



METRO VANCOUVER MOBILITY PRICING STUDY

FINDINGS AND RECOMMENDATIONS FOR AN EFFECTIVE,
FARSIGHTED, AND FAIR MOBILITY PRICING POLICY

Prepared by: the Mobility Pricing Independent Commission

M A Y 2 0 1 8



May 2018

LETTER FROM THE CHAIR

I am pleased to present the results of the work carried out by the Mobility Pricing Independent Commission over the past ten months.

The Mayors' Council and TransLink Board asked the Commission to study how (not if) a mobility pricing system could be implemented in Metro Vancouver that would:

- manage congestion
- promote fairness, and
- support investment.

The growth of our region represents an opportunity and a challenge. It is happening at a time when many sectors, including transportation, are undergoing rapid change and innovation. Efficient, affordable and sustainable mobility will be key to ensuring good outcomes for the people of Metro Vancouver. Mobility pricing offers a way to ensure this happens in a way that is farsighted, fair and flexible.

Our comprehensive investigation has found that a coordinated mobility pricing policy, that includes a decongestion charge, has the potential to address the threat of growing gridlock in a way that produces substantial benefits for quality of life and the region's economy. We have heard many concerns about fairness in relation to affordability, equity, access to transit options, privacy and the need for accountable and transparent governance. But we have found that there are ways to address these concerns through the way a mobility pricing policy is designed and implemented.

It is easy to characterize a decongestion charge as a "money grab" or "just another tax." The paradox is that the less you charge, the more it would be just that. The charge needs to be set at a level sufficient to unlock the considerable benefits of reduced congestion and more efficient mobility. That will also raise sufficient revenue to both invest in more affordable transportation options, reduce other costs of driving and offset costs for people on low incomes, just as we do for many other priced goods like housing and power.

Indeed, if you are only looking for a way to raise revenues for investment then a mobility pricing system that includes a decongestion charge is not the best solution. But if you are willing to take on the complex discussions it will require, then a decongestion charge could be transformative as part of a strategy to support efficient, affordable, and sustainable mobility in Metro Vancouver.

Continued...

To guide you in those difficult discussions we offer a series of principles which we believe should be followed in developing a policy for mobility pricing, along with recommended next steps.

Finally, I would like to acknowledge the hard work and commitment of my Vice-chair, Joy MacPhail, and the other members of the Commission in tackling this difficult subject in a spirit of curiosity, openness, cooperation and a healthy skepticism. My thanks also to the team of staff and consultants who supported our work.

It's time to continue this conversation so our region and its residents can continue to thrive.

Yours faithfully,

Allan Seckel

With support from all members of the Mobility Pricing Independent Commission:

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EXECUTIVE SUMMARY

Efficient, affordable transportation is crucial to Metro Vancouver's future.



Metro Vancouver is growing, bringing more opportunities to the people who live here – and to those who are coming here. That growth brings challenges, but the impacts of a falling population or a stalling economy would be a far bigger threat to everyone's quality of life.

One of the things we need to do to ensure everyone can benefit from the opportunities of growth is to provide an efficient, affordable, and sustainable transportation system for people and goods to get around.

Traffic congestion is getting in the way of that. It impacts our quality of life, health, safety, and regional economy. Building our way out of our traffic woes is increasingly expensive and doesn't support our region's goal to reduce greenhouse gas emissions. And the ways we currently pay for mobility could be better integrated and structured to help us meet our region's vision for livability and sustainability.

Innovations in mobility through electrification, automation and vehicle sharing are bringing new possibilities, but will also require new forms of coordination to achieve mobility goals. The mobility sector is going to change, and the way public authorities manage mobility to ensure equitable, sustainable outcomes will need to change along with it.

The Mobility Pricing Independent Commission was set up by the Metro Vancouver Mayors' Council on Regional Transportation and the TransLink Board of Directors to investigate how a more coordinated way of paying for mobility – *mobility pricing* – could help to address these challenges. The Commission was specifically asked to look at how paying for road use – *decongestion charging* – could play a role in such a strategy.

This report summarizes the findings and recommendations for how a comprehensive mobility pricing policy, that includes a decongestion charge, could support our region's growth.



How different forms of transportation and mobility are priced sends a signal which can have an impact on people's behaviour in the long term (where we choose to work and live) and short term (what time we make a trip or by what mode). Getting those signals right can lead to positive outcomes for everyone. Getting them wrong will cause multiple problems.

