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THE GHG REDUCTION IMPACT OF PUBLIC TRANSIT

The world is in the midst of a climate emergency. According to the 2018 report from UN scientists at the Panel on Climate Change[a], global greenhouse gas (GHG) emissions need to be cut in half by 2030 and reach net zero by 2050 to mitigate the effects of climate change by keeping global temperature rise below 1.5°C. Already, the world has warmed by 1°C above pre-industrial levels and will see increases of 3°C or more by 2100 if current trends continue[b]. To limit warming to 2°C, the share of low-emission final energy use in the transportation sector will need to rise from less than 5% today to about 35–65% by 2050.[c]

The transportation sector represents 24% of Canada's carbon emissions, with most of these coming from private vehicles. There are many proven ways to reduce emissions, such as carbon pricing. However, according to the International Energy Agency, "large shifts in transport systems will not be triggered by moderate carbon pricing alone in the short term"[d]. Existing climate policy tools need to be supplemented with targeted investments that will help decarbonize the transportation sector. Investing in public transit must be a key part of a broader policy agenda that helps Canada achieve our climate goals.

Canadian transit systems can reduce emissions in two ways; through service level effects, and by reducing emissions generated by their own vehicle fleet. Public transit's ability to reduce GHG emissions through service levels functions by interacting with the broader transportation sector in three primary ways: less car use as people switch to transit, reduced traffic congestion and shifting land use patterns. Understanding these effects is key to changing how we see transit policy. It's not only about mobility—it can be about emission reduction, too.

THE RIDERSHIP EFFECT

The ridership effect is how choosing to travel by transit avoids the same trip being taken in a private car. For example, when someone chooses to take a conventional TTC diesel bus instead of their car, they can cut their GHG emissions per kilometre by approximately 77%[e]. When someone decides how they will travel (a modal choice), studies indicate that they weigh several things—price, obviously, but also 'hidden costs' like convenience. This crucially important 'convenience factor' involves questions like: how frequently does the service come; how reliable is it to get me to my destination on time; and how long will it take me to get there compared to by car? These service factors are important in understanding why someone might spend significantly more money to own a car rather than take public transit[f].

Operating funding is the key determinant in changing commuter behaviour and encouraging modal shift. Why key? Because it determines how flexible transit systems can be in increasing service level factors that determine how convenient transit is to use, such as accessibility, frequency and reliability. It also allows transit systems to make these service enhancements without having to increase fares, which studies indicate can be counterproductive to ridership growth[g].

When considering public transit's role among climate policy options, it is important to recognize that investment in operations, whether it affects prices or service levels, may be just as important as carbon pricing in changing commuter behaviour. A ridership trends study conducted by the University of Toronto found compelling evidence of service and price impacts on the number of people taking transit[h]. This study indicated that there is a direct correlation between gasoline prices and transit ridership: when gasoline prices go up by 10%, transit ridership increases by 1.44%. On the other hand, the study also indicated that the higher fares go, the lower ridership gets. If households spent 10% more on public transit, ridership would fall by 1.43%.

Another metric to consider is how operating budgets translate into service expansion, and how this in turn translates into ridership increases. Each 10% increase in a transit system's total operating budget is likely to yield a 5.5% increase in 'vehicle revenue hours', which is a way of measuring broad-based service levels. Each 10% increase in these vehicle revenue hours is likely to increase ridership by 10%.

Evidence also suggests that the impacts of policy tools on changing commuter behaviour are also complementary—when combined, they can have greater impact than the sum of their parts[i]. Accordingly, increasing operational funding to improve critical service level outcomes can be a key tool that works with others, such as carbon pricing to increase ridership and reduce GHG emissions.

The more affordable and convenient transit is, the more likely people are to take it. It may seem obvious, but both of these rely on operating funding. Empowering transit systems to help more people choose transit should be a primary concern for policymakers who want to act on climate change.

Operational funding leads to tripling ridership in Brampton

The City of Brampton has taken advantage of the Ontario government's dedicated Gas Tax Funds for Public Transit program to invest in transit operations, including introducing a hybrid-electric ZÜM express BRT service. Since the provincial program was fully implemented in 2006, the City of Brampton has seen ridership grow from 10 million trips to 31 million trips in 2018. While a large part of this increase is due to population growth, ridership per capita has doubled over the last decade, indicating a strong success for the operational investments. BRT Buses run every 7-15 minutes every day of the week, and all ZÜM buses are equipped with on-board technology that can influence traffic signals if a ZÜM bus is running behind schedule. By increasing service coverage, service speed and frequency, Brampton has emerged as a leader for using operational investments to increase ridership.

