Getting Around Metro Vancouver

A CLOSER LOOK AT MOBILITY PRICING AND FAIRNESS

By Marc Lee

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CCPA
CANADIAN CENTRE
for POLICY ALTERNATIVES
BC Office

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ABOUT THE AUTHOR

MARC LEE is a senior economist in the BC office of the Canadian Centre for Policy Alternatives. From 2009 to 2015, Marc directed the CCPA's Climate Justice Project, and is a co-author of Transportation Transformation: Building complete communities and a zero-emission transportation system in BC. Marc has authored and co-authored numerous publications on climate justice, inequality and public finance, and is a frequent media commentator on public policy issues.

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CCPA
CANADIAN CENTRE
for POLICY ALTERNATIVES
BC Office

520 – 700 West Pender Street
Vancouver, BC V6C 1G8
604.801.5121 | ccpabc@policyalternatives.ca

www.policyalternatives.ca

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Mobility pricing is based on the principle that drivers must pay for what they use, taking away the illusion of there being "free roads."

METRO VANCOUVER IS AT A CRITICAL POINT where congestion-induced delays are the norm on the region's roads and bridges. Congestion problems will only steadily worsen due to a growing population and with every additional car added to the region's roads. Expansion of public transit is widely seen as essential to ensure accessible mobility, but progress has been slow.

Mobility pricing is one solution to such transportation challenges. Broadly defined, mobility pricing includes any fees paid by users to access a city's or region's transportation network, including transit fares, fuel taxes or bridge tolls. Declining technology costs, and widely cited case studies in London, Stockholm and Singapore, have prompted interest from cities around the world in changing the way drivers are charged in order to contain congestion, reduce pollution and raise revenues in support of the transportation system.

Paying for transportation in Metro Vancouver

Mobility pricing is based on the principle that users pay for what they use, taking away the illusion of *free roads*. Newer forms of mobility pricing would shift the way we pay for driving on Metro Vancouver's roads and/or bridges. This is envisioned as both a long-term replacement for fuel tax revenues, which are anticipated to decline as the number of electric vehicles increases, as well as a source of revenue to support the expansion of transit services and infrastructure in the region.

In Metro Vancouver we pay for transportation through a mix of *user fees* (transit fares, fuel taxes, and until recently, tolls on two bridges) and *public subsidies* (property taxes, BC Hydro levy, transfers from other levels of government). However, there are important differences between the treatment of public transit and private vehicles.

Public transit use is clearly subsidized. Fare revenue covers just over half (52 per cent) of the operating cost of providing transit service, reflecting a public subsidy that keeps ridership levels higher and roads less congested.

However, the perception that drivers fully pay for their rides is false. Most of the costs of driving are private costs: buying a vehicle, maintaining it, paying for insurance and filling up the tank. Once these costs have been paid, every trip on the road is free. Only fuel taxes and parking sales taxes represent revenue in support of the transportation network.

Yet, there are substantial public costs for infrastructure and services for cars: building and maintaining roads and bridges, policing and related public services, subsidies to fuel production, and parking spaces. In addition are external costs—those imposed on society as a whole—through carbon emissions, air pollution, sprawl, noise, and the environmental costs of upstream fuel extraction and processing.

What would mobility pricing look like in Metro Vancouver?

Any mobility pricing initiative must contribute to achieve the goals of Metro Vancouver's 2040 regional growth strategy and vision of more compact and complete communities, and transit-oriented development, sustainable economic development, and supporting a range of transportation choices.

An independent commission is currently considering two broad models for Metro Vancouver:

1. **Congestion point charges**, which could result in tolls on most regional bridges and other key choke points on highways.
2. **Distance-based charges**, which could vary by time and location.

Stockholm is an ideal case study for Vancouver because of its similar size and many bodies of water. Stockholm witnessed a drop in traffic volume of about 25 per cent across areas with congestion-point charges.

The first model is informed by real-world experiences, in particular London, Stockholm and Singapore, which have implemented a congestion-charging zone to access their central cities. Details of each scheme differ due to local geography and politics.

Stockholm is an ideal case study for Vancouver because of its similar size (900,000 people in the central city and about two million regionally) with many bodies of water defining the 18 points where there are congestion charges. Stockholm witnessed about a 25 per cent drop in traffic volume across the areas with congestion point charges (the cordon). Of this about 10 percentage points were work trips that switched to transit, while 6 percentage points were changes to discretionary trips—switching destination, reducing frequency or combining trips that previously would have been separate.

A distance-based charge would have a more direct relationship between charges and road space being used. However, a key shortcoming of this system is that it lacks fully implemented real world examples and also raises privacy issues. Technology for distance-based pricing would likely have much higher start-up costs. Metro Vancouver would be a pioneer if it went this route, doubly so given the desire that technology be time- and location-sensitive.

Equity issues for mobility pricing

Mobility pricing will likely fail if it is perceived to be unfair, although fairness is in the eye of the beholder. Through one lens, the "user pays" or "benefits received" principle, mobility pricing can be viewed as equitable because it charges those who are causing the problem and lets price determine access or who chooses to use the roads at peak times.

If all households had equal starting points in terms of income or resources, this might suffice. But of course that's not the world we live in. Thus, ability to pay is another core fairness principle, in particular with regard to low-income households. Fairness for other disadvantaged populations (including those precluded from driving due to age or disability) must also be considered.

That is, mobility pricing will create winners and losers. Importantly, equity outcomes depend both on how pricing is done (who pays) as well has how revenues are used (funding transit and any compensating mechanisms). Three central fairness or equity issues include:

- Impacts on low-income households.
- Impacts on households in different parts of the region.
- Fairness in comparison to public transit, car-sharing and ride-hailing.

A key equity concern is that low-income households who have no other options are either financially harmed or get priced out, while affluent drivers get faster car speeds without noticing much of an impact on their budget. Some people cannot immediately change their behaviour and/or may live in areas where it is hard to even consider alternative modes of getting around. Differential rates based on time of day will adversely affect workers who have little choice over their work hours.

Income equity issues in Metro Vancouver are also related to the high cost of housing. Low-income households may be forced to move further away from the central city to find affordable housing. These households already pay in the form of increased time spent travelling, which can add up to many hundreds of hours per year.

BC's carbon pricing experience holds lessons for mobility pricing. With the carbon tax, a low-income credit is funded out of carbon tax revenues. This should be considered for mobility pricing as well. Using mobility pricing revenues to expand public transit can further address congestion by getting more people out of their vehicles. It benefits most low-income households because they are much more reliant on public transit.

The need to invest in public transit is a central lesson from case studies of mobility pricing in other jurisdictions.

A well-designed cordon/toll on all regional bridges and other key nodes on major highways would address some of this particular fairness concern. That said, bridge tolls or a cordon system could end up charging people for short trips that cross a boundary while not charging longer trips that do not cross a charging boundary.

A per-km charging system is more closely linked to actual use of infrastructure, but could end up charging more to those who live furthest away from work and who live in areas poorly served by public transit. In Metro Vancouver's auto-dependent areas, a major build-out of public transit should thus be part of the revenue recycling regime.

The need to invest in public transit is a central lesson from case studies of mobility pricing in other jurisdictions. The availability of reliable and fast transit options greatly reduces the need to own a car (or multiple cars).

In addition to transit, a future of more seamless connections will also include car-sharing and ride-hailing services. These promote consumer choice but may also cannibalize transit ridership, and therefore contribute to congestion and increased emissions and pollution. Thus, mobility pricing should apply to ride-hailing and car-sharing services.

Conclusion

There are many complications and trade-offs at play in a move towards mobility pricing: different objectives, models, and equity and other policy issues. Getting car drivers and passengers on board is not impossible, but implies a pricing package that is perceived to be effective and fair. At

the end of the day drivers may simply prefer to pay with their time by queuing at regional choke points rather than pay more to relieve that congestion.

If the political hurdles can be overcome, well-designed mobility pricing could be an important part of the solution to manage congestion and accelerate the shift away from auto-dependency. Key directions for any mobility pricing scheme include:

Address low income with a credit—Achieving fair outcomes means a mobility pricing scheme should develop more fine-grained analysis of, and an equity plan for, low-income workers and families. Some portion of revenues will be needed to assist certain people who have no other options than to drive.

