastructure to safely deliver reliable, affordable and clean electricity to our four million customers.

BC Hydro consistently has some of the lowest greenhouse gas emissions in the North American electricity industry and we have developed a legacy of stewardship by embedding environmental considerations in our business. In introducing measures to help our customers reduce greenhouse gas emissions, we are building on our strong conservation programs. With continued investment in technology, we will help customers make smart energy management choices by supporting them with rates, tools and programs including opportunities for conservation and efficiency. We recently developed an Environment Strategy and Environmental Principles that provide direction on objectives to ensure our actions contribute to a healthy environment for the long term which includes the support of climate actions and targets as set out by the Province.

This report focuses on BC Hydro carbon neutral activities resulting from the operations of our buildings and fleet and our use of paper. It also identifies our continued efforts to reduce carbon emissions, our ongoing work to understand climate change and its effects on our business and the communities we serve, our support for energy conservation in the public sector, and our new and upgraded energy projects which emphasize clean, renewable, and generation production.

Cover photo: Arrow Lake Reservoir

2018 Greenhouse gas emissions

In 2018, BC Hydro emitted 32,820 tonnes of carbon dioxide equivalent (CO₂e) from emission sources included in the Carbon Neutral Government Regulation. This is an increase from 2017 of 8%. In 2018, 67% of our emissions came from our vehicle fleet, 33% from buildings (which includes energy use for heating, cooling, lighting and IT equipment), and less than 1% from paper use. Building emissions increased by 8% as compared to 2017 with the increased use of Site C's worker accommodations and offices being a major contributor. This increase of emissions is balanced against the project's operating value as a source of clean, renewable and cost-effective electricity for more than 100 years, producing the lowest levels of life-cycle greenhouse gas emissions per GWh compared to alternative resources. We also did an enhancement of our Fleet Management System that reconciled and corrected fuel types and fuel purchases. As a result of this reconciliation, the Fleet emissions show an increase of 8% in 2018.

Note:

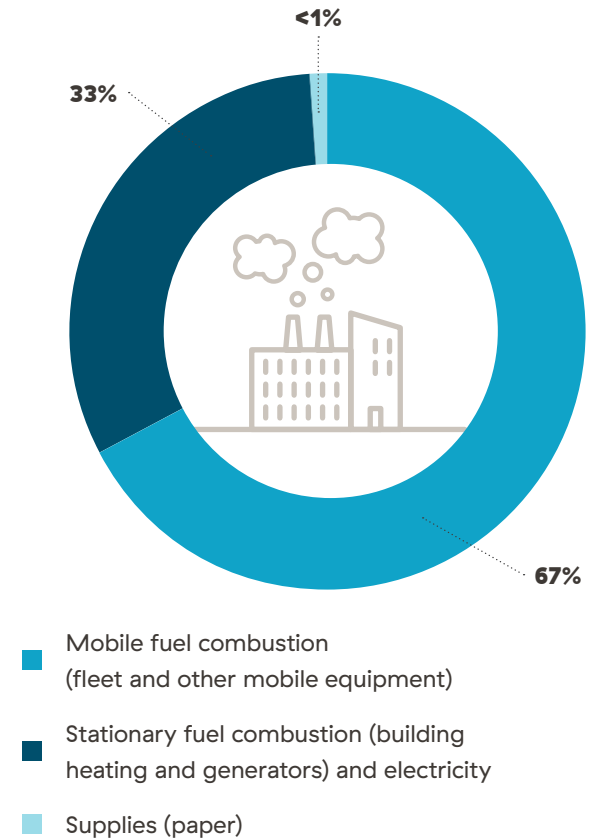
2018 Greenhouse Gas (GHG) Emissions do not include emissions from stationary combustion in crew quarters at remote diesel generating stations, emissions from mobile combustion from boats, snowmobiles or all-terrain vehicles, and fugitive emissions from cooling of buildings or vehicles.

These sources are estimated to emit less than 1% of the BC Hydro total carbon neutral emissions. Efforts to collect or estimate emissions from these sources would be disproportionately onerous. For these reasons, the emissions were deemed to be out-of-scope and are not included in BC Hydro's GHG emissions profile or offset purchase, in accordance with the 2018 B.C. Best Practices Methodology for Quantifying Greenhouse Gas Emissions.

