2021 BC TRANSIT

Climate Change Accountability Report

BCTransit

We acknowledge with respect that BC Transit delivers our mission on the ancestral territories of Indigenous Peoples across British Columbia, and their historical relationships with the land continue to this day.

Overview

Through our mission BC Transit provides transportation services our customers can always rely on throughout the Province of British Columbia. For the 131 communities we serve, from small towns to large urban centres, we transport more than 57 million customers in the province every year. From a sustainability perspective, our customers and partners rely on us to perform our services with a climate conscience. This conscience not only guides the delivery of our services and investment decisions but also supports the climate goals of the Province of BC and our local government partners.

We demonstrate responsible stewardship by ensuring our resources are used wisely and develop the most sustainable solutions for the services we provide. We work to ensuring our communities thrive by working closely and seeking vital input with local government and First Nations partners to improve the livability of their communities. A key implementation of these objectives is reducing greenhouse gas (GHG) emissions in both internal operations and the larger provincial community, as well as adapting to a changing climate to ensure safe operations and efficient use of financial and natural resources.

In 2019 we elevated our commitment to addressing Climate Change when we announced our Low Carbon Fleet Program. This program articulates the path we are taking to lower our GHG emissions through the replacement of our fleet and supporting infrastructure with electric technologies. The program also expresses how our investment in Compressed Natural Gas (CNG) buses not only provides for immediate GHG reduction, but creates the avenues necessary to take advantage of sourcing low carbon intensity Renewable Natural Gas to significantly lower our carbon emissions from our CNG fleet. Through these initiatives we are well-positioned to meet GHG reductions targets aligned to CleanBC.

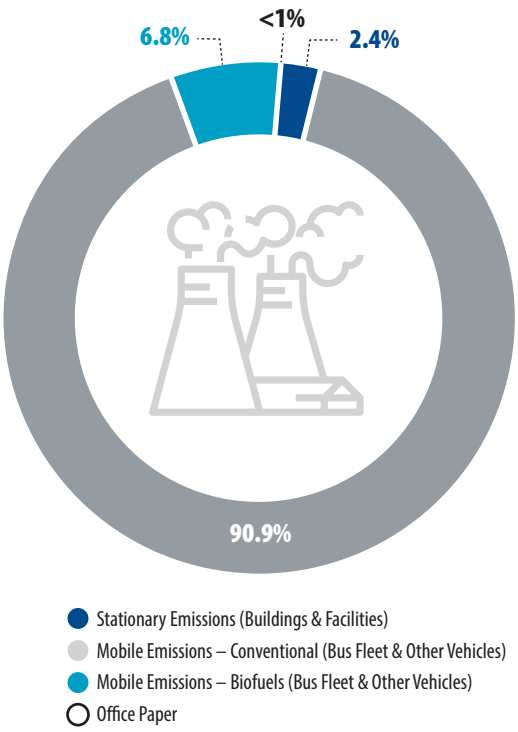
As per Carbon Neutral Government Regulation requirements, this report outlines the current state of BC Transit's GHG emissions inventory, showcases emission reduction projects completed over the 2021 reporting year, activities related to climate adaptation and planned future actions.

2021 Greenhouse Gas Emissions

2021 Emission Profile

Across 2021, 98% of BC Transit GHG emissions were produced by the bus fleet deployed throughout the province. Out of the fleet emissions, 7% of the fuel comes from renewable sources (biofuels), with the remaining being conventional diesel, gasoline and compressed natural gas (CNG).

A comparatively small 2% of GHGs were emitted by in scope[1] stationary sources which is primarily comprised of office space as well as operations and maintenance (O&M) facilities that perform upkeep on the bus fleet. GHG emissions from office paper accounted for a mere 0.01% of total organizational emissions.



Year Over Year Comparison

BC Transit's conventional GHG emissions, excluding biofuels, increased 4% from 57,115[2] tonnes carbon dioxide equivalent (tCO2e) in 2020 to 59,558 tCO2e in 2021.

Total GHG emissions (conventional + biogenic) also increased 4% during the same period from 61,6171 to 63,871 tCO2e.

A factor contributing to the increased year over year emissions was that 2020 total emissions were unusually low due to COVID-19 bus service interuptions. Compared to pre-pandemic 2019 with more stable operations, conventional 2021 emissions have decreased 6%.

An additional external impact that increased GHG emissions comparabily from 2020 was extreme weather events. In particular the heat wave that stretched across the province required more energy and fuel to keep buildings and buses cool for operations and customers.