Expand public transit first—Investing in public transit is the only way to guarantee accessible mobility for all citizens over the long term.

Level the playing field with other modes of transportation—Any mobility price should apply to ride-hailing and car-sharing services. More efficient modes like transit should also have priority in terms of lanes and traffic signals so that shared transportation is rewarded with faster and more convenient trips.

Introduction

There is general agreement that major new investments in Metro Vancouver's public transit system are needed but paying for them has been a challenge.

AS METRO VANCOUVER'S POPULATION HAS GROWN, so have its traffic congestion problems. Whether it's a long wait to cross a bridge or get on a bus, everyone can relate to the additional time and stress caused by a transportation system under strain. There is general agreement that major new investments in Metro Vancouver's public transit system are needed but paying for them has been a challenge.

Mobility pricing (also known as "decongestion pricing," "congestion charging" and "road pricing") has been touted as a solution to Metro Vancouver's transportation challenges. The current conversation is largely about implementing new charges for private vehicles for use of public infrastructure. Mobility pricing is based on the principle that users pay for what they use, taking away the illusion of "free roads."[1] While it is normal to pay a fare to access public transit, drivers do not pay to access regional roads and bridges (now that tolls on the Port Mann and Golden Ears bridges have been removed). Success stories in London, Stockholm and Singapore, along with declining technology costs, have prompted interest from cities around the world to change the way drivers are charged.

In Fall 2017, TransLink and the Mayors' Council (the authorities responsible for Metro Vancouver's transportation network) appointed a Mobility Pricing Independent Commission (MPIC), tasked with evaluating and making recommendations for Metro Vancouver. Its final report is due in Spring 2018. Any new direction for mobility pricing in Metro Vancouver will likely require the support of the BC government in the form of changes to TransLink's governing legislation. The MPIC's work is meant to support three central objectives:

- Managing congestion.
- Promoting fairness.
- Supporting investment in the transportation system.

The relationship between car-oriented travel and public transit is critical to each of these goals. This report closely examines the main equity and fairness issues around mobility pricing. In addition, environmental impacts and greenhouse gas emissions are not mentioned as key objectives for the MPIC but must be part of a thorough evaluation. Our previous climate justice work on transportation emphasizes making structural changes in order to develop complete communities (defined by short distances between where people live, work, shop and access public services)

1 Gordon Price, "Road pricing: What's not to love?" *Vancouver Sun*, November 25, 2013, http://www.vancouversun.com/opinion/op-ed/Road+pricing+What+love/9211911/story.html

and repurposing road lanes and parking spaces in favour of low-carbon, higher-efficiency modes of transportation.[2]

The focus of the MPIC's work has largely been Metro Vancouver's growing congestion challenges. Congested roads have obvious costs like lost time due to delays, damage to property, and injuries and death due to accidents. Congestion is also costly from a business perspective, reducing efficiency and productivity in the regional economy. A 2015 study put the costs of congestion in Metro Vancouver at $500 million to $1.2 billion per year.[3] With little to no ability to build our way out of this problem by increasing road capacity, urban planners are looking at mobility pricing as a means of reducing congestion.

Public opinion research done for the MPIC found that 89 per cent of residents are frustrated by delays due to congestion and 80 per cent are frustrated with the unpredictability of travel times.[4] Willingness to pay for reduced congestion and increased transit service is another matter. Some 62 per cent thought it would be a "good idea to study ways to change mobility pricing in the region," but faced with a specific proposal and a "no" campaign support could plummet. Public perceptions around equity and fairness, in particular, are likely to make or break any mobility-pricing scheme in terms of acceptability. Thus, it's important to get the details right.

Public perceptions around equity and fairness, in particular, are likely to make or break any mobility-pricing scheme in terms of acceptability.

The next section reviews how we currently pay for transportation in Metro Vancouver, followed by what mobility pricing might look like in the region, and a discussion of the main equity considerations. Mobility pricing can be effective, but attention must be given to the equity aspects of whichever design is chosen.

2 Patrick Condon, Eric Doherty, Kari Dow, Marc Lee and Gordon Price, *Transportation Transformation: Building complete communities and a zero-emission transportation system in BC*, April 2011, https://www.policyalternatives.ca/transportationtransformation.

3 Benjamin Dachis, "Tackling Traffic: The Economic Cost of Congestion in Metro Vancouver," C.D. Howe Institute, March 2015, https://www.cdhowe.org/public-policy-research/tackling-traffic-economic-cost-congestion-metro-vancouver.

4 Mobility Pricing Independent Commission, *Moving Around Metro Vancouver: Exploring New Approaches to Reducing Congestion*, October 2017, https://www.itstimemv.ca/uploads/1/0/6/9/106921821/its_time_e1_research_report_-_moving_around_metro_vancouver_-_oct_24.pdf.

How do we pay for transportation in Metro Vancouver?

Newer and more sophisticated forms of mobility pricing would shift the way we pay to drive on Metro Vancouver's roads and bridges.

TRANSPORTATION IS ALREADY PRICED IN VARIOUS WAYS in Metro Vancouver. Broadly defined, mobility pricing includes all fees paid by users to access the transportation network, including public-transit fares, fuel taxes, bridge tolls and parking sales taxes. Newer and more sophisticated forms of mobility pricing, as discussed in this paper, would shift the way we pay to drive on Metro Vancouver's roads and bridges. Proponents envision this as both a long-term replacement for fuel-tax revenues, which are anticipated to decline as electric-vehicle use becomes widespread, and a more immediate source of revenue to support the expansion of transit infrastructure and services in the region.

TransLink is the regional agency responsible for both public transit and 2,400 km of major roads in Metro Vancouver. Since its inception in 1999, the authority has overseen a significant expansion of regional rapid transit including the Millennium, Canada and Evergreen SkyTrain lines, and reinvestment in and replacement of the bus fleet. Federal and provincial governments have contributed capital funding to major new infrastructure projects, but do not provide ongoing operating funding.

TransLink's three major revenue sources are transit fares (36 per cent of revenues in 2016), fuel taxes (28 per cent) and property taxes (24 per cent). Smaller revenue sources include a regional parking sales tax[5], a levy on BC Hydro bills[6], and an annual subsidy from the District of Mission for the West Coast Express commuter train. In recent years, tolls on the Golden Ears bridge were another revenue source, however, they were ended by the new provincial government on September 1, 2017.

Fuel taxes are an indirect form of mobility pricing. They have increased from eight cents per litre on gasoline sold in Metro Vancouver in 2000 to a current 17 cents per litre. Fuel tax revenues, however, have declined as a share of overall TransLink revenues in recent years, reflecting the

5 Parking spaces are taxed at a rate of 21 per cent.

6 The levy of $1.90 per month per household is a legacy of BC Hydro providing electricity for the transit system's electric streetcars and trolley buses.

gradual shift away from travel by car to other modes of transportation, as well as improvements in fuel efficiency. This trend will accelerate as electric cars achieve a greater share of the market in the coming decades.

Tolls are most similar to the mobility pricing options discussed in this paper. They were intended not as congestion-reducing measures but to recoup the capital and operating costs of the Golden Ears bridge (run by TransLink) and the new Port Mann bridge (run by the BC government). BC's former tolling policy was widely viewed as unfair because it applied to only two bridges in the entire region and led many to shift to untolled crossings. After tolls were removed on September 1, 2017, traffic jumped 27 per cent and 28 per cent on the two bridges compared to a year earlier.[7]

In neither case did toll revenues come close to covering the annual costs of the new bridges. For the Golden Ears bridge, there was $52 million in 2016 tolling revenue while total expenditures (including payments to the private operator under a public-private partnership contract) were much higher, at $95 million.[8] Negotiations are under way between TransLink and the BC government to address the revenue losses associated with the removal of tolls, including the BC government potentially assuming ownership of the bridge.

Mobility pricing is a potential revenue source for Phase 3 of the Mayors' Plan and further phases of transportation investment.

Looking forward, the main focus for transportation planning in Metro Vancouver is the 2014 plan from the Mayors' Council on Regional Transportation, *Regional Transportation Investments: A Vision for Metro Vancouver* (often referred to as the Mayors' Plan),[9] a $7.5-billion capital plan that aims to keep up with population growth by upgrading and building new infrastructure. This includes plans to build a new Pattullo bridge and add substantial transit capacity, including an extension of the Millennium Skytrain Line along Vancouver's heavily used Broadway and two new light-rail lines in Surrey, among other upgrades.