These recommendations on how to get the mobility pricing signals right stem from an intensive eight-month research and public engagement project called *It's Time*, launched in October 2017 by the Mobility Pricing Independent Commission. In this period, we established baseline research, analyzed policy and lessons learned from other jurisdictions, conducted multiple rounds of modelling and evaluation, completed two rounds of education and engagement with public, stakeholders, and government officials, and explored pathways to implementation.

We have found different and effective ways for a decongestion charge to make an impact in Metro Vancouver, as part of a coordinated mobility pricing policy.

Our research has shown that a decongestion charge has worked to reduce congestion in cities around the world and we looked at how it could work in our region. From our analysis, we have identified two illustrative concepts that, if implemented as part of a coordinated package, could reduce our region's congestion and support transportation investment in a fair way:



Regional congestion point charges that would cost the average paying household \$5-8 per day could reduce congestion by 20-25% and raise \$1-1.5 billion net per year



Multi-zone distance-based charges that would cost the average paying household \$3-5 per day could reduce congestion by 20-25% and raise \$1-1.6 billion net per year

These numbers are based on preliminary analysis and more work will be needed to refine concepts, costs, and benefits.

We have heard residents' and stakeholders' top concerns and have put together principles to address them.

From our research of experiences in other cities, we know public support is low before implementing a decongestion charge. Throughout our engagement, we heard from over 17,350 residents and over 300 stakeholders and government officials. Their top concerns were about affordability, availability and accessibility of transportation options, equity, and the accountable management of revenues.



These concerns are understandable and they can be addressed. We know from our analysis that it is possible to design a decongestion charge aligned with transit access and which respects privacy. A design is also possible that does not disadvantage those travelling longer distances, people with disabilities, seniors, or people with lower incomes.

We propose a set of principles to guide the design of a mobility pricing policy, covering:



Congestion, including the need to deliver meaningful reductions in congestion, ensure everyone pays a fair share, and that all the ways we pay for mobility are coordinated to deliver on regional goals



Fairness, meaning that differences in the way we pay for mobility should be consistent and explainable, that a mobility pricing policy should support equity, and that a decongestion charge should be aligned with access to transit

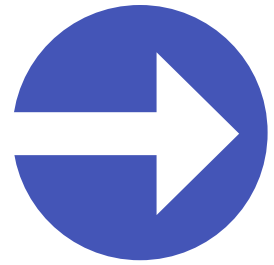


Supporting investment while at the same time ensuring accountability in the way revenues are used and affirming that revenue should not be the primary aim of mobility pricing



Other matters, such as the need to deliver positive economic benefits, protect individual privacy, provide stability, and support regional growth targets. We also confirm the need for continued public dialogue

We cannot leave our region at a stand-still. This is a visionary opportunity for us to move forward.



Changing the way people pay will be politically difficult, and the issues raised by a decongestion charge are many and complex. But the possibilities to support regional goals for quality of life, environment, and the economy are significant.

This report provides guidance on formulating an efficient, farsighted, and fair mobility pricing policy for Metro Vancouver. This will need to be developed and incorporated into regional policy.

This report can be considered the first phase of a feasibility study. It suggests principles that should be followed in formulating a mobility pricing policy and describes some high level decongestion charging concepts that show interesting results. More work will be needed to develop them into something that can be implemented. That is estimated to take around six to twelve months, and should include:

- Further iterations and development of the illustrative concepts
- A thorough assessment of affordability and equity impacts as well as impacts for business
- A first assessment of available technology for distance-based charging

Without visionary mobility pricing policy, our population and economy are projected to soon outgrow our transportation network.

Our region is at a critical juncture. It's time to move us forward.

ABOUT THIS REPORT

This report fulfills the Commission's mandate defined in the Terms of Reference to summarize its work and recommendations for the consideration of the Mayors' Council on Regional Transportation and the TransLink Board of Directors.

Part 1 describes why and how the project was undertaken, as well as describing how a comprehensive mobility pricing policy that includes a decongestion charge fits into the regional transportation policy.

Part 2 reviews the Commission's findings from research and engagement with the public and stakeholders. **Part 3** uses the findings to propose a set of principles to be followed in designing a mobility pricing policy. **Part 4** contains some illustrative concepts to show how a decongestion charge could be implemented in a way that meets the principles.

Part 5 contains recommendations for next steps.

The research, evaluation, communications, and engagement used to develop the findings and recommendations is contained in the appendices.

This report builds on work carried out in Phase 1 during fall 2017. The Phase 1 full and summary project update reports can be found on the *It's Time* website.