* Tonnes of carbon dioxide equivalent (t CO₂e) is a standard unit of measure in which all types of greenhouse gases are expressed based on their global warming potential relative to carbon dioxide. Due to rounding, numbers may not add up precisely to the totals provided.

** Under the Carbon Neutral Government Regulation of the Greenhouse Gas Reduction Targets Act, all emissions from the sources listed must be reported. As outlined in the regulation however, some emissions do not require offsets.

BC Hydro greenhouse gas emissions by source for the 2018 calendar year (t CO₂e*)



Total emissions: 33, 615 t CO₂e

Total offsets required: 32,820 t CO₂e

Emissions which do not require offsets: 795 t CO₂e**

Carbon neutral actions

Buildings

BC Hydro owns or leases approximately 236 buildings in more than 80 municipalities across British Columbia, covering more than 350,000 square metres of floor space. We incorporate energy savings opportunities and sustainable design aspects in our capital construction and renovation plans, and life-cycle costing in our project decision making. Our continued investment in new construction, renovations, and capital upgrades ensures lasting energy performance by incorporating energy efficiency measures.

BUILDING DEVELOPMENT (NEW BUILDINGS AND MAJOR RENOVATIONS)

Two of the more significant Properties projects in 2018 were the completion of new field buildings in Victoria and in Whistler. Both of the new facilities were constructed on the existing sites, which supported us avoiding impacts that would have been associated with the development of new locations.

Both new facilities were designed to meet or exceed energy savings targets and include features such as improved building envelope performance, energy efficient lighting, HVAC systems and plumbing fixtures, as well as efficient operational layouts and optimized space utilization.

An example of these design features is the Victoria field building, where the heating and cooling is provided primarily by Air Source Heat Pumps, which are backed up by natural gas boilers. These design features will eliminate CO₂ emissions from natural gas consumption for building heating under normal operating conditions.

In addition to the two new facilities that were completed in 2018, a new field building is under construction in Pemberton and is scheduled to be completed in 2019. It is replacing an old and very inefficient facility on the existing site. Similar to other new buildings recently completed by BC Hydro, the new facility will have a high performing envelope, use energy efficient HVAC systems, be designed to optimize the use of space, energy efficient lighting and plumbing fixtures

BUILDING IMPROVEMENTS (MINOR RENOVATIONS AND BUILDING SYSTEM UPGRADES)

We consider energy efficiency opportunities as part of the project scope for building improvements and upgrades. We have focussed our efforts on buildings with the greatest potential benefit. In 2018, some of the projects we delivered with energy efficiency benefits included:

- At Abbotsford, we replaced the existing roof with a new roof, increasing insulation value of the roofing assembly which is expected to reduce the overall energy demand on the building;
- We completed the final phase of multi-year interior renovations at our Edmonds Campus. These renovations, totalling approximately 560,000 sq. ft., included significant energy efficient upgrades to all lighting fixtures, improved lighting management and control systems, upgrades to low flow plumbing fixtures and improvements to HVAC systems and controls;
- We completed interior upgrade projects at Cache Creek and Hamilton Centre, including installation of energy efficient fixtures for lighting, plumbing fixtures, high wear and recyclable interior finishes and fixtures;

- We completed an interior upgrade of the auditorium at the Edmonds campus, including energy efficient lighting and new movable wall partitions;
- We finalized the construction of new offices in a former warehouse space at the Salmon Arm location. This included installing energy efficient lighting, replacement of old overhead doors with new overhead doors with higher insulation value, and energy efficient plumbing fixtures.



Victoria District Office



Renovations at Hamilton Centre

Vehicle fleet

Our vehicle fleet operates throughout the province to support operations and maintain a safe and reliable supply of electricity, and as of the end of 2018, included more than 2,800 vehicles. We are improving fleet fuel efficiency by regularly replacing vehicles with newer, more efficient models and performing regular maintenance on all of our vehicles. During 2018, the fleet emissions increased by 8% over the previous year. The rise in reported emissions was due to the correction and enhancement to the Fleet Management System which provide accurate apportionment of fuel types and fuel purchases.