Federal and provincial contributions will cover a large share of the upfront capital costs of the Mayors' Plan and the BC government recently pledged to pay 100 per cent of the costs of the new Pattullo bridge. TransLink must pay a share of the capital costs as well as the full operating costs of new infrastructure and services. A new deal between TransLink and the BC government recently approved a region-wide development cost charge on new construction and an increase in the parking sales tax from 21 per cent to 24 per cent. TransLink will also modestly increase transit fares and property taxes to support Phase 2 of the Mayors' Plan.

Who's subsidizing whom?

Metro Vancouver's transportation network of roads, bridges and public transit is financed through a mix of *user fees* (transit fares, fuel taxes, tolls) and *public subsidies* (property taxes, BC Hydro levy, transfers from other levels of government). However, there are important differences between the treatment of public transit and private vehicles.

7 Jennifer Saltman, "Metro Vancouver bridge traffic continues to shift a month after tolls removed," *Vancouver Sun*, October 3, 2017, http://vancouversun.com/news/local-news/metro-vancouver-bridge-traffic-continues-to-shift-a-month-after-tolls-removed.

8 TransLink 2016 Year-End Financial and Performance Report https://www.translink.ca/-/media/Documents/about_translink/corporate_overview/corporate_reports/quarterly_reports/2016/Financial_and_Performance_Report_31_12_2016.pdf.

9 https://tenyearvision.translink.ca/downloads/10%20Year%20Vision%20for%20Metro%20Vancouver%20Transit%20and%20Transportation.pdf.

It is clear that public transit in Metro Vancouver is subsidized: fare revenue covers just over half (52 per cent) of operating costs, a public subsidy that keeps ridership levels higher and roads less congested. This is similar to subsidies in Ottawa, Calgary and Montreal, higher than Edmonton's (43 per cent) and lower than Toronto's (65 per cent).[10] Riders already face a mobility price through transit fares, including some distance-based pricing for rapid transit trips (on SkyTrain and SeaBus) that cross zone boundaries.

The perception, however, that drivers fully pay for their rides is false. Most of the costs of driving are private: buying a vehicle, maintaining it, paying for insurance and filling up the tank. Once these costs are paid, every trip is "free." Only fuel taxes and parking sales taxes represent revenue in support of the transportation network. Yet, there are substantial public costs for infrastructure and services for vehicles: building and maintaining roads and bridges, policing and related public services, subsidies for fuel production, and providing parking spaces. In addition, there are external costs—imposed on society as a whole—including carbon emissions, air pollution, urban sprawl, noise, and the environmental costs of fuel extraction and processing. These external costs can account for about 40 per cent of the total price of driving, according to a review of transportation costs in North American cities.[11]

The perception that drivers fully pay for their rides is false. Most of the costs of driving are private. Yet, there are substantial public costs for infrastructure and services for vehicles.

Together, these public and external costs are much higher than the fuel and parking taxes paid by drivers. A study conducted for TransLink estimated the total public subsidies and external costs for cars in Metro Vancouver at $2.9 billion per year plus another $690 million for trucks in 2013.[12] In contrast, combined fuel and parking sales-tax revenues that year were just over $406 million.

An apples-to-apples comparison is challenging because public transit and driving have different cost-benefit profiles. Indeed, many people do not have the option of driving due to disability, age or low income. In general, it makes more sense to subsidize public transit because such investments have many positive social effects including increased convenience, speed and comfort for transit users as well as improved road safety, and societal benefits such as reduced pollution, improved public health, and land use and economic development opportunities.[13]

10 Vancouver data have been estimated by the author of this paper. Data on other cities are from Nathan Pachel, *2017 Transit Report Card of Major Canadian Regions*, August 2017, https://sites.google.com/a/nathanp.org/document-archive/Reports/2017%20Transit%20Report%20Card%20of%20Major%20Canadian%20Regions.pdf?attredirects=0&d=1.

11 Todd Litman, 2011, "Transportation Cost Implications," in *Transportation Cost and Benefit Analysis*, second edition, Victoria Transport Policy Institute, http://www.vtpi.org/tca.

12 TransLink, Transportation Funding: Regional Transportation Strategy Backgrounder #10.

13 Todd Litman, *Evaluating Public Transit Benefits and Costs: Best Practices Guidebook,* Victoria Transport Policy Institute, updated 2017, http://www.vtpi.org/tranben.pdf.

What mobility pricing could look like in Metro Vancouver

ROAD PRICING HAS LONG BEEN VIEWED by regional planners as a means of meeting the twin goals of managing traffic and raising revenues. This goes back to the *Transport 2021* plan for regional transportation, jointly developed by the Greater Vancouver Regional District (now Metro Vancouver) and the BC government, and released in 1993.[14] At the time, Metro Vancouver had the highest per-capita car ownership in North America and transit was not expanding as specified in the regional planning framework, the *Livable Region Strategic Plan*.

Anticipated population growth in Metro Vancouver could lead to even more cars on the region's roads.

Moving forward today, any mobility-pricing initiative must help achieve the goals of the 2040 regional growth strategy, which envisions more compact and complete communities with transit-oriented development, sustainable economic development and a range of transportation choices.[15] Two principal strategies set out in the plan are to:

1. "coordinate land use and transportation to encourage transit, multiple-occupancy vehicles, cycling and walking."
2. "coordinate land use and transportation to support the safe and efficient movement of vehicles for passengers, goods and services."

Anticipated population growth in Metro Vancouver could lead to even more cars on the region's roads. Between 2001 and 2016, the total number of registered vehicles grew by 37 per cent, or 441,000 vehicles, for a total of 1.6 million vehicles in 2016.[16] These figures are for Metro Vancouver only and do not include vehicles that come into the city from Squamish, Abbotsford and Chilliwack, for example. This increase in vehicle use was much greater than the regional population growth of 22 per cent that occurred during the same period of time.

14 Executive summary recommendations 2.10 to 2.14, *Transport 2021: A Long-Range Transportation Plan for Greater Vancouver*, Greater Vancouver Regional District and the Province of British Columbia, 1993, http://www.metrovancouver.org/about/library/HarryLashLibraryPublications/TRANSPORT-2021-Report-A-Long-Range-Transportation-Plan-for-Greater-Vancouver.pdf.

15 *Metro Vancouver 2040: Shaping Our Future*, updated 2017, http://www.metrovancouver.org/services/regional-planning/PlanningPublications/RGSAdoptedbyGVRDBoard.pdf.

16 Metro Vancouver, "Total number of registered vehicles, 2001–2016," http://www.metrovancouver.org/services/regional-planning/data-statistics/annual-planning-data/Pages/default.aspx.

As former Vancouver city councillor Peter Ladner wrote: "If the 1.1 million people coming here in the next 30 years match today's patterns of car ownership, we will have to find road and parking space for 730,000 more cars. Parked bumper to bumper that many cars would reach from Horseshoe Bay to Sault Ste. Marie Ontario. This is physically and financially impossible."[17]

Traffic pattern research for the Mobility Pricing Independent Commission (MPIC) identified the most congested parts of the region: [18]

- Travel to and from downtown Vancouver.
- The Massey Tunnel and bridges crossing the Fraser River.
- Bridges on and around Richmond, Vancouver and the airport.
- Major arterials in Vancouver and Burnaby.
- Travel to and around regional urban centres such as New Westminster, Surrey City Centre, Metrotown in Burnaby and Richmond City Centre.
- Bridges to and east-west traffic from North Vancouver and West Vancouver.
- Travel to and from Port Moody, Coquitlam and Port Coquitlam.
- Highways 1 and 91.

The MPIC also published an evaluation of eight possible mobility pricing formulations and more recently has narrowed its focus to two models that best meet the commission's objectives:[19]

- A series of congestion point charges (or tolls) for entering or leaving a defined area.
- Distance-based (or per-km) charges that vary by time of day and location.

Within each model type there are a few ways they could be implemented. These were the subject of a series of examples published to inform public engagement work,[20] and they are discussed below. However, it is unclear whether a specific formulation will be recommended when the commission reports back in May 2018.

