



The Express Bus to Folly

EV Bus Plans Challenged by Canadian Climate, Costs and Declining Ridership

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THE EXPRESS BUS TO FOLLY

EXECUTIVE SUMMARY

Several of Canada's largest cities have recently purchased all-electric buses and announced plans to buy many more.

Proponents of battery-electric buses claim that they will have lower operating costs than diesel-powered buses due to lower fuel costs and lower maintenance costs. There is no doubt that their initial capital cost is higher. A brand-new diesel-powered bus costs \$500,000 in Canada, half of what most transit systems now pay for all-electric buses.

NGV America, an organization that promotes natural gas-powered vehicles, published its assessment of the cost arguments used by electric bus proponents using data from the actual experience of transit companies in the United States¹. It found that over their lifetimes electric buses are unlikely to be less costly to own and operate than either natural gas buses or diesel buses, especially when factoring in the need for additional buses and costly infrastructure upgrades. The cost disadvantage arises from a number of factors:

- Frequent breakdowns of all-electric breakdowns in some US cities have made them available for service only 63% of the time.
- Due to the limitations of electric bus operating range, electric charging requires multiple hours and multiple sites
- Electric buses can only be operated on certain carefully selected routes
- Electric bus performance worsens considerably in extreme cold or hot weather conditions
- Electric buses have difficulty with battery-powered heating and cooling, requiring a fuel-powered solution; those costs are rarely included in the cost comparisons
- Electric bus advocates fail to evaluate the costs and extent of major electric utility upgrades needed to accommodate an expected surge in electricity transmission and demand for electric buses

¹ <https://ngvamerica.org/wp-content/uploads/2021/02/NGVA-Transit-Full-Study-December-2020.pdf>

Governments, by their direct and indirect subsidies, are biasing the investment decisions of cities and transit commissions and encouraging the purchase of vehicles that never would have been bought if normal economic and financial considerations prevailed. From an economic perspective, this promotes a misallocation of resources that ultimately will make us all worse off. **The fact that this is being done on borrowed money makes the situation even worse.**

The vast investment that many Canadian municipalities are making in light rail and bus transit seems premised on the view that there will be a constantly increased demand for such service.

The Canadian Chamber of Commerce released a study entitled *Canada's Workplace Mobility Trends* in November 2022 in which it analyzed changes in mobility patterns across Canada since the start of the pandemic. It showed that the pandemic produced a large reduction in the percentage of people who commuted to work by whatever means. In Calgary, for example, commuting to work declined by 42% from January 2020 to September 2022.

Public transit ridership has plummeted. According to Statistics Canada², in July 2022 transit agency operating revenues (excluding subsidies) were still under two-thirds (66.1%) of the pre-pandemic July 2019 level.

If all the major Canadian cities carry out their announced plans to spend lavishly on battery electric buses, the total capital cost will approach \$3 billion by 2030. So, what would be the environmental benefits? Canada's total GHG emissions account for only 1.6% of the global total and the total GHG emissions from bus, rail and aviation passenger transportation combined is just over one per cent of Canada's total emissions. In other words, completely eliminating all GHG emissions from buses in Canada would have a vanishingly small impact on the global climate. The expenses incurred represent only symbolic gesturing.

² <https://www150.statcan.gc.ca/n1/daily-quotidien/220920/dq220920c-eng.htm>

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EV BUS PLANS CHALLENGED BY CANADIAN CLIMATE, COSTS AND DECLINING RIDERSHIP

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Several Canadian cities, encouraged by federal and provincial government subsidies, are embarked on programs to purchase significant numbers of all-electric buses. Some, infatuated with the belief that reducing greenhouse gas (GHG) emissions within their urban boundaries to “net-zero” by 2050 will somehow prevent catastrophic climate change, have committed themselves and their residents to eliminating diesel fuel-powered buses altogether. This article will examine the background to, and likely consequences of, these decisions if they proceed.

I will not here discuss the failed logic behind Canadian climate policy. I and others have done so in several other places.

Futile Folly: [Canada’s Climate Policy Goals in the Global Context](#)

A Cruel and Unusual Punishment: [Responding to “A Healthy Environment and A Healthy Economy” #HEHE](#)

BACKGROUND

Based on recent media reports, several of Canada’s largest cities have recently purchased all-electric buses and announced plans to buy several more.



Image licensed from Adobe Stock – representative of busses, not necessarily those acquired by municipalities cited in this report.

Metro Vancouver’s Translink is now taking delivery of 15 battery-electric buses. The transit agency’s long-term goal is to introduce 400 battery-electric buses to its fleet by 2030 and to “fully transition” the fleet to zero-emission vehicles by 2050.