GLOSSARY

Term	Definition
Congestion point charge	A decongestion charge in which vehicles are charged for travelling past a given location or series of locations on the road network.
Decongestion charge	Decongestion charging is a tool used to combat congestion. It is a form of mobility pricing and refers to a range of fees that could be applied for the use of transportation services.
Distance-based charge	A decongestion charge in which vehicles are charged by distance travelled on all or parts of the road network.
Fuel Tax	A fee added to the purchase price of motor vehicle fuel. In Metro Vancouver, drivers pay \$0.17 fuel tax per litre to support the regional transportation system.
Mobility pricing	Mobility pricing refers to a range of fees that could be applied for the use of transportation services. Examples that we already pay include car insurance, bike sharing fees, parking fees, fuel taxes and transit fares.
User Cost principle	A concept in which users are charged in proportion to how much they contribute to congestion in busy locations during busy times of the day.
User Pay principle	A concept in which users pay in proportion to how much they use the road network. In this report, road use is measured in terms of kilometres travelled.

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Why we did this

PART 1. CONTEXT

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What's our opportunity?

Metro Vancouver is growing, bringing lots of new opportunities.

By 2040 there are expected to be around a million more residents and half a million new jobs. The regional growth strategy *Metro 2040*, and the Regional Transportation Strategy define the pivotal role of an efficient, affordable, and sustainable transportation system in giving everyone access to the opportunities growth will bring.

The strategy will see continued development of

1) diverse and dense neighbourhoods

2) ... that are walkable

3) ... connected by high-frequency transit

4) ... and where demand for car use is managed.



Density brings many advantages. Being closer makes it easier and faster to get together, increasing opportunities for trade and innovation and increases our quality of life. A region that is more spread out means longer trips to get together and more time spent in traffic.

But our rising population and its demand for goods and services will bring more vehicles and a need to manage traffic growth. This will keep denser urban areas as attractive places to live and work. The regional growth and transportation strategies include a plan to explore demand management strategies, such as road usage charging. This is why the Mayors' Council on Regional Transportation and the Board of TransLink established the Mobility Pricing Independent Commission ('the Commission').

Traffic congestion is a growing threat to those opportunities.

Imagine if those million new residents bring with them as many cars as Metro Vancouverites own today. There could be more than 600,000 new vehicles trying to find space on our already crowded streets. Congestion is already having an impact on our quality of life, our health and our safety, and our region's economy. Estimates of the economic cost of congestion to our region range from \$500 million to \$1.4 billion every year¹. That means the costs of congestion are one of many things contributing to our region's challenges with affordability.

Polling conducted in September 2017 shows what our residents think about congestion:



89%

are frustrated with traffic delays caused by high volumes.



80%

are frustrated with the unpredictability of travel times.