Hybrid and electric vehicles are incorporated into our vehicle fleet as part of the regular vehicle replacement process, where cost-effective and appropriate, based on the expected vehicle operating context and the available vehicle capabilities and capacities. Our green fleet consists of 86% electric and hybrid cars, 66% hybrids in the compact SUV class, 7% hybrids in mid-size SUV segment and 14% electric forklifts.

BC Hydro's subsidiary, Powertech, tests high pressure hydrogen components, designs and constructs fueling stations for hydrogen fuel cell vehicles, provides fueling protocols, and operates a fast fill hydrogen fuelling station at their headquarters in Surrey.

BC Hydro has also supported public accessibility through the Electric Vehicle Smart Infrastructure Project. Through a two phase installation project initiated in 2012, BC Hydro will have installed over 50 Direct Current Fast Charger stations in south-west B.C. in 2018 and plans to install additional 23 charging stations by 2020.

Some of measures taken by BC Hydro to reduce emissions include

1. Incorporating new technologies such as hybrids, electric and extended-range electric vehicles.
2. Developing a telematics program that will provide actionable operational data related to fuel use and driver behaviour.
3. Continue to promote ride sharing.
4. Continue to work with governments, business and stakeholders to expand Direct Current Fast Charger station infrastructure in B.C. for public use.
5. Continue to promote the use of shared vehicles across the province to reduce fuel consumption and emissions.
6. Exploring continued contributions to electric vehicle infrastructure development to increase employee adoption, improvement to metering capabilities and expansion to newer fit for purpose products as they come to market.



Chevrolet Bolt vehicle charging



Heavy Hybrid Truck front view



Heavy Hybrid Truck side view

Paper


Since 2010, we have reduced our office paper use by 39%. To keep our paper use low, all network printers and photocopiers are set to double-sided printing by default. We preferentially order recycled stock paper and in 2018, 81% of all paper used at BC Hydro was 100% recycled.

In fiscal year 2019, BC Hydro continued to promote paperless billing to our customers with a focus on consolidated customers. Consolidated customers are those companies or groups with multiple service points across the province. This capability was made possible as a result of an enterprise infrastructure billing project. In the project's inaugural year, we were able to convert about 33,000 consolidated member accounts out of about 106,000, surpassing our fiscal 2019 target of 20% with a strong 31%. As a result, the percentage of total paperless billing customers rose to 54% at end of the fiscal year.

We continue to have one of the highest rates of paperless billing among those utilities surveyed by the Canadian Electricity Association. This adoption rate is facilitated by our efforts to make it easier for customers to pay their bills via the option of detailed email bill notifications including the amount owing, due date and electricity usage.



Electronic billing reduces paper consumption.

	
Bill details	
Nov 10, 2017 to Jan 10, 2018	
PREVIOUS BILLING PERIOD	
Previous bill.....	\$99.08
Payment received Dec 8, 2017.....	-\$99.08
BALANCE FORWARD	\$0.00
ELECTRICITY CHARGES	
Based on Residential Conservation Rate 1101 Nov 10, 2017 to Jan 10, 2018 (1,467 kWh used)	
Basic Charge 62 days @ \$0.18990 /day.....	\$11.77*
ENERGY CHARGES	
Step 1: 1,376 kWh @ \$0.08580 /kWh.....	\$118.06*
Step 2: 91 kWh @ \$0.12870 /kWh.....	\$11.71*
Rate rider 5%	\$7.08*
Regional transit levy: 62 days @ \$0.06240 /day.....	\$3.87*
TAXES ON ELECTRICITY CHARGES	
* GST 5% (GST Registration #R121454151).....	\$7.62
ELECTRICITY CHARGES SUBTOTAL	\$160.11
TOTAL DUE	\$160.11

Paperless customer billing app entry screen.