Calgary’s City Council may soon decide to buy up to 259 battery-electric buses. These will cost \$491 million, with the city putting up \$100 million and the Canadian Infrastructure Bank providing \$391 million, \$223 million in grants and \$168 million in loans. Reportedly, the buses alone will cost \$391 million (i.e., roughly \$1 million each) and the balance of the funding will pay for infrastructure.

Edmonton already has 60 battery-electric buses and is adding 20 more.



https://www.edmonton.ca/projects_plans/transit/electric-buses

Winnipeg Transit is adding 100 battery-electric buses to its fleet, aided by the expenditure of \$509 million by three levels of government to purchase both electric and diesel buses.

Toronto Transit Commission, which already has 60 battery-powered buses, is adding 300 more as well as 300 hybrid-electric buses. The 300 new battery electric buses will cost \$1 million each.

Ottawa’s Climate Master Plan, approved by the city’s Council in 2021, calls for the expenditure of \$1 billion on battery-electric buses by 2027, mostly funded by hoped-for grants by the federal and Ontario governments. According to the city, the agreements it hopes to sign with Infrastructure Canada will result in 450 “zero-emission” buses added to

the bus fleet by 2027, with a full electrification of the fleet possible by 2036. That's over \$2 million per bus but includes the recharging infrastructure. If agreements are signed soon, OC Transpo will recommend purchase of 74 battery electric buses and related charging infrastructure as part of the City of Ottawa next annual capital budget.

Montreal's STM now has 42 battery-electric buses of different kinds. It has stated that, starting in 2025 if the technology is available, it is committed to acquiring only fully electric vehicles.

Halifax is in the process of purchasing 60 battery-powered buses, to be delivered in 2024, as part of a \$112 million agreement with the federal and Nova Scotia governments. The city claims that it plans to have a totally electric fleet by 2028.

FINANCIAL AND PLANNING CONSIDERATIONS

Determining the private and social costs of all-electric buses is complicated by the large role that governments play. Proponents of battery-electric buses claim that they will have lower operating costs than diesel-powered buses due to lower fuel costs and lower maintenance costs. There is no doubt that their initial capital cost is higher. **A brand-new diesel-powered bus costs \$500,000 in Canada, half of what most transit systems now pay for all-electric buses.**

It remains to be seen whether the operating costs will be lower than those of diesel-powered buses or of other alternative-fuel buses such as those powered by compressed natural gas. NGV America, an organization that promotes natural gas-powered vehicles, published its assessment of the cost arguments used by electric bus proponents using data from the actual experience of transit companies in the United States³. It found that over their lifetimes electric buses are unlikely to be less costly to own and operate than either natural gas buses or diesel buses, especially when factoring in the need for additional buses and costly infrastructure upgrades. The cost disadvantage arises from a number of factors:

³ <https://ngvamerica.org/wp-content/uploads/2021/02/NGVA-Transit-Full-Study-December-2020.pdf>

- Frequent breakdowns of all-electric breakdowns in some US cities have made them available for service only 63% of the time.
- Due to the limitations of electric bus operating range, electric charging requires multiple hours and multiple sites
- Electric buses can only be operated on certain carefully selected routes
- **Electric bus performance worsens considerably in extreme cold or hot weather conditions**
- Electric buses have difficulty with battery-powered heating and cooling, requiring a fuel-powered solution; those costs are rarely included in the cost comparisons
- **Electric bus advocates fail to evaluate the costs and extent of major electric utility upgrades needed to accommodate an expected surge in electricity transmission and demand for electric buses**

The NGV America paper noted that the availability of significant US state and federal government financial support for electric buses masks the true cost of owning and operating such vehicles. This is perhaps even more the case in Canada. **In addition to the huge taxpayer subsidies that Canadian governments now give to electric buses, the federal government gives EV manufacturers \$30 million per year in tax breaks.**

The perception that electric buses will have lower operating costs is based partly on peoples' expectations as to how governments will manipulate energy supply and prices in future. Climate policy makers seek deliberately to impair investment in additional oil supply development to create an artificial scarcity that drives up oil product prices. They also impose ever-rising carbon taxes on oil products. The case for all-electric buses ignores the unintended effects of current policy efforts to transition to all-renewables electricity generation. If these are successful, the added cost of bulk power storage and other investments needed to maintain the security of electricity supply may raise power rates far higher than they are today, thus increasing the cost to refuel electric buses.

ENABLING INCREASED INTERMITTENT GREEN GENERATION VIA WIND ENERGY STORAGE

Transalta Corporation

PROJECT TYPE	PROJECT VALUE	PROJECT STATUS	LOCATION	FUNDING AMOUNT
Demonstration	\$22,700,000	Active	Pincher Creek, AB	\$11,146,300



Here's a picture of TransAlta's \$16 million, 20 MWh battery energy storage facility being built near Pincher Creek. According to the [Calgary Herald article](#) from which this picture was taken,[6] the project consists of three Tesla lithium ion battery storage groupings and is slightly smaller than a soccer pitch.