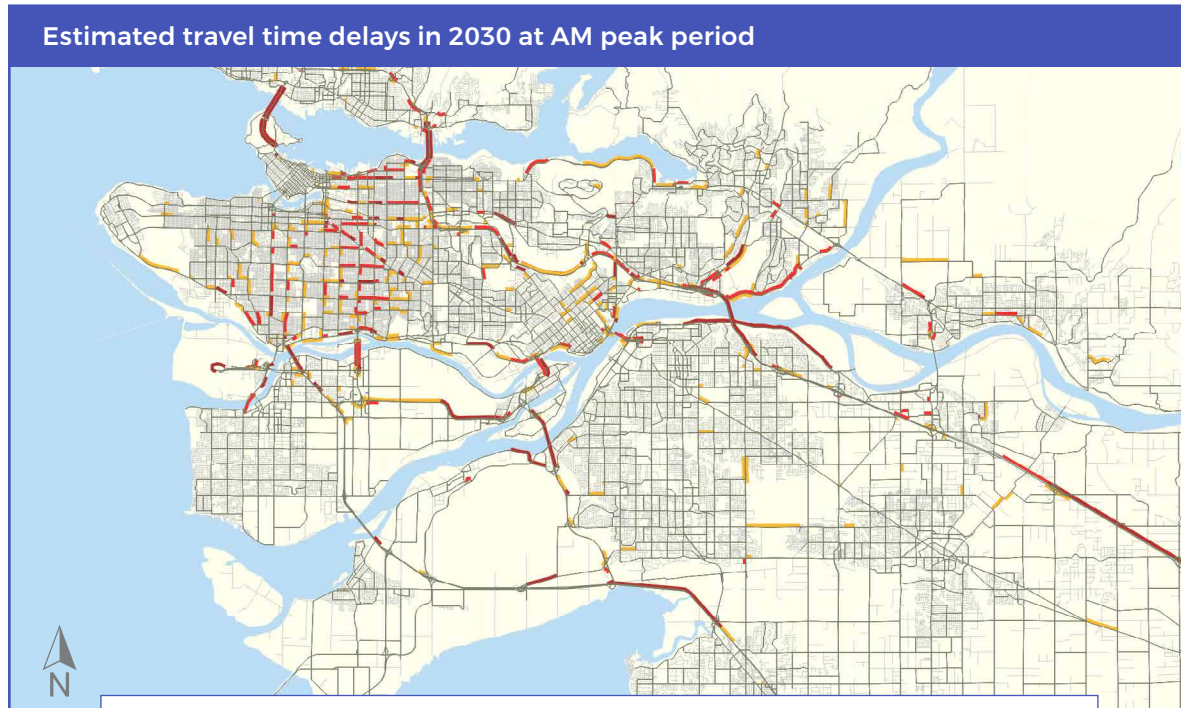
81%

say transportation delays cause them lost time every week.

¹ C.D. Howe Institute, 'Tackling Traffic: The Economic Cost of Congestion in Metro Vancouver.' 2015 and Canada's Ecofiscal Commission 2015

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Analysis shows that congestion will continue to rise, increasing by about 40% by 2030. We will spend more of the day stuck in traffic. Unless we do something, we will all be wasting nearly 15 million minutes every day stuck in traffic – that’s the equivalent of more than 28 years.



The map above shows the projected level of vehicle delay during a morning rush hour in 2030. Vehicle delay is calculated in hours where:

— 10-30 hours — 30-60 hours — over 60 hours.

It is calculated as hours of delay over and above the Level of Service D (LOS D)² performance level multiplied by the vehicle volume on the road network.

The region needs more transit and better roads – and fairer ways to pay for them

The Mayors’ 10-Year Vision, currently being implemented, will make a big contribution to expanding our transportation system and enabling affordable, efficient, and sustainable mobility as the population and employment grow.

Building new roads and transit can slow the rate of growth in traffic congestion, but they won’t fix the problem. As long as the population is growing and the economy is doing well, traffic growth will quickly fill up any new road or transit capacity. Soon, more will be needed and that will have significant costs.

The region’s previous approach to paying for some new bridges using tolls caused diversion onto less suitable routes and was unfair – as recognized by the provincial government when they ended toll collection in September 2017. Another major source of funding, the fuel tax, will not be sustainable in the long term as vehicles become more fuel efficient and electric cars become more commonplace.

²Level of service (LOS) is a measure used to describe traffic flow. LOS D represents an efficient use of the road network in peak traffic, but is not the same as free-flow. See Appendix B2 for a more detailed description.

What is mobility pricing and how could it help?