Traffic pattern research for the Mobility Pricing Independent Commission identified the most congested parts of the region.

The two models above align with preliminary thinking in the Mayors' Plan, which briefly cited two potential models for consideration in its shortlist of funding options: $2 to $3 tolls on all regional bridges; alternatively, a 2 to 5 cent per km system-wide charge.[21]

How revenues are spent is a major consideration in terms of impact on transportation and political acceptance. While transit investment is stated as a top objective, a reduction in the fuel tax is being considered as a compensation mechanism. The Mayors' Plan suggested that per-km charges could be accompanied by a reduction of 6 cents per litre in fuel tax. Based on 2016 TransLink revenues such a reduction would cost about $140 million per year. Some caution is needed here so as not to undercut carbon pricing, which is aimed at reducing vehicle greenhouse gas emissions.

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17 Peter Ladner, letter to editor printed in the Vancouver Sun, reposted on Price Tags, February 15, 2014, https://pricetags.wordpress.com/2014/02/15/ladner-lettter-1-is-translink-a-success/

18 Mobility Pricing Independent Commission, *Moving around Metro Vancouver: exploring new approaches to reducing congestion, October 2017*, https://www.itstimemv.ca/uploads/1/0/6/9/106921821/its_time_e1_research_report_-_moving_around_metro_vancouver_-_oct_24.pdf

19 Mobility Pricing Independent Commission, *Phase 1 Project Update: Full Report, January 2018*, https://www.itstimemv.ca/uploads/1/0/6/9/106921821/its_time_-_phase_1_full_report_-_final_-_digital_version.pdf.

20 Mobility Pricing Independent Commission, *Decongestion Charging Examples, Public Engagement Phase Two*, https://www.itstimemv.ca/uploads/1/0/6/9/106921821/decongestion_charging_examples.pdf.

21 Mayor' Plan "Appendix F: How to Fund," https://www.translink.ca/-/media/Documents/about_translink/governance_and_board/mayors_vision/mayors_council_vision_appendices_june_2014.pdf. Other options included a 0.5 % regional sales tax, a vehicle registration fee, a carbon tax, land value capture, and mobility pricing. Their option of a regional sales tax notably failed to gain approval in a referendum.

There are a number of design considerations that would affect total revenues. In addition to time and location, different rates could be levied based on:

- Type of vehicle (including length and/or weight) in order to charge more to vehicles that have poorer environmental performance or cause greater we ar and tear on roads.
- Commercial and freight vehicles in order to encourage movement of goods in off-peak hours.
- High-occupancy vehicles, including buses, ride-hailing and car-sharing vehicles.

The start-up and ongoing operating costs of whatever system technology is chosen must be better understood to determine the net revenues. Moreover, rates could be regularly revisited to ensure traffic flow objectives are being met as is the case in Singapore. Daily or weekly maximum charges could also be applied. Finally, whether and how to charge visitors driving in the region should be considered. Getting these details right will be important to whether mobility pricing can pass the key test of political acceptability.

Congestion point charges/tolls

This model is informed by real-world examples, in particular in London, Stockholm and Singapore, which each have implemented a congestion-charging zone in their central areas. The details of each scheme differ due to local geography and politics. A review of the experience in these three cities by the US Department of Transportation notes: "Area-wide pricing in Singapore, London and Stockholm resulted in 10 to 30 per cent or greater reduction in traffic in the priced zone and has sustained the reductions over time. The speeds at which cars were able to travel increased significantly within the zone as well as outside along approach roads."[22]

"Area-wide pricing in Singapore, London and Stockholm resulted in 10 to 30 per cent or greater reduction in traffic in the priced zone and has sustained the reductions over time."

— US Department of Transportation

Metro Vancouver's geography includes a large number of water crossings that affect regional travel patterns. Four variations of tolls that could be charged for crossing certain regional boundaries are under consideration by the MPIC:

A **Crossing into central Vancouver**. This could mean only the downtown peninsula or a potentially broader area bounded, for example, by Broadway to the south and Main Street to the east.

B **Crossing into the Burrard Peninsula** (i.e. crossings over water into Vancouver, Burnaby and New Westminster, but not crossings from Delta to Richmond).

C **Crossing all major bridges** and going through the Massey Tunnel.

D **Passing through key congestion hot spot**s on major highways and near regional centres. This option is similar to the US practice of implementing high occupancy toll lanes where faster access would be provided and other traffic would divert to free crossings via alternate routes.

Metro Vancouver's geography and the location of congestion problems point to Option C as a logical approach. Tolls for all major bridges and the Massey Tunnel could be supplemented with elements of Option D with additional tolling points at other key highway hot spots. The downside of Option A is that it would fail to address the widespread congestion across the region as a

22 Kiran Bhatt, Thomas Higgins and John T. Berg, *Lessons Learned From International Experience in Congestion Pricing*, prepared for the US Department of Transportation, August 2008, https://ops.fhwa.dot.gov/publications/fhwahop08047/Intl_CPLessons.pdf.

whole. Option B is an approach that falls midway between A and C and reflects the presence of superior existing rapid transit options within Vancouver, Burnaby and New Westminster.

The Association of Consulting Engineering Companies of British Columbia and transportation economist Robin Lindsey of the University of British Columbia (UBC) have proposed tolling major bridges and other nodes (most similar to Option C). Lindsey argues that tolling all major bridges "would intercept a large fraction of total traffic, and since no toll-free alternative land routes exist, there would be no significant problems with traffic diversion." Such a plan would arguably be geographically equitable and have the potential to result in significant emissions reduction and revenue generation.[23]

This formulation would be similar to Stockholm, which is a useful case study when thinking about Vancouver. It is a similar size (900,000 people in the central city and about two million regionally) and has many bodies of water that help define the 18 points of the city's charging cordon. In contrast, the London and Singapore congestion zones are smaller and are aimed at the central business district. Vehicles in Stockholm are charged when crossing the cordon in both directions. Rates vary by time of day, with no charge on weekends or off-peak times (6:30 p.m. to 6:30 a.m. weekdays). The cost for crossing the cordon during peak times ranges from 1 to 2 euros (approximately $1.50 to $3) to a maximum of 6 euros per day ($9). Cameras capture license plate numbers and drivers are sent a monthly bill.

Stockholm witnessed a drop in traffic volumes crossing the cordon of about 25 per cent. Drivers of commercial vehicles also modified their routes in order to cross the cordon less often.

Following implementation of the system in 2006–2007, Stockholm witnessed a drop in traffic volumes crossing the cordon of about 25 per cent. Of the 25 per cent drop, about 10 percentage points represented work trips that switched to transit and another 6 percentage points were changes to discretionary trips—switching destinations, reducing frequency or combining trips that previously would have been separate. Many of the affected drivers initially crossed the cordon three days or less per week.[24] Thus, it is important to recognize that not all trips are work trips, and there are many ways that drivers adapt to a congestion charge. Drivers of commercial vehicles also modified their routes in order to cross the cordon less often.

Stockholm is also an interesting case study for political reasons. The city tested the cordon system for six months in 2006 and then put the system to a successful referendum before it was fully implemented in 2007. The system initially faced public opposition, but has since been supported by two-thirds of the population.[25] According to a review of mobility pricing systems by the International Council on Clean Transportation, the system has been "extremely cost-effective." Its primary benefits are shorter travel times (valued at US$85 million per year), increased road safety (US$18 million per year) and health and environmental benefits (US$13 million per year).[26]

Figure 1 shows what a Stockholm-style cordon in Metro Vancouver might look like based on major regional bridges and the Massey Tunnel. To increase coverage, other key nodes could include roads into UBC, along Highways 1 and 7A, and on the bridges and viaducts into downtown Vancouver. Alternatively, these bridges and nodes could form the basis of zones similar to those used for SkyTrain and SeaBus.

23 Robin Lindsey, "Prospects for Urban Road Pricing in Canada," Brookings-Wharton Papers on Urban Affairs, 2008, 235–93, https://www.researchgate.net/publication/236820556_Prospects_for_Urban_Road_Pricing_in_Canada.

24 Summarized in Jonas Eliasson, The Stockholm Congestion Charges: An Overview, Centre for Transport Studies Stockholm, 2014, http://www.transportportal.se/swopec/cts2014-7.pdf.