REDUCED CONGESTION

When someone takes a bus or train, they occupy far less road space than they would have if they had driven their car. The average transit vehicle carries more than 40 people[j], while 84.8% of all commutes by car are done by a single person driving alone[k]. When we talk about large masses of people in cities commuting to work, the fewer of those people taking transit, the worse congestion will get.

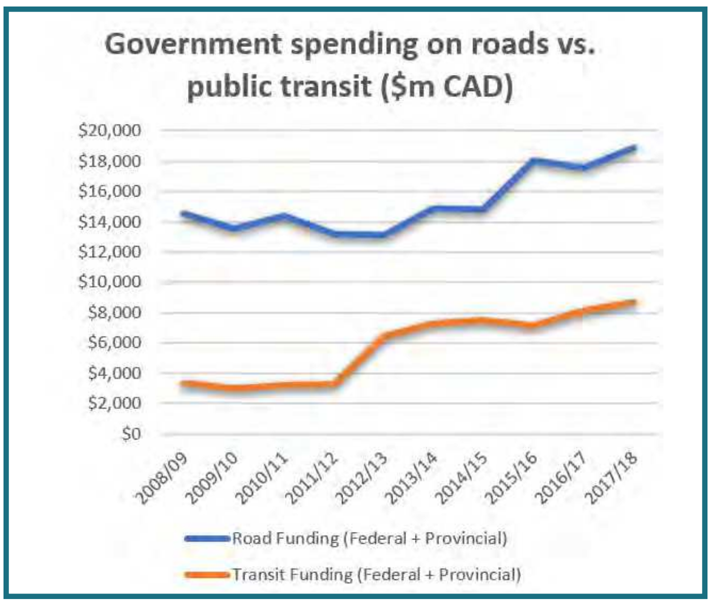
By investing in public transit, we can reduce congestion and eliminate the additional GHG emissions created by stop-and-go idling. A 2016 study conducted by Montreal's transit system found that the STM reduced GHG emissions from congestion alone by about 836,000 metric tonnes of CO_2 per year[l]. An additional benefit is that when travel becomes more space- efficient, it means less public space needs to be afforded to roads and parking, which in turn helps create denser, more sustainable development.

THE LAND USE EFFECT

Transit supports more sustainable and dense cities by clustering economic activity in areas accessible by transit in a process called 'agglomeration'. This process shifts the housing and living patterns in urban areas. Sometimes, this is done through transit-oriented development, which when done right, the World Bank defines as "a planning and design strategy that consists in promoting urban development that is compact, mixed-use, pedestrian- and bicycle-friendly, and closely integrated with mass transit by clustering jobs, housing, services, and amenities around public transport stations"[m]. A 2015 study showed that population density in U.S. cities would be 27% lower if they did not have transit systems to support compact development. In other words, U.S. cities would consume 37% more land to house their current populations.[n]

Denser cities increase the use of public transit, shorten commutes and leads to 'trip-chaining'. This is when people consolidate multiple trips into one, especially when walking to and from transit stations located near hubs of economic activity. Most importantly, it helps to limit urban sprawl, a form of land use that increases trip frequency and length, encourages car use, and increases carbon pollution. Suburban households, for example, use their cars three times as much as households in city centres[o].

Governments in Canada spend billions more on roads, highways and bridges than they do on transit[p]. Yet, there is strong evidence that building new roads does not reduce congestion due to what economics calls the law of induced demand—that building more roads encourages more people to use them[q]. In addition to this huge disparity in subsidy levels, most roads do not have mobility pricing, while transit does. These carrots and sticks induce real behaviour changes which promote the use of cars over transit and urban sprawl over densification.



LEADING THE GREEN MOBILITY REVOLUTION

With Canada being home to innovative and growing firms such as NFI Group (Formerly New Flyer Industries) and Nova Bus, our transit industry is a world leader in manufacturing zero-emission transit vehicles. Montreal and Toronto have a target to green their entire transit fleets by 2040. Vancouver has set the same target for 2050.