Battery life is ~10 years. Recurring investment is required.

<https://blog.friendsofscience.org/2021/05/04/electricity-from-the-sun-reality-versus-fantasy/?highlight=electricity%20from%20the%20sun>

Governments, by their direct and indirect subsidies, are biasing the investment decisions of cities and transit commissions and encouraging the purchase of vehicles that never would have been bought if normal economic and financial considerations prevailed. From an economic perspective, this promotes a misallocation of resources that ultimately will make us all worse off. The fact that this is being done on borrowed money makes the situation even worse.

The electric vehicle industry is being confronted with battery fires in electric cars, scooters and buses. Lithium batteries can reach 2700 degrees Celsius while burning, making battery fires difficult to contain and extinguish. Recently, there have been a number of highly-publicized electric bus fires in France and the United States that were viewed widely on the internet. Fortunately, no one has been injured or killed in an electric bus fire so far, but the speed with which they spread offers a terrifying prospect of how difficult it would be to get all passengers off an electric bus if a fire started while it was operating in traffic.



Source: Inside EV <https://insideevs.com/news/583324/paris-suspends-149-bolloré-electric-buses-after-two-fires/>

Other vehicles are not immune to fire risks, and there is no way yet to assess whether the risks associated with electric buses are worse than those with more conventional buses. **All it would take would be one spectacular incident to raise public concern about the haste with which transit authorities are embracing the new and relatively untried technology.**

The vast investment that many Canadian municipalities are making in light rail and bus transit seems premised on the view that there will be a constantly increased demand for such service. That is not what recent mobility trends show.

The results from Statistics Canada's 2016 census indicated that the proportion of people commuting to work by transit has edged up since 1996, raising from 10.1% in that year to 12.4% in 2016. Transit ridership by 2016 was up to about 20%. **The survey found, but down-played, an even more interesting thing - from 1996 to 2016, the percentage of people driving or being driven to work only went down from 80.7% to 79.5%. People still love their cars!**



Image licensed from Adobe Stock

Transport Canada recently funded a study of Canadian Urban Mobility that was characterized as a review of how prepared Canadian cities were to “facilitate mobility innovation”, a thinly disguised term for switching to public transit. The data used was still based on the 2016 census. The results for each of the major urban areas that is investing in electric buses are summarized in Table 1.

Table 1
Main Modes of Commuting by Percentage (2016)

CITY	CAR OR TRUCK	TRANSIT	WALK	CYCLE
VANCOUVER	67.6	21.4	7.3	2.5
CALGARY	76.8	15.4	5.1	1.6
EDMONTON	82.0	12.0	4.1	1.1
WINNIPEG	78.8	14.0	4.7	1.7
TORONTO	67.7	24.7	5.3	1.4
OTTAWA-GATINEAU	71.5	18.9	6.5	2.4
MONTREAL	69.1	22.8	5.4	2.0
HALIFAX	77.7	12.0	8.1	1.0

Source: Statistics Canada

A mid-2021 Statistics Canada survey shed light on the effects of the COVID-19 pandemic.⁴ In April 2020, the proportion people working from home had increased to 41.4%, and the number of transit passenger trips had declined to 25.7 million. The proportion working from home subsequently decreased to a low of 25.3% in September 2020 before rising to 30.6% by May 2021. Conversely, the number of transit trips increased to a high of 62.9 million in September 2020 before declining to 49.3 million in May 2021.

The Canadian Chamber of Commerce released a study entitled *Canada's Workplace Mobility Trends* in November 2022 in which it analyzed changes in mobility patterns across Canada since the start of the pandemic. It showed that the pandemic produced a large reduction in the percentage of people who commuted to work by whatever means. Mobility declined by 37% from the start of the pandemic to April 2020 and has slowly increased since then, but

⁴ <https://www150.statcan.gc.ca/n1/pub/45-28-0001/2021001/article/00030-eng.htm>

by October 2022 was still 7% below the start of the pandemic. **The national trends, however, are strongly accentuated in the 10 largest downtowns. There, mobility to work declined by an astounding 67% in April 2020 and, while increasing since then remained at 33% below pre-pandemic levels in September 2022.** Table 2 indicates the percentage declines in mobility from January 2020 to September 2022 in the cities making the largest investment in electric buses:

Table 2
Pandemic Inspired Declines in Mobility (percentage)