Other GHG reduction initiatives

In 2018, BC Hydro participated in Compugen's Green4Good program that helps organizations to dispose of their end-of-first-life® (EOFL) IT assets in an environmentally responsible way. Typically 92% of the EOFL assets can be securely refurbished and resold, allowing Green4Good to pay the organization for their serviceable assets. By deferring the manufacture of new IT assets through reuse, a voluntary carbon offset is created that gets registered with the Canadian Standards Association GHG Reductions Registry. These carbon offsets have been verified by an external verifier.

In the past year, 32 tonnes of carbon offsets have been generated by Compugen in BC Hydro's name (through reuse of BC Hydro's end-of-life IT assets)

BC Hydro is working on mitigating sources of greenhouse gas in our operating system. Sulphur hexafluoride (SF₆) and carbon tetrafluoride (CF₄) are potent greenhouse gases used in electrical equipment worldwide which can leak to the atmosphere. BC Hydro is continuing to manage SF₆ and CF₄ releases by prioritizing repairs or replacement of leaking equipment identified in the annual release report. The SF₆ and CF₄ tracking application, which will help ensure accurate accounting of gas releases, is in the final development stages and is anticipated to be rolled out to field crews in calendar 2019. We also continue to work towards our goal of continually reducing emissions from SF₆ and CF₄ and in 2018 our emissions from SF₆ releases improved by 40%.



Adaptation to climate change

BC Hydro is focused on climate change effects on our assets and operations and is currently in the process of developing a climate change adaptation plan. The overarching goal of this plan is to ensure the integration of current climate change science through a coordinated and risk-based assessment of BC Hydro's strengths and vulnerabilities in a changing climate. BC Hydro is committed to understanding the impacts of climate change upon our business and to minimizing the risk of not being sufficiently prepared for climate change.

As part of its climate change adaptation strategy, BC Hydro has undertaken internal studies and worked with some of the world's leading scientists in climatology, hydrology and glaciology to determine how climate change could affect water supply, the seasonal timing of reservoir inflows, and changes we might expect in the future. Specifically, BC Hydro has been a key partner in the Pacific Climate Impacts Consortium (PCIC) since its inception in 2006 and has worked with PCIC to assess changes to the climate of BC over the last century. This work has provided possible climate and hydrological scenarios out to the end of the current century. PCIC completed their first BC Hydro research work plan in 2012 and is now completing an update and extension of that research. Their new four year work plan focusses on fine-tuning climate projections specific to BC Hydro needs, as well as training BC Hydro subject matter experts on integration of the scenarios into future planning and design.

The BC Hydro electricity system is designed and operated to perform safely and effectively across a wide range of conditions and extreme events. BC Hydro's experienced staff are highly trained to

adapt quickly to changing conditions. To battle against the increasingly extreme weather events occurring in British Columbia, BC Hydro is focused on preparing for storms year-round. Using the smart meter network, BC Hydro is introducing new technology and processes to improve response times, some of which includes:

1. Enhanced prediction logic—using an algorithm and the smart meter network—BC Hydro's system can confirm an outage and mark its location, where a dispatcher can then send a crew to investigate and make necessary repairs.
2. New mobile dispatch tools—these tools communicate via satellite and transfer information from the field to the operations centre faster and more frequently, providing more timely updates for customers.
3. Improved meteorology models—this information provides greater insight into where and when a storm might hit, so that BC Hydro can ensure crews are ready to respond.

After the 1998 ice storm in Eastern Canada and US, BC Hydro assessed the transmission network and began to upgrade 230kV and 500kV transmission lines to withstand 1-in-200 year return period ice loadings. The newly constructed lines were designed using reliability based design principles to withstand 1-in-200 and 1-in-100 year return period weather loadings, respectively. Similarly, 500kV and 230kV transmission lines under construction have been designed to withstand 1-in-200 and 1-in-100 year return period weather loadings.



Upgraded Transmission Lines withstand icestorms

Support to CleanBC plan

The government's Climate Action Plan, CleanBC, details how B.C. plans to reduce greenhouse gas emissions by switching from fossil fuels to lower carbon energy. It also describes specific emission reduction actions that will move the province toward its 2030 climate goals. These include cleaner transportation, increased industrial electrification, reduced emissions from forestry, land use and agriculture, and improved community design and services.