25 Eliasson, 2014.

26 International Council on Clean Transportation, Congestion Charging: Challenges and Opportunities, 2010, http://www.theicct.org/sites/default/files/publications/congestion_apr10.pdf.

Figure 1: Metro Vancouver bridges and Massey tunnel

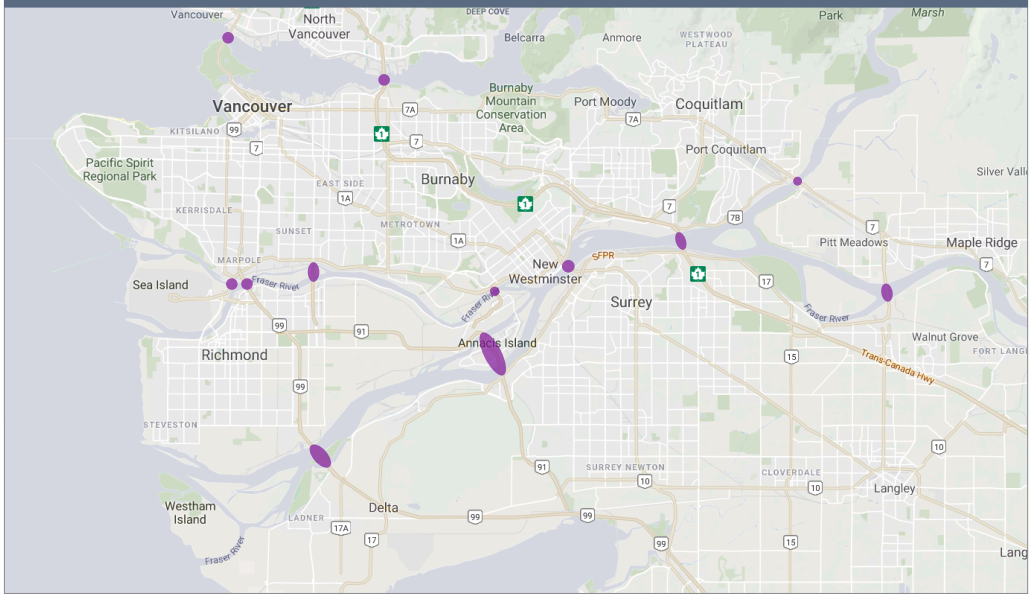
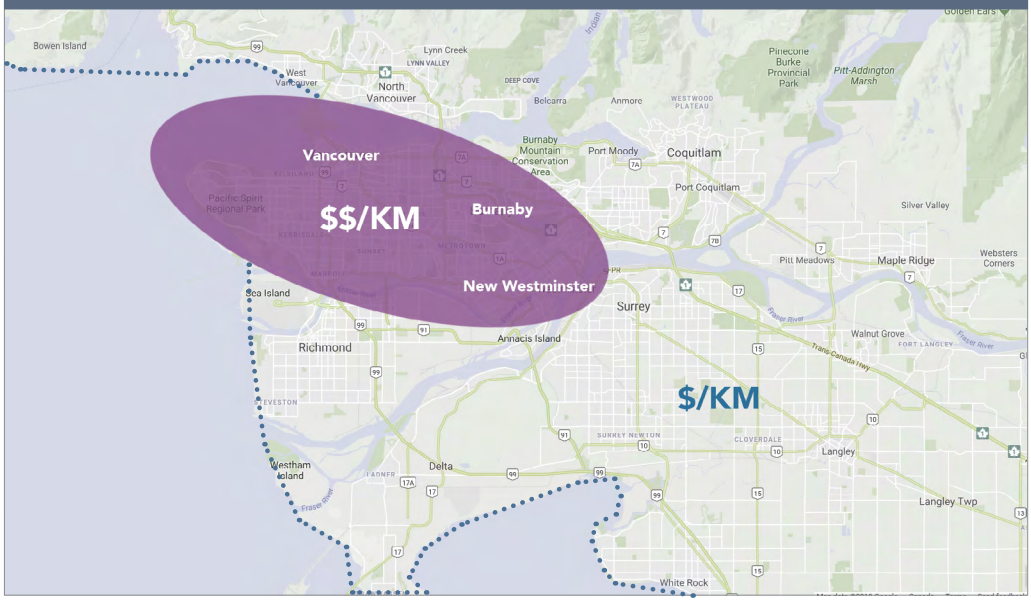


Figure 2: Two zone distance-based charge example



These figures are based on examples from the Mobility Pricing Independent Commission. The first shows a pricing scheme based on tolling major regional bridges. The second would apply a per-km fee for all driving in the region, with a higher fee for driving in the Burrard Peninsula. These examples are indicative only and many other variations and exemptions would be possible.

Without a proposal on specific rates—the time of day and day of the week that such tolls would apply—or exemptions on specific types of travel, it is hard to predict impacts and revenues. For example, a $2 toll charged each way for a commuter travelling 240 workdays per year would add up to $960 per year; at $3, it would be $1,440 per year. These are both less than comparable transit passes ($1,512 per year for a two-zone pass and $2,064 for a three-zone pass). System-wide, the Mayors' Plan version suggested tolls of $2-3 per major crossing would raise between $150 million and $500 million per year.[27]

27 Appendix F.

In terms of technology, the tolling systems already exist and were used on the Port Mann and Golden Ears bridges. Both systems used small transponders on users' windshields to bill the majority of vehicles passing through the gantry, supplemented by photo capture of vehicles and license plates. Administrative and billing infrastructure would be available for expansion to other bridges and nodes.

Distance-based charges

Distance-based charges would create a more direct relationship between charges and road space being used. In a cordon system, vehicles making short trips across the cordon are charged, while vehicles making longer trips that do not cross the cordon are not charged. There can also be some shifting of traffic onto secondary or minor roads to avoid crossing the cordon. On the other hand, a cordon system can better target key choke points, whereas a location-sensitive per-km charge would reduce congestion more generally in a defined geographic area.

Three variants of this approach are being considered by the MPIC:

- **E** **A flat per-km rate** for all driving in the region.
- **F** **A two-tiered rate with a basic regional charge per km** plus a higher charge for driving in the Burrard Peninsula (Vancouver, Burnaby and New Westminster).
- **G** **A series of progressively higher charges** for driving closer to the most congested regional centres (central Vancouver, central Surrey, etc.).

A shortcoming of a per-km charging system is a lack of fully implemented real world examples. Metro Vancouver would be a pioneer if they went this route.

These options are somewhat similar to the system in London, which charges for all driving within the congestion zone rather than just entries into it. The London charge, however, is a flat rate (approximately $17 per day) rather than per kilometre. No details are provided by the MPIC on rates and how they would vary by time or location, including whether some driving would be exempt. While Option E is the easiest to understand and has strong revenue-generating potential, it would not specifically address the region's congestion hot spots. At the other extreme, Option G could be very complicated, to the point of making it challenging for drivers to know exactly how much they would pay for a given trip. Option F is shown in Figure 2.

A key shortcoming of a per-km charging system is that we lack fully implemented real world examples. In 2015, Oregon started a pilot program, OReGO, with 5,000 vehicles on a voluntary basis. Users pay 1.5 cents per mile in lieu of fuel taxes and use a device/dongle that is inserted into the vehicle's diagnostic port.[28] Similar pilot programs have taken place in Washington and California, but they have been state-level initiatives primarily aimed at replacing fuel tax revenues rather than city-level ones aimed at reducing congestion.

TransLink and Metro Vancouver would thus be a pioneer in per-km charging if they went this route, doubly so if the technology was time- and location-sensitive. Whereas the technology for a cordon is essentially the same as for bridge tolling, technology for per-km pricing would likely have much higher start-up costs. As TransLink's Compass card rollout showed, there can be delays in implementation and unanticipated challenges in getting a system off the ground.

28 Oregon Department of Transportation, Oregon's Road Usage Charge: The OReGO Program Final Report, 2017, http://www.oregon.gov/ODOT/Programs/RUF/IP-Road%20Usage%20Evaluation%20Book%20WEB_4-26.pdf.