1 *As per 2020 B.C. Best Practices Methodology For Quantifying Greenhouse Gas Emissions document*

2 *Note the figures published in BC Transit's 2020 Carbon Change Accountability Report were listed as 56,926 tCO2e for conventional emissions and 61,391 tCO2e for total. The updated figure is due to a change in provincial reporting methodology from the 2020 B.C. Best Practices Methodology For Quantifying Greenhouse Gas Emissions document*

Stationary Emissions (Buildings & Facilities)

Between 2020 and 2021, total GHG emissions from facilities increased by 1%. While there have been numerous energy saving projects implemented throughout the year as well as a decrease in the BC Hydro grid connected electrical emissions factor[3], increases in efficiencies of installed equipment have been largely negated by the large heating load required due to increased ventilation requirements of COVID-19. To improve air quality and lower transmission rates, there is more ventilated air moving through each facility. This air must be accordingly be heated or cooled, meaning significantly increased energy load.

Mobile Emissions (Fleet & Other Vehicles)

Between 2020 and 2021, total mobile emissions increased 4%. Mobile emissions are primarily associated with the bus fleet (>99%), but other auxiliary vehicles are also included such as office pool cars, Transit Supervisor vehicles, and maintenance vans. With the large weighting towards bus fleet, the year over year increase is largely attributed to 2020 being an atypical year of low fuel consumption due to service interruptions during the onset of the COVID-19 pandemic. Comparing with pre-pandemic figures in 2019, mobile fleet emissions have decreased 7%.

Cooling requirements for the bus fleet were much higher in 2021 than 2020 due to the atypically hot summer, in particular the heat dome atmospheric event that occurred across much of the province. Cooling degree days[4] across much of the province increased year over year, with some locations in which BC Transit operates seeing increases of over 300%. Bus air conditioning systems require considerably more fuel than heating systems, meaning more fuel was consumed in the bus fleet to maintain a safe internal temperature for riders and operators.

Low carbon biofuels made up nearly 7%[5] of BC Transit's total fleet fuel supply in 2021. While this is a slight decrease of 3% compared to 2020, the volume of biofuels have increased 15% since 2019. This trend is expected to continue with the percentage of biofuels planned to increase significantly in coming years.

Using biofuels means existing fleet infrastructure can be leveraged to minimize GHG emissions while bridging to a future of new technologies via the Low Carbon Fleet Program.

Paper

BC Transit has successfully reduced office paper related GHG emissions to 5.1 tCO2e, down 31% from 2020. This continues a multi-year trend as the 2021 figures reflect a 49% reduction since 2019.

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3 The electrical emissions factor is a quantification of the amount of carbon emitted to produce a unit of electricity. Between 2020 and 2021, this factor decreased as per provincial reporting guidelines

4 Cooling degree days are a measure of how hot the temperature was on a given day or during a period of days

5 Normalized by biogenic vs conventional GHG emissions

Actions Taken to Minimize Emissions

BC Transit has been approaching emission reductions across the organization, including infrastructure installed in its buildings and facilities, new technologies in the bus fleet, supply chain sourcing, biofuels, and operational and procedural changes.

Stationary Emissions (Buildings & Facilities)

A variety of BC Transit retrofit projects, new construction, policies and programs have been initiated, completed or have been worked on in 2021.

BC Transit is in the data gathering stage to develop a Facility Energy Management Strategy. This strategy will identify pathways to decarbonize the future of stationary emissions and align with provincial CleanBC targets. The strategy will include future projects, as well as those already underway such as: a project to assess the replacement of failing transit centre boilers in Kamloops and Vernon with low carbon high efficiency options, electrification of Heating Ventilation and Air Conditioning (HVAC) systems in the Whistler Transit Centre bus wash, and high efficiency parts cleaner replacements in both Victoria Transit Centre and Langford Transit Centre.

New handyDART Facility - LEED Gold

The new construction handyDART facility for the Victoria Regional Transit System will be the first BC Transit building being built to achieve a Leadership in Energy and Environmental Design (LEED) Gold rating. The facility design was finalized across 2021, and is planned to include high efficiency heat pumps, heat recovery systems, bay door air curtains, electric forklifts, and other innovative technologies. The office areas of the new facility will additionally meet Energy Step Code 3, meaning these areas must be up to 40% more energy efficient than base 2018 building code. No fossil fuels are expected to be used in the building operations.

handyDART Facility Rendering

The yard at the new handyDART site is being designed to include charging infrastructure for a fleet of electric buses to be housed at the facility, meaning both the facility and the fleet are being designed to minimize environmental impacts.