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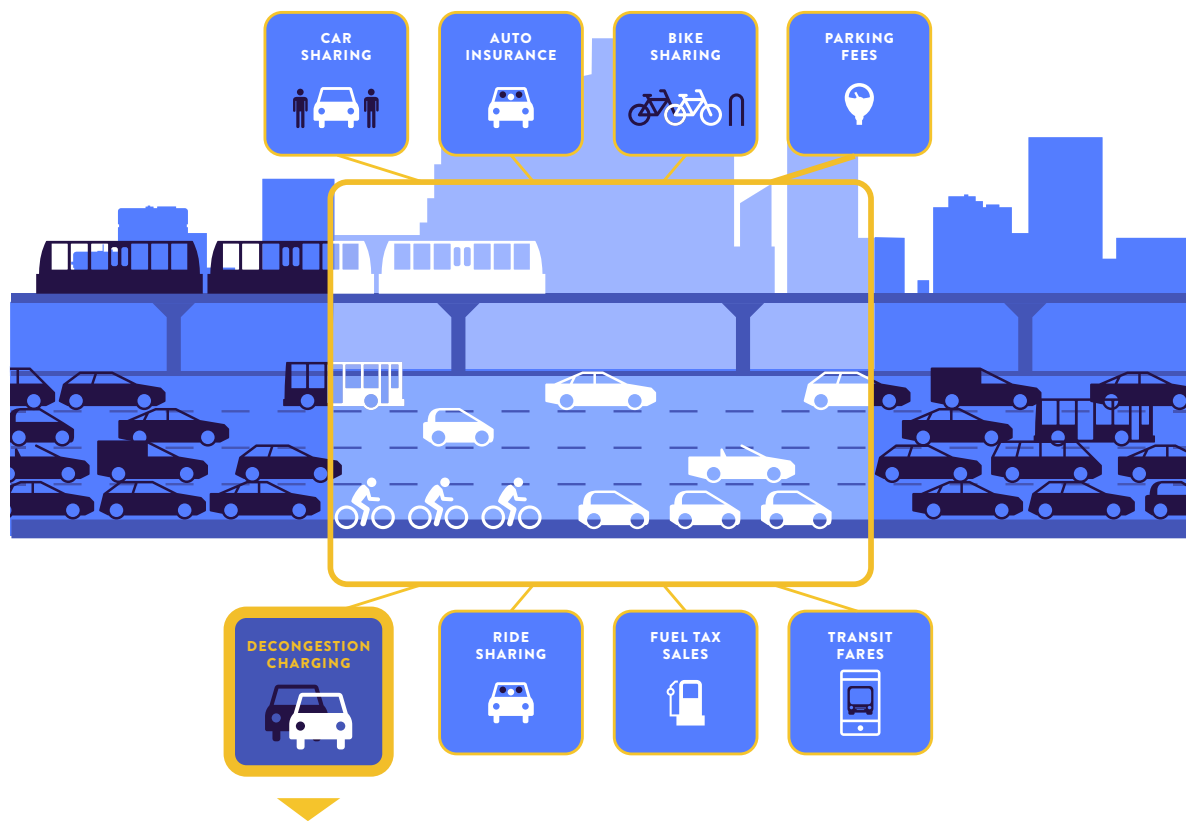
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In our region, we pay to get around in all kinds of ways: transit fares, parking charges and taxes, insurance, fuel taxes and costs for things like taxis, bike and car share. Prices are used for different reasons.

Mobility pricing means coordinating some of the ways we pay and paying differently to make it easier for everyone to get around. This is done by using price signals in a way that can manage congestion and encourage the use of different modes of transportation. If done in the right way, it can be fairer and can raise money for investment in the transportation system.



What is decongestion charging?

Decongestion charging, also referred to as road usage charging, is a mobility pricing tool that manages demand for road space.

Every road has a limit on its capacity. A road that can carry 1,500 cars per hour will work well when 1,400 cars are using it. But when that number climbs to 1,600, traffic will slow to a crawl for that period of time. The congestion doesn't only affect the 200 cars that just joined, it affects the 1,400 that were already there and no one goes anywhere. In severe congestion, as more vehicles are trying to move past a given point, fewer vehicles are actually getting through.

Decongestion charging addresses this by charging more to drive at busy times of the day or in heavily congested areas. The charge is set so that it motivates just the right number of people to change their travel habits, by using another route, carpooling, taking alternate modes of transportation (transit, walking, cycling or motorcycle), or simply avoiding travelling during peak periods.

The relationship between travel demand and travel time is non-linear, meaning that if a few people change their behaviour, and there are a few less cars on the road, there will be substantial improvements in travel times. Most people will continue to drive and will benefit from faster, more reliable journey times.

HOW EXACTLY DOES DECONGESTION CHARGING WORK IN THEORY?

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Traffic congestion is a cost for us as individuals like our time, stress, what we pay for fuel, insurance, and vehicle wear and tear etc.

But when we drive on congested roads, we also impose a cost on everyone else (their time, stress and costs) and on the rest of society (like pollution, road crashes, noise, and road wear and tear).

A decongestion charge is based on the economic theory that if we charge the full cost of using the roads when they're congested, that will cause just enough people to choose to travel in another way or at a different time that congestion will be reduced. The cost we charge is called the *marginal social cost*.