How much any new technology would cost in terms of upfront capital costs and ongoing billing, administration and enforcement is a key question. A study for the Congressional Research Service estimates administrative and enforcement costs for electronic billing to range from 5 per cent to 13 per cent of collections. This does not include banking or credit card fees, which would represent another 2 to 3 per cent of revenues.[29]

Privacy concerns have also been raised about potential tracking and surveillance of people as they move through the transportation network. While this is an issue in a cordon system as well, risks would be more acute in a per-km system. Such concerns are warranted in light of an exposé in *The Tyee*, which found that TransLink was "routinely providing police personal information of transit users—including where they travelled—without warrants or notification to individuals." In 2016, there were 147 police requests and TransLink provided information in response to 111.[30]

Privacy concerns have been raised about potential tracking and surveillance of people as they move through the transportation network.

Table 1 shows some potential charges for vehicles with different amounts of kilometres driven annually, although in practice revenues would depend on the specific rates, exemptions and other design choices. In addition to 2 and 5 cents per kilometre (drawn from the Mayors' Plan), a higher rate of 7 cents per kilometre is also considered given estimated revenue requirements and a potential future reduction in the fuel tax.

A plausible range of charges for vehicles with relatively light usage of 8,000 kilometres per year (in locations and at times subject to the charge) would be $160 a year at 2 cents per kilometre up to $560 per year at 7 cents per kilometre. A vehicle with heavy usage of 22,000 kilometres per year would be charged $440 (at 2 cents) or $1,540 (at 7 cents) per year, and the range of gross revenues (that is, before deducting system operating costs) would depend on the exact rates and how and when they would apply.

Table 1: Potential costs per vehicle

Rate (cents/km)	Light usage (8,000 km/year)	Medium usage (15,000 km/year)	Heavy usage (22,000 km/year)
2 cents	$160	$300	$440
5 cents	$400	$750	$1,100
7 cents	$560	$1,050	$1,540

Source: Author's calculations.

A modified option would be to reform Insurance Corporation of British Columbia premiums, linking them to annual kilometres driven based on annual odometer readings. This would lower capital costs and eliminate privacy concerns. However, it would not allow for fee adjustments based on time of day, day of the week or location. This option was rejected by the MPIC but could be a better replacement for fuel tax revenues over the long run.

29 Robert S. Kirk and Marc Levinson, Mileage-based Road User Charges, Congressional Research Service, 2016, #7-5700, https://fas.org/sgp/crs/misc/R44540.pdf.

30 Bryan Carney, "TransLink Increasingly Sharing Riders' Personal Information, Travel With Police," The Tyee, August 8, 2017, https://thetyee.ca/News/2017/08/08/TransLink-Sharing-Riders-Information-With-Police/.

Equity Issues for Mobility Pricing

Mobility pricing can create winners and losers, but good design can ameliorate the outcome. Fairness is key.

MOBILITY PRICING IS LIKELY TO FAIL if it is perceived to be unfair. The MPIC's terms of reference task the Commission with promoting fairness. But fairness is in the eye of the beholder. Through one lens, the "user pays" principle, mobility pricing can be viewed as equitable because it charges those who are causing the problem of traffic congestion. Essentially, mobility pricing will lead some drivers to shift their mode of transportation or travel pattern so that those remaining pay to get faster and more reliable travel times.

If all households had equal starting points in terms of income or resources, this might suffice. But, of course, that's not the world we live in. Thus, ability to pay is another core fairness principle, in particular with regard to low-income households. Fairness for other disadvantaged populations, including those precluded from driving by age or disability, must also be considered. And mobility pricing may disadvantage those who are forced to move farther away due to the price of housing.

That is, mobility pricing can create winners and losers, but good design can ameliorate the outcome. Three central fairness or equity issues are discussed in depth below: impacts on low-income households, impacts on households throughout the region and fairness in comparison to other modes of travel including public transit, car-sharing and ride-hailing.[31] Importantly, equity outcomes depend both on how pricing is done (who pays) and how revenues are used (funding transit and any other compensating mechanisms).

Low-income households

Access to an efficient transportation system is necessary for people to get to work and school, to buy food and other necessities, and to access recreation, public and private services. Equity issues must be considered for drivers with a variety of income levels as well as for driver and non-driver households using other modes of travel (transit, biking, walking).

Among drivers, mobility pricing will be regressive in nature, meaning low-income drivers will pay a greater share of their income than higher-income drivers. That said, the status quo of financing

31 United States Department of Transportation, Income-based Equity Impacts of Congestion Pricing, 2008, https://ops.fhwa.dot.gov/publications/fhwahop08040/cp_prim5_00.htm

transportation is not much better. Current fuel taxes, transit fares and property taxes are all similarly regressive.

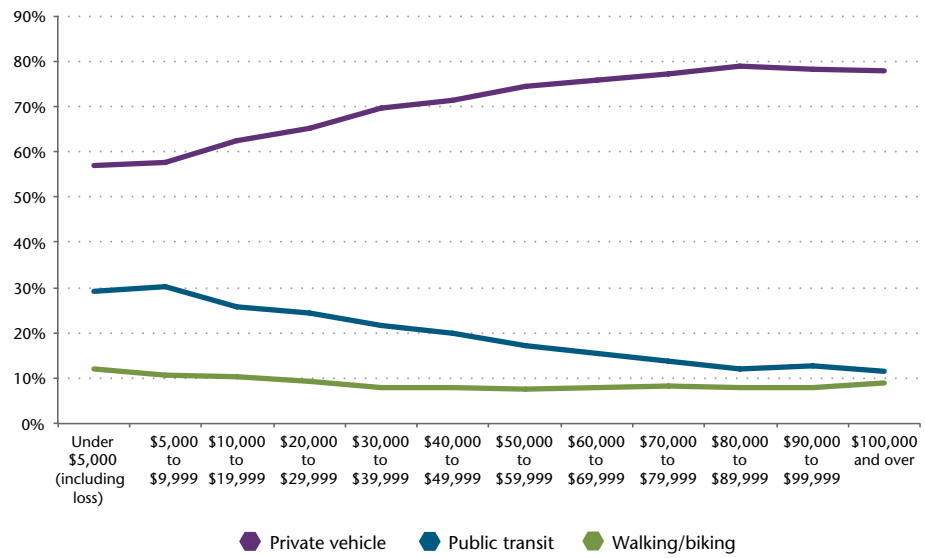
A key equity concern is that low-income households who have no other options are either financially harmed or get priced out, while affluent drivers get faster car speeds without noticing much of an impact on their budget.[32] Some people cannot immediately change their transportation behaviour and some live in auto-dependent areas where it is hard to even consider alternative modes of getting around. Differential rates based on time of day will adversely affect workers who have little choice over their work hours.

A key equity concern is that low-income people with no option besides driving are adversely impacted while affluent drivers move around more quickly without noticing much of a change in their budget.

Income equity issues in Metro Vancouver are related to the high cost of housing. Low-income people may need to move further away from city centres to find affordable housing, and these households already pay in the form of increased travel time, which can add up to many hundreds of hours per year. And it may not be feasible for them to switch to public transit because of their work hours, the location of work or other household needs like school and child care drop-offs and pickups. In contrast, higher-income households can afford to live closer to downtown Vancouver and would therefore pay less.[33]

Figure 3 shows the mode split in Metro Vancouver between private vehicle, public transit and walking/biking for different levels of income. As income rises, commuters are more likely to drive and less likely to take transit. But even among low-income households, the mode share of driving is almost double that of transit. Mobility pricing revenues dedicated to making transit more reliable and/or faster would benefit those who do not have cars. For any household that is able to give up a car in favour of other travel modes, they are likely to save several thousand dollars per year in car ownership costs (insurance, maintenance and amortization).

Figure 3: Mode share by household income level



Source: Author's calculations based on 2016 census

32 United States Department of Transportation, Income-based Equity Impacts of Congestion Pricing, 2008, https://ops.fhwa.dot.gov/publications/fhwahop08040/cp_prim5_00.htm

33 This can be seen graphically at https://censusmapper.ca/maps/838?index=0#11/49.2284/-123.0204

BC's carbon pricing experience holds lessons for mobility pricing. With the carbon tax, a low-income credit is funded out of carbon tax revenues. This should be considered for mobility pricing as well. It could piggyback on the GST credit in a similar fashion to BC's carbon tax credit although it would ideally reach higher up the income ladder to modest- and middle-income households. Such a credit could be targeted specifically to drivers or go to all low-income households (whether their members drive or not).[34] In the latter case it would provide a powerful incentive to shift to transit because they would not lose the credit. The key point is that low-income households would be compensated for circumstances in which they cannot immediately change their behaviour due to structural factors.