Administration Building Renovation

Work continued on the BC Transit Administration Building across 2021, redesigning the existing space to include LED flat-panel lighting, occupancy controls, new high efficiency electric heat pumps and air curtain retrofits. These retrofits will be completed in 2022 and is expected to reduce the amount of energy required to heat the building in the winter, cool it during the summer and illuminate it throughout the year, all while improving employee and visitor comfort.

Recommissioning Program

A 2021 project to recommission HVAC systems across a number of facilities was completed to make more effective use of existing equipment without requiring major retrofits.

HVAC systems repairs and enhancements at transit facilities in Kamloops, Whistler, Vernon, Kelowna, Campbell River and Cowichan were completed including optimal start programs of heating systems, decreases of heating temperatures in low occupancy areas, repairs to sensors and coils, and other HVAC improvements.

In a related project the Kelowna Transit Centre's bay doors were interlocked with the HVAC controls to ensure heating systems were not firing while doors were open.

Lighting Retrofits

LED lighting and control system upgrade projects were completed at the Chilliwack Transit Centre. These upgrades will improve employee and visitor comfort, reduce carbon emissions from operations as well as decrease the frequency of equipment replacement due to the extended lifespan of LED technologies.

Air Curtains and LED paneling at the Victoria Administration Building

Chilliwack Transit Centre Bay Lighting

Whistler Transit Centre Boiler System

Boiler Additive Improvements

A radiant boiler additive which improves heat transfer by reducing surface tension of water in boiler systems was installed at Whistler Transit Centre, informed by a pilot project at transit facilities in Vernon and Kamloops. An analysis of the pilot project yielded averaged boiler GHG savings between the two facilities of 11%. Whistler's installation will be monitored to evaluate energy savings and will inform potential future expansion to additional facilities.

Block Heater Controls

The Kelowna Transit Centre's yard was retrofitted to include block heater control systems so that the bus fleet will only draw electricity shortly before the buses are to depart for service. This project spanned 2020, with 2021 being the first full year the control system was in operation. This retrofit reduces the electrical power associated with unnecessarily heating the engine blocks overnight when the buses will not be in use.

Mobile Emissions (Fleet & Other Vehicles)

Renewable Natural Gas (RNG) is a form of natural gas processed from decomposing organic waste such as food or agricultural waste that would conventionally go to a landfill, meaning it is a carbon neutral fuel rather than a fossil fuel. RNG can typically be used in any application that conventional natural gas is used, whether that is heating a home or being compressed to fuel a vehicle. BC Transit currently operates a fleet of buses that run on conventional compressed natural gas (CNG) that is pressurized to less than 1% of its typical volume.

BC Transit spent 2021 developing an RNG purchase contract to eliminate a significant percentage of GHG emissions from the CNG fleet, with the expectation of RNG delivery in calendar 2022. BC Transit plans for expected reductions from the use of RNG in the near future to reach between 11,000-14,000 tCO2e/year which equates to a 15% to 20% reduction in the total organizational emissions.

Hydrogenation-Derived Renewable Diesel (HDRD) is a type of biofuel distinct from biodiesel in that it can be used at high percentages in conventional diesel engines. BC Transit's liquid fuel supply contract is currently under revision, and is being assessed to raise the percentage of HDRD required to be provided in the overall supply blend.

For each litre of bus diesel replaced with HDRD, more than 98% of the GHG impact is avoided[6]. Therefore by raising the amount of HDRD in the fuel supply blend, overall fleet emissions will subsequently decrease.

Low Carbon Fleet Program

In 2021 BC Transit issued a Request for Proposals (RFP) and awarded a contract for the electrification opportunity analysis to support planning the next battery electric bus deployments for conventional fleet transit systems. The scope includes analysis of energy requirements of the transit system routes, range of the battery electric buses, and infrastructure concept design development for the associated charging. This information is critical for planning battery electric bus deployments. Early deliverables have informed program planning activities,

6 *As per 2020 B.C. Best Practices Methodology For Quantifying Greenhouse Gas Emissions, using biodiesel emissions factor as per direction from Climate Action Secretariat*

the capacity for Battery Electric Buses in BC Transit's transit systems, and different pathways to electrification.

A Request for Information (RFI) for Light Duty Battery Electric Buses was completed to inform the next steps in the procurement of light duty battery electric buses. BC Transit also installed a charging unit to support light duty battery electric bus trials at the existing Victoria handyDART location. Aligned with this, the design of the new Victoria handyDART depot continued to progress with electrification considered in the design to support an initial deployment of six light duty battery electric buses and a future fully electric fleet. The procurement for BC Transit's Integrated Solution for the first 10 Heavy Duty Battery Electric Buses was released in November 2020 and the procurement process progressed significantly through 2021.

BC Transit completed a feasibility study for transit exchange layover charging in 2021. This information will help inform the planning of battery electric buses going forward.