By 2030, CleanBC policies require an additional 4,000 gigawatt hours of clean electricity over and above projected BC Hydro demand growth. Through 2030, BC Hydro can meet this increased electricity use with existing and planned clean energy projects along with conservation or demand-side management programs, thus playing a significant role in achieving provincial greenhouse gas reduction goals.

BC Hydro supports CleanBC through its investments in renewable and clean energy projects that involve upgrading large hydroelectric dams and building new infrastructure. Aging infrastructure, a growing population, and a need for more capacity in our system as demand for electricity increases are the main drivers behind our investments. Our investments also recognize and incorporate criteria and decisions to improve reliability, address safety concerns and mitigate environmental effects.

After over seven years of planning and more than four years of construction, we completed the John Hart Generating Station Replacement Project with the three turbines and water bypass facility now operating. It's the largest construction project by dollar value we've ever undertaken on Vancouver Island, and the second largest project we've undertaken in the current era, after Site C. The new facility will generate about 10% more clean

electricity or enough to supply about 80,000 homes. The new facility was designed to benefit not just our customers, but the environment as well. The new water bypass facility within the powerhouse will make sure that if one or all three of the new generators shut down for any reason, downstream river flow can be maintained for fish and fish habitat.

BC Hydro is building Site C to meet the energy and capacity needs of its residential, commercial and industrial customers. Site C will be a third dam and generating station on the Peace River in northeast B.C. Once built, Site C will be a source of clean, renewable and affordable electricity in B.C. for more than 100 years. The facility's six generating units will provide 1,100 megawatts of capacity, and produce about 5,100 gigawatt hours of electricity each year – enough energy to power the equivalent of about 450,000 homes per year in B.C. The project is scheduled to be complete in 2024. As a commitment to providing clean power to the LNG industries in the Peace region, BC Hydro is building a 230kV double circuit transmission line called the Peace Region Electricity Supply (PRES) line.

The independent power sector is an important partner and supplier to B.C.'s clean energy mix. The sector provides power through more than 120 electricity purchase agreements across a wide range of renewable energy projects such as hydro, biomass, wind and solar. Currently, independent power producers provide about 25% of B.C.'s electricity and will continue to help meet B.C.'s electricity needs

TRANSPORTATION

BC Hydro is actively working to remove barriers and support the wider adoption of electric vehicles (EVs). To do this, BC Hydro is developing an integrated customer

EV experience, building out the network of public fast charging stations, ensuring that grid standards and metering support EV load, and looking to eliminate barriers associated with home or workplace charging. In addition to these areas, which are targeted at light duty passenger vehicles, BC Hydro is exploring other transportation electrification opportunities such as technology pilots with buses.

Electric vehicle use is on the rise across the province. In July 2018 BC Hydro completed the second phase of B.C.'s electric vehicle fast charging network, allowing drivers to travel across the province from Tofino to the Alberta border. BC Hydro plans to construct an additional 23 fast charging stations by January 2020 that includes new stations from Kamloops to Prince George and on Vancouver Island from Campbell River to Port Hardy. In addition, there are a few stations that will be twinned in the Lower Mainland and Hope.

Powertech, a world-renowned testing and research laboratory and a wholly owned subsidiary of BC Hydro, is delivering four Hydrogen stations in the Lower Mainland and Vancouver Island with one station already in operation.

In 2018, BC Hydro assisted the Port of Vancouver and DP World to install a shore power connection for container ships at Centerm in Vancouver. The shore power connection allows container ships docked at port to plug into the clean B.C. Hydro grid instead of idling their Diesel engines. With a first successful plug-in taking place in October of 2018, this project has demonstrated how electrification in the marine transportation space contributes to the reduction of GHG emissions in B.C. It is estimated that each large ship at berth connected to the grid for 60 hours will reduce its GHG emissions by about 95 tons.

BC Hydro has also worked closely with TransLink to reduce GHG emissions in the transportation sector through electrification. BC Hydro will help with the implementation of electric bus trial beginning in the summer of 2019. This trial involves two chargers and four electric buses and is a critical next step in the electrification of the fleet.