BC's carbon pricing experience holds lessons for mobility pricing. With the carbon tax, a low-income credit is funded out of carbon tax revenues. This should be considered for mobility pricing as well.

Using mobility pricing revenues to expand public transit will benefit low-income households. Transportation policy expert Todd Litman notes that, typically, about half the public subsidy provided to transit is for equity purposes—that is, providing better mobility to those who can't drive due to income, age or disability.[35] A faster and less crowded transit system would benefit low-income households and would also improve conditions for young people, seniors and people with disabilities (all of whom are more likely to be low-income). People with disabilities, people travelling with children and those transporting groceries or large packages are more affected by overcrowded buses and trains, or inadequate specialty transit services (e.g. HandyDART), because they need more space, which can mean longer waits.

There is a strong case to be made for public transit services to be expanded *prior* to implementing mobility pricing if only to accommodate those who switch from cars to transit. Similarly, using incremental mobility pricing revenues to support improved public transit services would give low-income households more affordable mobility.[36] In London and Stockholm, the use of mobility pricing revenues to improve public transportation was "a major objective and selling point," according to a review of lessons from the international congestion-pricing experience for the US Department of Transportation.[37]

Regional differences

While the mode share of trips by car has declined in Metro Vancouver, the 2016 census shows that some 69 per cent of commuter trips were still made by private vehicle.[38] There has already been a major shift away from car trips in the City of Vancouver with half of commuting trips by public transit, biking and walking instead of by private car. In contrast, households in many suburban areas are still extremely car-dependent.

Perceptions of fairness played a big part in the elimination of tolls on Metro Vancouver bridges in 2017. When only some infrastructure is tolled, a regional fairness question arises about why some people have to pay to cross a bridge while other bridges are not tolled. A well-designed cordon/toll on all regional bridges and at other key nodes on major highways would address this particular fairness concern.

34 Michael Manville and Emily Goldman, "Would Congestion Pricing Harm the Poor? Do Free Roads Help the Poor?" Journal of Planning Education and Research, 2017: 1–17, http://journals.sagepub.com/doi/abs/10.1177/0739456X17696944

35 Todd Litman, *Evaluating Public Transit Benefits and Costs: Best Practices Guidebook*, Victoria Transport Policy Institute, updated 2017, http://www.vtpi.org/transben.pdf

36 United States Department of Transportation (2008) Income-Based Equity Impacts of Congestion Pricing, https://ops.fhwa.dot.gov/publications/fhwahop08040/cp_prim5_00.htm

37 Bhatt, Higgins and Berg, *Lessons Learned From International Experience in Congestion Pricing*.

38 Statistics Canada census transportation data.

However, bridge tolls or a cordon system could end up charging people for short trips that cross a boundary while not charging for longer trips that do not cross a boundary. This is seen as a shortcoming of London's congestion charge zone because vast areas of the city are not affected by the charge at all. On the other hand, in Metro Vancouver the increased cost would be accompanied by much faster travel times due to reduced congestion. Ideally, a large portion of the change in travel patterns would arise from discretionary trips being shifted outside of charging hours or multiple trips being combined into one.

A per-km charging system is more closely linked to the infrastructure a driver uses. There are large differences in average commuting distance by region, which would be reflected in a per-km pricing model. Table 2 shows the percentage of commuter trips made in cars and the average car commuting distance in each region. The average for Metro Vancouver as a whole is 11.2 kilometres each way. At the low end, the average distance for a vehicle based in the City of Vancouver (including the University Endowment Lands) is 8 kilometres each way and in Burnaby 9 kilometres; at the other end of the spectrum, the average for Maple Ridge is 16 kilometres each way, double that of Vancouver.

Table 2: The journey to work by car

	Share of commuter trips made by car	Average one-way car commute distance (in km)
Metro Vancouver	69%	11.2
City of Vancouver	49%	8.1
Burnaby	64%	9.1
Richmond	74%	8.8
Delta	83%	12.7
Surrey	81%	12.9
Langley	90%	14.6
Coquitlam	77%	12.5
Port Coquitlam	83%	12.7
Port Moody	78%	12.2
North Vancouver	72%	8.5
New Westminster	60%	10.6
Maple Ridge	87%	16.2

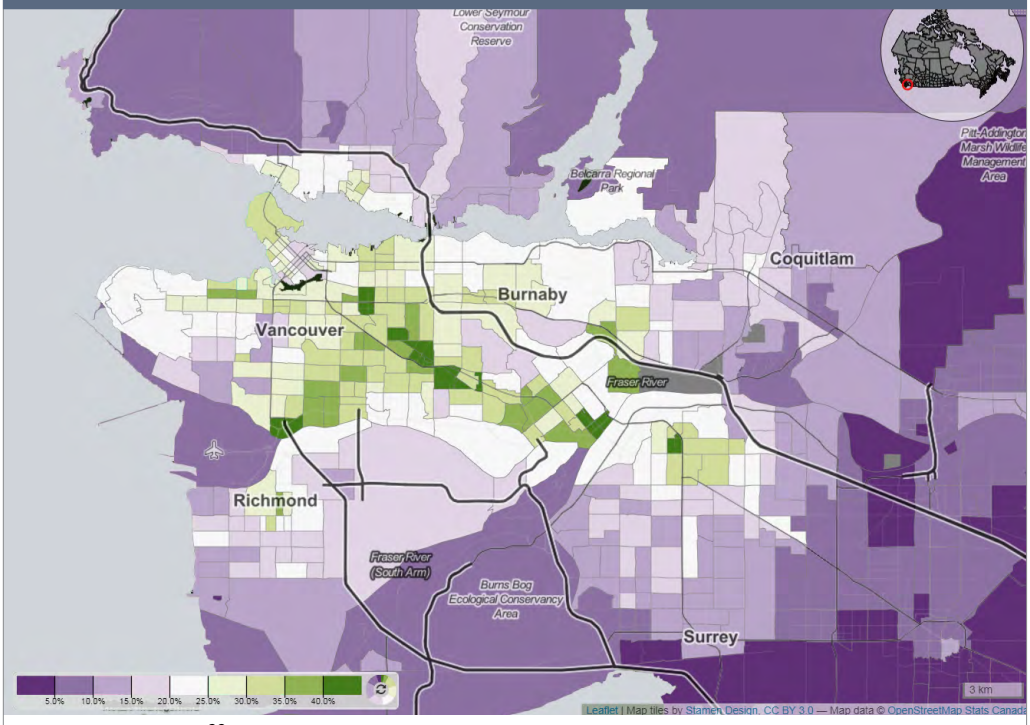
Source: 2016 census.

Ideally, a large portion of the change in travel patterns would arise from discretionary trips being shifted outside of charging hours or multiple trips combined into one.

Thus, a per-km fee would end up costing more for those who live furthest away from work and live in areas poorly served by public transit. The Mayors' Plan, fully implemented, would greatly enhance public transit options across the region. Nonetheless, additional public transit investments may also be needed (for example, extending the Millennium SkyTrain line to Maple Ridge and the Canada Line to Delta) to improve mobility over the long run.

In Metro Vancouver's auto-dependent areas, a major expansion of public transit should be part of the revenue recycling regime. However, the purpose should not be to replace long trips by car with equally long trips by public transit. Land use planning will also shape travel patterns in the region, and further development of regional town centres as destinations for employment, entertainment and services will help reduce the average commute distances.

Figure 4: Share of commuter trips made by public transit



Source: Censusmapper[39]

London and Stockholm already had well-developed public transit systems before their congestion charges came into effect with over 30 per cent of trips made by public transit.

The need to invest in public transit is a key lesson from case studies of mobility pricing in other places. The City of London's congestion charge, which came into effect in 2003, was accompanied by major new investments in bus service and the reallocation of road space in the central city for bus lanes.[40]

London and Stockholm already had well-developed public transit systems before their congestion charges came into effect with the share of trips made by public transit over 30 per cent prior to congestion charging.[41] In both cases implementation of mobility pricing was further accompanied by increased transit services. In Stockholm transit ridership went up 4 to 5 per cent after the

39 Censusmapper.ca is an online visualization tool created by Jens von Bergman for Statistics Canada census data. Map based on 2016 census, https://censusmapper.ca/maps/984#11/49.2517/-122.9631.