A project to evaluate the feasibility of integrating HDRD into the fleet fuel supply, and the role biofuels will play in the fleet transition, is underway.

2022 will continue the ramp up of the Low Carbon Fleet Program. In 2022 BC Transit expects to award its RFP for the Integrated Solution for the first 10 Heavy Duty Battery Electric Buses and identify additional battery electric bus projects. This initial deployment will inform future projects and allow for the deployment of additional electric buses, beginning the transformation of the operating paradigm to that of a zero emission fleet.

As part of this transformation, infrastructure is a key enabler of electrification and infrastructure projects to support these next deployments will be advanced. Funding and investments to support the low carbon fleet and support local government affordability is being pursued. So too will the work on the next fleet classifications for electrification. The electrification opportunity analysis will proceed with concept designs for the charging infrastructure to support battery electric buses; these concepts will enable thoughtful engagement with local government partners, inform capital plans, and demonstrate a rigorous deployment strategy.

Paper Consumption

Across 2021, BC Transit achieved significant reductions in office paper related GHG emissions. A large component of these reductions can be attributed to BC Transit moving to replace the majority of office paper with the low carbon alternative Sugar Sheet. This paper alternative is manufactured from bagasse which is 100% agricultural fibre waste made out of sugar cane residue after the useful sugars have been extracted. No trees are required in Sugar Sheet production and bagasse would otherwise be a waste product deposited in a landfill, meaning preservation of existing forests, lowered land use and minimized methane emissions from landfill methane emissions compared to conventional paper.

Another component of office paper emission reduction has been BC Transit's continued shift to electronic filing which has decreased overall paper use. A redesign of policies and procedures around electronic filing, interoffice communication and records keeping has allowed for significant reductions in printed materials, meaning there is both less material being printed, and that which is printed has a lower environmental impact than in prior years.

Other Initiatives

Avoided Emissions Quantification

The comprehensive impact of public transit on community GHG emissions are much more than the story told by the emissions associated with the bus and facility infrastructure alone. Transit inherently offsets the use of other forms of transportation and decreases the use of personal passenger vehicles such as cars, trucks and SUVs. By decreasing the use of passenger vehicles, associated GHG emissions are similarly decreased. The modeshift of individuals moving from other forms of transportation to using public transit is known as Avoided Emissions.

In 2021 a project to assess the Avoided Emissions impact of BC Transit operations began, with the goal to quantify high level impacts of service.

GHG Analysis – Capital Planning

BC Transit has begun actively integrating GHG impacts into core business practices by incorporating GHG analysis into business cases and the capital planning process to more effectively inform decisions and drive emission reductions.

Currently operational emissions are assessed for all infrastructure projects, and for larger scale projects the Investing in Canada Infrastructure Program (ICIP) Climate Lens methodology is applied to expand the analysis to additional scope including construction activities.

All new non-revenue vehicles are being evaluated for low or zero carbon options including pool cars, Transit Supervisor vehicles, maintenance trucks and vans, forklifts and scissor lifts.

Green Procurement Guidelines

In an effort to further reduce GHGs from its operations, BC Transit amended its Procurement Policy to include principles of 'green' procurement in late 2020. Subsequently, across 2021 BC Transit developed a Green Procurement Guideline to assist BC Transit employees with their procurement processes.

The Guideline provides an overview of green procurement principles such as the environmental cost of ownership, environmental design, environmental standards and certifications, as well as packaging and waste management. Additionally, the Guideline provides suggested language that can be utilized in solicitation documents and their evaluations.

BC Scrap-it Program

The Victoria Regional Transit System offers a monthly pass incentive for vehicle owners to scrap their older, heavier-polluting vehicles and adopt transit. Six of these eco-passes were issued in 2021. Implementation of this program removed 82.9 tCO_2e that would have otherwise been emitted in 2021.

CleanBC Integration

CleanBC is a plan by the Government of British Columbia to reach the province's climate goals including both GHG reductions and early phase climate adaptation actions.

As a public sector organization, BC Transit has a responsibility to support and adopt governmental climate goals including those outlined in the CleanBC plan. Plans to reduce carbon emissions in both fleet and facilities, as well as develop and maintain climate resilient infrastructure and operations is in alignment with CleanBC.

CleanBC's Transportation Pathway includes the action of "encouraging mode shifting to more energy efficient forms of transport", which means changing individual and business behaviour to switch the method of transportation from low efficiency (such as single occupancy vehicles) to high efficiency (such as walking, cycling or public transit.