CITY	DECLINE
MONTREAL	3.5
HALIFAX	6.3
WINNIPEG	10.8
CALGARY	41.6
EDMONTON	43.8
OTTAWA	45.1
TORONTO	46.3
VANCOUVER	47.6

Source: Environics Analytics

Consequently, the pandemic caused public transit ridership to plummet. In early 2020 it went down as much as 85% in Toronto, leading the City to lay off 450 employees and reduce service. The remaining passengers, crowded onto transit vehicles and unable to “socially distance”, felt even more insecure. **In Ottawa, transit planners were counting on ridership to rise to 83% of pre-COVID levels in 2022, but by July 2022 ridership in Ottawa, as in other large Canadian cities, was only back to 63%. According to Statistics Canada⁵, in July 2022 transit agency operating revenues (excluding subsidies) were still under two-thirds (66.1%) of the pre-pandemic July 2019 level.**

⁵ <https://www150.statcan.gc.ca/n1/daily-quotidien/220920/dq220920c-eng.htm>



With a crumbling public health care system, it is curious that public health associations encourage the public to 'use your voice' to advocate to waste billions of dollars on public transit, claiming it is 'good for our planet.' Public transit is useful and important for urban residents, but it does not 'save the planet' in anyway. Certainly, battery electric vehicles are created from some of the most toxic elements mined in the least environmentally responsible ways in developing nations.

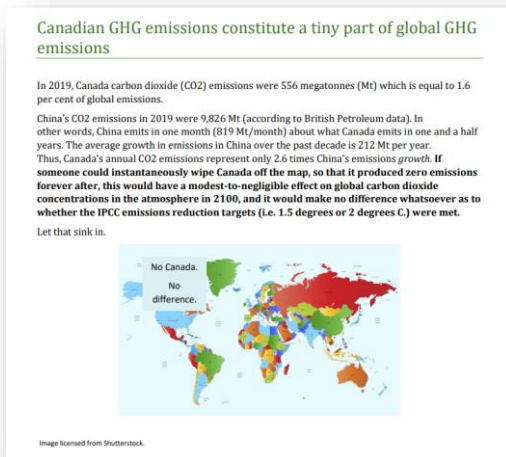
<https://www.cpha.ca/sites/default/files/uploads/resources/climateaction/hgir-public-transit-factsheet-e.pdf>

In many cities, and especially in Ottawa, the work-from-home trend has been twinned by the probably permanent redesign of office buildings in the core. In countless federal government offices, the former private workspaces are gone, replaced by open-concept workstations that are used by the few who actually come to the building and high-tech lockers to store personal effects of the majority who attend only one or two days per week. The Treasury Board is probably delighted by the cost savings, but **the message (i.e., that past projections of rapid growth in transit ridership need to be thrown out the window) has not yet reached the urban planners or transit commission. More people need to ask why governments should still be investing billions of dollars in ultra-expensive transit systems.**

CONCLUSION

If all the major Canadian cities carry out their announced plans to spend lavishly on battery electric buses, the total capital cost will approach \$3 billion by 2030. So, what would be the environmental benefits?

We should recall that Canada's total GHG emissions account for only 1.6% of the global total. Even if they could be



Source: <https://blog.friendsofscience.org/wp-content/uploads/2020/08/Futile-Folly-aug-2020-Reissued-FINAL.pdf>

completely eliminated, it would have no measurable effect on global emissions or temperatures. Further, according to Canada's 2022 National Inventory Report to the United Nations, the total GHG emissions from bus, rail and aviation passenger transportation combined was ten million tonnes in 2019 and six million tonnes in 2020, or just over one per cent of Canada's total emissions. **In other words, completely eliminating all GHG emissions from buses in Canada would have a vanishingly small impact on the global climate. The expenses incurred represent only symbolic gesturing.**

Spending so much to attain so little is like taking the direct, non-stop route to nowhere, the express bus to folly.



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ABOUT THE AUTHOR

Robert Lyman is an economist with 27 years' experience as an analyst, policy advisor and manager in the Canadian federal government, primarily in the areas of energy, transportation, and environmental policy. He was also a diplomat for 10 years. Subsequently he has worked as a private consultant conducting policy research and analysis on energy and transportation issues as a principal for Entrans Policy Research Group. He is a frequent contributor of articles and reports for Friends of Science, a Calgary-based independent organization concerned about climate change-related issues. He resides in Ottawa, Canada. [Full bio.](#)

ABOUT FRIENDS OF SCIENCE SOCIETY

Friends of Science Society is an independent group of earth, atmospheric and solar scientists, engineers, and citizens that is celebrating its 20th year of offering climate science insights. After a thorough review of a broad spectrum of literature on climate change, Friends of Science Society has concluded that the sun is the main driver of climate change, not carbon dioxide (CO₂).

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