40 Moshe Givoni, Re-Examining the Results of the London Congestion Charging Scheme: A Critical Review, paper for the World Conference on Transport Research, 2010.

41 Data from International Association for Public Transit in Transport for London, 2016.

charge was implemented, and reduced road congestion led to improved speeds and punctuality for bus services.[42]

In contrast, Metro Vancouver needs to catch up. Only 20 per cent of commuter trips in 2016 were made by transit. The availability of reliable and fast transit options greatly reduces the need to own a vehicle (or multiple vehicles). The map of the region shows that high levels of transit use occur where good infrastructure is in place (Figure 4).

Fairness across modes

Transit fares in Metro Vancouver are expected to steadily rise over the coming decade. So why should transit riders pay for each trip while drivers do not? As a more efficient mode of transportation, it should be cheaper and more convenient to use public transit compared to driving.

Ride-hailing and car-sharing expand consumer choice but may also cannibalize transit ridership, contributing to road congestion and increased emissions and other pollution.

TransLink is undertaking a Transit Fare Review, which is scheduled to make recommendations in Spring 2018. The outcome is likely to be a fare system that is more sensitive to distance while removing the penalty for those who take short trips that cross a zone boundary (e.g., between Joyce–Collingwood and Patterson SkyTrain stations). Two shortlisted options are to replace the current zone system with per-km fares for the whole transit system, or just for SkyTrain and SeaBus, leaving buses with a whole-system flat fare. Trips would have minimum and maximum fares similar to today's pricing. Public opinion research released by TransLink suggests strong popular support (70 per cent) for a more distance-based fare system, at least for SkyTrain trips but not necessarily for buses, as well as for off-peak discounts.[43]

The possibility of integrating all or many modes of transportation (other than walking and biking) would mean the way we charge could also be integrated. In addition to transit, a future of more seamless connections could also include bike- and car-sharing and ride-hailing services. For example, a person could use a bike-share to ride to a SkyTrain station and after several stops drive a car-share vehicle to their final destination.

Ride-hailing and car-sharing expand consumer choice but may also cannibalize transit ridership, contributing to road congestion and increased emissions and other pollution. In London, for example, ride-hailing services are not subject to the city's congestion charge and have taken over some of the trips that used to be made in private vehicles. This should be avoided.

Metro Vancouver's taxi and car-sharing services already incorporate elements of mobility pricing. Taxis charge based on a flat fee, a per-km charge and a time element. Car-sharing has also emerged as an alternative transportation option, mostly in the City of Vancouver. Evo and Car2Go are the two largest car sharing companies providing point-to-point services (i.e. drop a car off anywhere in the zone). Their pricing model is on a per-minute basis rather than per km. These services provide the benefit of being able to park in normally restricted areas.

A different car share model is provided by Modo, a regional car-share co-operative, which charges per quarter-hour of time as well as 25 cents per km. This includes all fuel, insurance, maintenance and amortization costs and there is a daily maximum cost. To use vehicles, members must pay to

42 Eliasson, 2014.

43 TransLink, Transit Fare Review: Phase 2 Summary Report, June 2017, https://www.translink.ca/-/media/Documents/plans_and_projects/transit_fare_review/Transit_Fare_Review_Ph2_Summary_Report_6-15-2017.pdf, and Transit Fare Review: Phase 3 Discussion Guide, November 2017, https://www.translink.ca/-/media/Documents/plans_and_projects/transit_fare_review/20171120_Transit_Fare_Review_Phase_3_Discussion_Guide.pdf

join the co-op as casual (lower cost but higher per-use rates) or full members. This model differs from Evo and Car2go in that vehicles must be returned to the same place, which means one-way trips are not possible.

Evidence on the impact of car-sharing is mixed. A study done in 2014 for Metro Vancouver found that car-sharing programs could increase driving for some users and decrease it for others (for example, if a two-car household is able to give up a car).[44] The study also found that most car-share usage was for non-work, discretionary trips that are harder to make with transit, but that further study would be required to determine the relationship between transit and car-share choices.

Widespread use of autonomous vehicles may be several years away, but for mobility pricing it is essential that such services pay for using the transportation network.

Ride-hailing services like Uber and Lyft may soon come on the scene, and notwithstanding controversial issues like precarious labour practices and profits flowing outside the city, there is clearly consumer demand for the niche they occupy. A number of recent studies have found that ride-hailing is increasing total distance travelled by car and taking away mode share from public transit and car-sharing. One study of ride-hailing users in seven US cities found that ride-hailing can worsen congestion not just due to passenger rides but also because of "dead-heading" miles, where passenger-less vehicles drive around. This suggests that mobility pricing should not exempt ride-hailing.[45]

It is particularly important to get these details right in advance of a widely predicted shift towards autonomous vehicles. This is ride-hailing without the driver, meaning potentially low costs to access this mode. At such low costs, autonomous vehicles could adversely affect public transit ridership but could also continue the pattern of congestion at the centre of the discussion in this paper. Widespread use of autonomous vehicles may still be several years away due to technological challenges, but for mobility pricing it is essential that such services pay for using the transportation network.

44 Metro Vancouver, The Metro Vancouver Car Share Study: Technical Report, November 2014.

45 Regina R. Clewlow and Gouri Shankar Mishra, Disruptive Transportation: The Adoption, Utilization, and Impacts of Ride-Hailing in the United States, 2017, https://itspubs.ucdavis.edu/wp-content/themes/ucdavis/pubs/download_pdf.php?id=2752

Conclusion

THIS DISCUSSION HIGHLIGHTS THE FACT there are many complications and trade-offs regarding mobility pricing: differing objectives, differing models, and equity and other policy issues. Getting vehicle users (who make 69 per cent of trips in the region) on board is not impossible, but will require a pricing package that is perceived to be effective and fair. Ultimately, drivers may prefer to pay with their time by queuing at regional choke points rather than pay more to relieve that congestion. The case of Stockholm, however, shows that a well-designed system can win over the public.

Ultimately, drivers may prefer to pay with their time by queuing at regional choke points rather than pay more to relieve that congestion. The case of Stockholm, however, shows that a well-designed system can win over the public.

Here are some of the key requirements for developing a fair mobility-pricing system:

Address low income with a credit—Whichever mobility pricing scheme is chosen should reflect a detailed analysis of, and an equity plan for, people with low incomes. Some portion of revenues will be needed to assist people who have no other options than to drive, and it is also a matter of transportation justice to invest in mobility for disadvantaged groups. A more rigorous process, specific to the Metro Vancouver context, for evaluating equity impacts in terms of who wins and loses should be undertaken prior to decision-making on mobility pricing. But as with the carbon tax, a piece of the fairness puzzle can be addressed by directing some share of the revenue to an offsetting credit for low- and middle-income households.

Expand public transit first—Investing in public transit is the only way to guarantee accessible mobility for all residents over the long term. A key point from case studies is to expand public transit first. In London and Stockholm, the mode share of transit prior to implementation of a congestion charge was more than double that of Vancouver. Ideally, the transit investments in the Mayors' Plan would be fully implemented before mobility pricing comes in as this would provide more options to households in car-dependent areas.

Level the playing field with other modes of transportation—Mobility pricing should also apply to ride-hailing and car-sharing services. More efficient modes such as transit should have priority in terms of traffic lanes and signals so that choosing shared transportation is rewarded with faster, more-convenient trips. Keeping transit fares low relative to driving will lead to higher ridership and be less of a burden for low-income households. We must also keep in mind that many people do not have the option of driving at all due to low income, age or disability.

This is a good conversation to be having right now. Metro Vancouver is at a critical point where its roads will not be able to handle the expected growth in private vehicles with the anticipated population growth. While this trend has long been recognized in regional planning, the politics of making substantial new investments in public transit have been challenging, to say the least. If it can overcome the political hurdles, well-designed mobility pricing—implemented with complementary policies and public investments—could be an important part of managing congestion and accelerating the shift away from vehicle dependency.

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520 – 700 West Pender Street
Vancouver, BC V6C 1G8
604.801.5121 | ccpabc@policyalternatives.ca

www.policyalternatives.ca