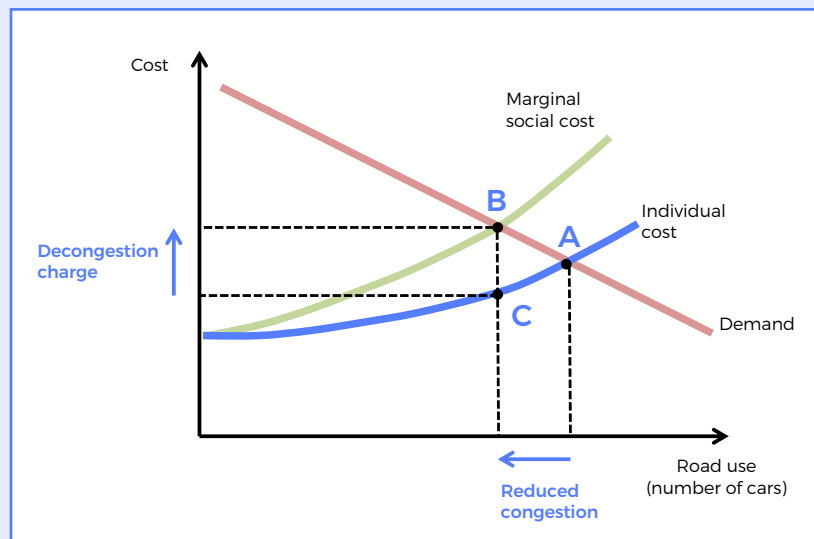
The figure below shows these relationships graphically. The horizontal axis represents the demand for car travel and the vertical axis represents the travel costs. Demand (the red line) decreases as the costs of driving increase. The blue line represents the individual cost each traveller experiences.

Costs increase as congestion increases. At point A, we see where the demand curve and the individual cost curve meet, and the level of congestion without charging. We also see that the marginal social costs are much higher.

The green line represents the marginal social cost. Costs to society also increase with higher demand for car travel, but a faster rate. At point B, we see where the marginal social cost intersects with the demand curve where demand is lower and the price is higher.

The difference in trip costs between point C and point B is the "economically optimal" congestion charging level, assuming the goal of the charge is to recover no more and no less than the sum of all social costs associated with driving.

The marginal social cost may represent a higher cost for drivers than we are prepared to charge in reality. That was the case in this project and so the concepts presented in Part 4 represent charges set at between 50% and 75% of the marginal social cost. That is, we are choosing to accept some congestion in order to reduce the out-of-pocket costs for individuals.

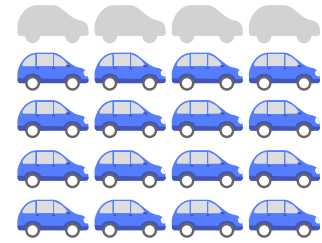


How and where has decongestion charging been implemented?

Other cities around the world have implemented decongestion charging to combat their congestion, including London, Stockholm, Milan, and Singapore. Pilot projects and studies are underway in many North American jurisdictions including Oregon, Los Angeles, and Seattle.

Several lessons have emerged from examining these international examples of decongestion charging and road usage charging:

- Well-designed decongestion charging systems have reduced traffic by 15-20% and cut congestion by around one third
- Most people continue to drive and enjoy decreased travel times and increased travel time reliability
- Many of those that adapt the way they travel shift the time they travel, combine trips, car share or switch to other forms of individual transport like bicycle or motorcycle. Some people will shift to transit, and these can be accommodated with targeted increases in transit services
- All the systems studied have produced revenues that can be reinvested in the transportation system or used to reduce other costs of driving
- There are other co-benefits, like better air quality, improved public health, improved safety and a reduction in crashes.
- Although people are often skeptical of decongestion charging before it is introduced, in most cases acceptance increases once the positive effects of the charges are demonstrated, and the adaptations are not as negative as people anticipated



More information about other jurisdictions that have implemented decongestion charging and what lessons we can learn are found in Appendix B of the Phase 1 report found on the *It's Time* website.

How could a decongestion charge work as part of a mobility pricing policy for Metro Vancouver?

Growing congestion is threatening our region's opportunities. The region needs new and improved infrastructure. Decongestion charging appears to offer a partial solution to these challenges, but how could it work here? And will people really be willing to pay differently in return for shorter and more reliable journey times? These are the questions the Commission was asked to explore.



The Commission's mandate, as defined in its Terms of Reference, includes:

- An evaluation of the viability and acceptability of potential regional road usage charging alternatives for motor vehicles (including both automobiles and trucking-based goods movement) in Metro Vancouver and, based on this evaluation, recommendations on how the region should proceed with developing and implementing a more coordinated regional road usage charging policy and system
- An assessment of the implications of introducing coordinated regional road usage charging in Metro Vancouver in terms of consistency, compatibility, and coordination with pricing for other types of transportation and mobility
- Conducting and leading the work in an objective, transparent, and credible manner

Refer to Appendix A of the full report for more information on the Commission's mandate, its members, and all meeting summaries.