BC Transit's core operations are directly aligned with the mode shifting component of CleanBC, with the provincial bus fleet essential to meet the pathway goal of increase the share of trips made by public transit, walking and cycling to 30% by 2030, 40% by 2040 and 50% by 2050.

Climate Adaptation & Risk Management

Infrastructure Assessments

Climate change is expected to impact different parts of British Columbia in a myriad of diverse ways. Adapting to these impacts across the large geographic bounds of BC Transit operations requires a comprehensive understanding of risks in the current state, future state and in-between, as well as how these risks will coincide with existing infrastructure and long term capital plans.

To build a foundation of knowledge, BC Transit initiated a Climate Risk Vulnerability Assessment for ten key facilities across the province. This assessment will use a modified version of the Public Infrastructure Engineering Vulnerability Committee (PIEVC) Protocol to quantify risks and initiate development of mitigation actions and projects to decrease this risk.

A Climate Change Adaptation Roadmap is planned for development in 2022/23, informed by the outputs of the initial Vulnerability Assessment project. With future site-specific investigations this roadmap will lead to forming an implementation strategy of concrete actions.

Climate Resilient Public Sector Buildings Workshop

BC Transit engaged in the Climate Resilient Public Sector Buildings Workshops across 2021 to participate in the development of guidelines, processes, standards and other resources for public sector organizations to plan for and respond to climate change impacts.

Emergency Response

Climate impacts do not only impact organizational infrastructure but also the communities that BC Transit serves. The BC Transit Emergency Management team takes part in Provincial Regional Emergency Operation Centres that respond to events expected to have increased likelihood and magnitude due to the changing climate.

BC Transit was engaged in provincial emergency response across 2021:

- During the 2021 summer heatwave, the bus fleet was used to evacuate vulnerable populations and shelter from the heat with air-conditioning.
- Buses were used by firefighters as a safe shelter to cool down during active fire response.
- During the Lower Mainland flooding in fall 2021, the BC Transit bus fleet was engaged to evacuate people to safe areas.

Declaration Statement

This PSO Climate Change Accountability Report for the period January 1, 2021 to December 31, 2021 summarizes our greenhouse gas (GHG) emissions profile, the total offsets to reach net-zero emissions, the actions we have taken in 2021 to reduce our GHG emissions, and our plans to continue reducing emissions in 2022 and beyond.

By June 30, 2022 BC Transit's final 2021 Climate Change Accountability Report will be posted to our website at www.bctransit.com/corporate-reports

Emissions and Offset Summary Table:

BC Transit 2021 GHG Emissions and Offsets Summary

BC Transit 2021 GHG Emissions and Offsets Summary	
GHG Emissions created in Calendar Year 2021	
Total Emissions (tCO_2e)	*63,871*
Total BioCO2	*4,313*
Total Offsets (tCO_2e)	*1,565*
Adjustments to Offset Required GHG Emissions Reported in Prior Years	
Total Offsets Adjustment (tCO_2e)	*0*
Grand Total Offsets for the 2021 Reporting Year	
Grand Total Offsets (tCO_2e) to be Retired for 2021 Reporting Year	*1,565*
Offset Investment ($25 per tCO_2e)	*$39,125*

Note, BioCO2 is included in Total Emissions but not Total Offsets. Total Offsets do not equal Total Emissions minus Total BioCO2 because offset exempt emissions for buses are included within Total Emissions.

Retirement of Offsets:

In accordance with the requirements of the *Climate Change Accountability Act* and Carbon Neutral Government Regulation, BC Transit (the Organization) is responsible for arranging for the retirement of the offsets obligation reported above for the 2021 calendar year, together with any adjustments reported for past calendar years (if applicable). The Organization hereby agrees that, in exchange for the Ministry of Environment and Climate Change Strategy (the Ministry) 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 27, 2022

Signature **Date**

Erinn Pinkerton *President and Chief Executive Officer*

Name (please print) **Title**

Links to Additional BC Transit Sustainability Information

BC Transit Sustainability
https://bctransit.com/about/sustainability

Government Mandate Letter – 2021/2022
https://www.bctransit.com/documents/1529712549325

BC Transit Service Plan 2021/22 – 2023/24
https://www.bctransit.com/documents/1529712211258

BC Transit 2020 – 2021 Annual Report
https://www.bctransit.com/documents/1529713470619

BC Transit Strategic Planning
https://www.bctransit.com/transforming-your-journey

BC Transit is a member of the Community Energy Association
http://communityenergy.bc.ca/

BC Transit Victoria Regional Transit System is member of BC Scrap It Program
https://scrapit.ca/rebatechoices

BC Transit is a member of the Canadian Urban Transit Research & Innovation Consortium (CUTRIC)
http://cutric-crituc.org/