INDUSTRY

Carbon based fuel use by industry is changing in B.C. While decreasing load from the pulp and paper industry has occurred over time, the oil and gas sector load has been steadily increasing over the past 10 years, especially in northeast British Columbia. Natural gas processing facilities (gas plants) are being constructed by multiple operators in this part of the province. In most parts of North America, gas processing facilities use gas turbines to drive their compressors, using fuel drawn from the gas available on-site. Supplying these plants with electricity and allowing them to transition from natural gas to a clean and renewable energy supply will avoid these emissions and support federal and provincial GHG emission reduction objectives.

BC Hydro has been working to expand the electrical grid in northeast British Columbia to enable gas producers to use clean electricity. One major transmission project, the Dawson Creek–Chetwynd Area Transmission (DCAT) project, was completed in 2015 and construction of the the Peace Region Electricity Supply (PRES) project, began in 2018. These two projects will provide electricity service to natural gas producers in the Montney region of northeast British Columbia, an area where BC Hydro was not previously capable of supplying transmission voltage industrial customers.

The PRES project will increase the capacity of the transmission system by approximately 600 MW, and could avoid up to 2.6 million tons of GHG emissions per

year by avoiding the need for natural gas as an energy source for natural gas production, processing and compression. PRES will enable the electrification of 3.7 billion cubic feet per day of natural gas production and increase reliability for existing DCAT customers.

In October 2018, LNG Canada announced that it is moving forward with its LNG facility at Kitimat. LNG Canada will use grid electricity from BC Hydro for its non-compression energy needs, avoiding up to 60% of GHG emissions from on-site natural gas-fired generation.

BUILDINGS

To encourage low carbon electrification, BC Hydro has been working with EfficiencyBC to develop and launch residential and commercial retrofit programs, which were brought to market in 2018. BC Hydro also plans to develop and launch low-carbon electrification offers to help reach customer electrification opportunities not covered by existing EfficiencyBC programs. These offers and the EfficiencyBC offers will be integrated with BC Hydro's existing demand-side management programs and initiatives to further remove barriers for customers.

REMOTE COMMUNITIES

BC Hydro has been working with remote communities over the past several years to assist in the transition from diesel generation to cleaner generation resources when cost effective. BC Hydro provides electrical service to 14 remote or Non-Integrated Areas (communities not connected to the BC Hydro grid). The energy delivered is approximately 50% diesel generated by BC Hydro and 50% renewable primarily from Independent Power Producers (IPPs).

BC Hydro continues to work with these communities to realize additional diesel reduction through:



Biomass gasifier



Biomass Plant at Kwadacha

1. Capacity building in the communities,
2. Demand Side Management,
3. Renewable heat and heat pumps and
4. Clean energy generation.

One of the recent implementation is a biomass plant in the community of Kwadacha (see attached pics). The plant utilizes beetle kill wood to generate 20% of the community's electricity as well as providing heat for the nearby school and greenhouses.

Emissions and offset summary table

BC Hydro GHG Emissions and Offset for 2018	
GHG emissions created in calendar year 2018	
Total emissions (t CO ₂ e)	33,615 t CO ₂ e
Total offsets (t CO ₂ e)	32,820 t CO ₂ e
Adjustments to GHG emissions reported in prior years	
Total emissions (t CO ₂ e)	-1 t CO ₂ e
Total offsets (t CO ₂ e)	-1 t CO ₂ e
Grand total offsets for the 2018 reporting year	
Grand total offsets (t CO ₂ e)	32,819 t CO ₂ e

Retirement of offsets:

In accordance with the requirements of the Climate Change Accountability Act and Carbon Neutral Government Regulation, BC Hydro (the Organization) is responsible for arranging for the retirement of the offsets obligation reported above for the 2018 calendar year, together with any adjustments reported for past calendar years. The Organization hereby agrees that, in exchange for the Ministry of Environment and Climate Change Strategy ensuring that these offsets are retired on the Organization's behalf, the Organization will pay within 30 days, the associated invoice to be issued by the Ministry in an amount equal to \$25 per tonne of offsets retired on its behalf plus GST.

Executive sign-off:

May 31, 2019



Chris O'Riley, President & COO