The problem is that today, battery-powered electric and other low-carbon technology buses can be up to double the capital cost of regular diesel-powered vehicles. But without additional financial support, transit systems are forced to confront a trade-off. They can reduce emissions by increasing service, but this will likely involve fuels like diesel. Or they can buy electric buses and expand service by less. To maximize GHG reductions, they should be helped to expand service and electrify their fleets concurrently.

KEY IMPACTS OF PUBLIC TRANSIT ON GHG EMISSIONS

Current public transit services in Canada reduce net GHG emissions by between 6.1 and 14.3 megatonnes a year, depending on the land use multiplier estimate used (1.9 – 4)[u]. At the high-end estimate, this is equivalent to taking over three million cars off the road[v].

Switching our current urban transit fleet to low-carbon vehicles could reduce tailpipe GHG emissions by up to an additional 1.37 megatonnes a year[w]. Each additional $250 million invested in transit operations could reduce GHG emissions from cars and trucks by the equivalent of taking between 57,000 to 120,000 cars off the road, depending on the land use multiplier used[x].

One solution would be to have the federal government introduce a voucher program to offset the capital costs of zero-emission vehicles. This would incentivize transit systems to both green their fleets and expand service at the same time. Ideally, these vouchers would be given to registered sellers and would be a point-of-purchase subsidy modeled after the existing iZEV program[r] for electric cars. In February 2020, CUTA submitted a Zero-Emission Bus Procurement Incentive Program (ZEBPIP) recommendation to the federal government as part of the 2020 pre-budget consultation process[s]. This recommendation outlined how such a program could work, and also indicated the need for support to cover costs related to the buildout of charging infrastructure.

Another complementary solution would be for the federal government to partner with provinces and municipalities to help fund transit operations. If transit's operating funding is left primarily to the municipal level, which only has access to 10% of Canada's tax base, its ability to help reduce emissions will be constrained. Municipal budgets are already stretched thin as they are responsible for 60% of the country's infrastructure, with limited revenue tools[t].

During the 2019 federal election, Prime Minister Trudeau pledged an additional $3 billion annual funding for public transit and a permanent transit fund. As this new funding envelope is developed, the scope of federal investments should be widened to include operations. An example of how this could work already exists in Ontario's Gas Tax Funds for Public Transit program, which has a long and consistent history of increasing transit ridership. With federal involvement in funding transit operations, significant reductions in carbon emissions could be achieved by tracking outcomes such as ridership growth and modal share.

ECONOMIC IMPACTS IF INVESTING IN ZEV

Canada's economic position for manufacturing heavy-duty electric vehicles, such as buses is more advanced than it is for passenger cars. We are one of a very small number of countries with multiple heavy-duty electric vehicle manufacturing companies with significant presence. In 2018, 75% of electric HDVs sold in Canada were built by OEMs with global headquarters here[y].

Today, Canada's ZEV economy accounts for about $1.1 billion of GDP and employs around 10 thousand people[z]. Most ZEV-related economic activity (about 92%) comes from providing transport services, such as freight and passenger transport[aa]. According to Navius research[bb], In response to current policy, this economy is projected to grow to $43 billion of GDP and 342 thousand workers by 2040. Under stronger policy direction, however, this could grow to $152 billion and 1.1 million workers by 2040. A recent white paper co-authored by the International Council on Clean Transportation and the Pembina Institute recommended that the federal government develop additional incentives that specifically support the uptake of electric buses by transit agencies and deliver targeted support to Canadian-based manufacturers of heavy-duty transit vehicles[cc]. A vision for Canadian leadership in the green transportation industry should be part of what has been called a 'challenge-driven industrial strategy' by leading policy thinkers[dd].

Canada's transit systems can help reduce carbon emissions in many ways. But one thing is clear, the more it can be a part of daily life for more people, the more it will help meet our climate goals. If our buses carry more people and directly reduce their own tailpipe emissions, transit's ability to be part of the climate solution only grows. For this reason, additional federal policy support for operational funding and stimulating the growth of the Canadian heavy-duty ZEV market and manufacturing base is warranted.

The Canadian Urban Transit Association (CUTA) is the voice of Canada's public transit industry. For additional information including research reports, industry updates, news bulletins and more, please contact us or visit our website.

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