In October 2017, the Commission launched the *It's Time* project, a research and public engagement initiative to explore a mobility pricing policy and a decongestion charge. The *It's Time* project was governed by the Commission's three objectives:

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Reduce traffic congestion

on roads and bridges across the Metro Vancouver region so people and goods can keep moving, and businesses can thrive



Promote fairness

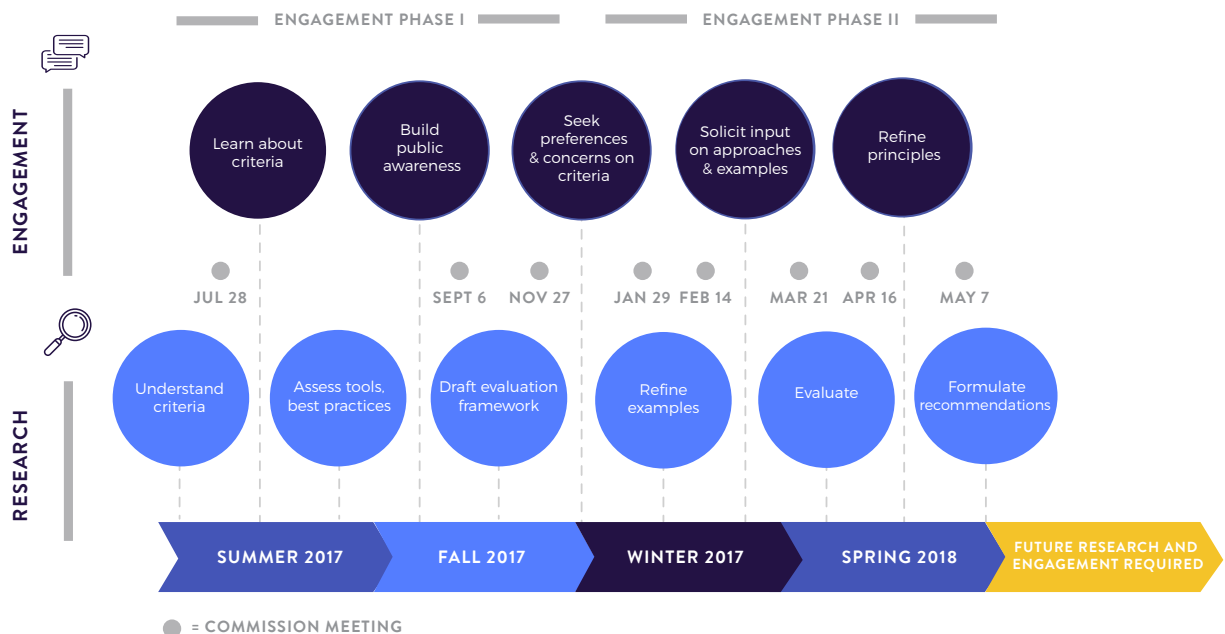
to address concerns around the previous approach to tolling some roads and bridges but not others, as well as providing affordable transportation choices



Support transportation investment

to improve the current transportation system in Metro Vancouver for all users

The timeline below illustrates how the project was carried out:



How did we evaluate mobility pricing and decongestion charging for the region?

It was not within the Commission's mandate to make decisions about if and when a decongestion charge should be introduced. Rather, the mandate was to explore and recommend *how* a decongestion charge could be introduced as part of a broader mobility pricing policy, including understanding the views of the public and stakeholders.

The Commission completed the following structured evaluation process to develop its recommendations:

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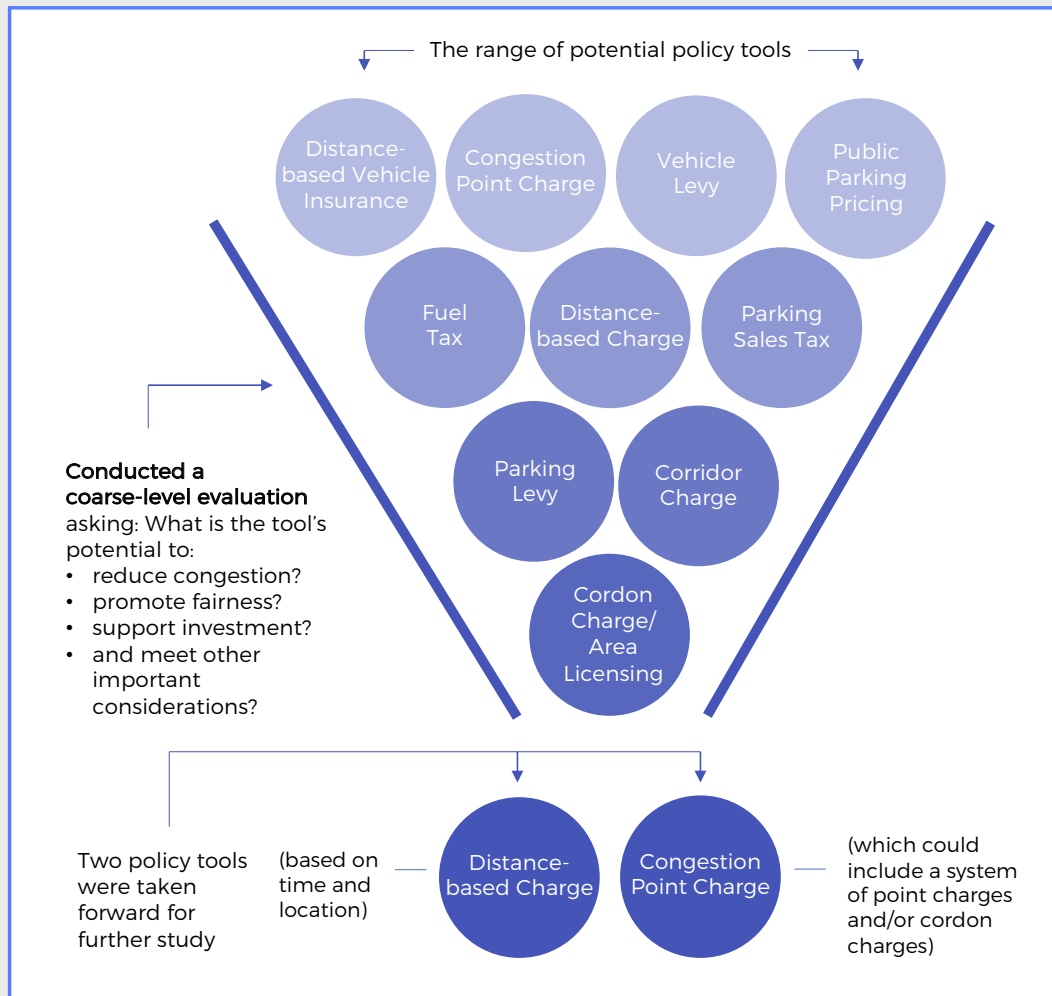
1

Identified a list of policy tools with some potential to address congestion and raise revenue. This was based on the range of tools that have previously been contemplated in this region or are commonly considered in other jurisdictions.



2

Conducted a coarse-level evaluation of the potential of each policy tool to address the Commission's three core objectives of reducing congestion, promoting fairness, and supporting investment in transportation, as well as high-level implementation considerations.



On the basis of this evaluation, a number of policy tools were set aside. Some, like charges only on highways, were rejected because they don't adequately address any of the core objectives. Others, like a vehicle levy or fuel taxes, were set aside because although they could raise money, they would likely have limited impacts on congestion. These and other policy tools not recommended for detailed study in this project may be explored in the future for other purposes. The Commission also recommended that limited further work be carried out on parking pricing.

3

Created an evaluation framework for more detailed analysis of decongestion charging systems based on research and input from public and stakeholder engagement. The framework covers issues and values the Commission feels are important, including metrics around:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Congestion | <input checked="" type="checkbox"/> Privacy |
| <input checked="" type="checkbox"/> Fairness | <input checked="" type="checkbox"/> Environment and health |
| <input checked="" type="checkbox"/> Investment | <input checked="" type="checkbox"/> Consistency with the Regional Growth Strategy and Regional Transportation Strategy |
| <input checked="" type="checkbox"/> Local effects | <input checked="" type="checkbox"/> Future-proofing |
| <input checked="" type="checkbox"/> Ease of implementation | |

4

Developed and evaluated decongestion charging systems through four rounds using the evaluation framework. The purpose was to support the Commission's learning rather than reaching a conclusion about a preferred decongestion charging system.

5

Formed recommendations resulting from this evaluation process that consist of:

- **Principles** (found in Part 3) to direct and shape the design of a mobility pricing policy including a decongestion charge in Metro Vancouver to reduce congestion, promote fairness, support transportation investment, and support other priorities emerging from this investigation phase. The principles have been developed over the course of the project based on engagement and research findings and Commission discussions.
- **Illustrative concepts** (found in Part 4) showing how a decongestion charge could be applied in Metro Vancouver in a way that meets the principles.

PART 2. THE COMMISSION'S FINDINGS

What we learned

PART 2. THE COMMISSION'S FINDINGS

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This section summarizes the Commission's findings from the evaluation, research, and engagement activities that have informed the development of the principles.

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KEY RESEARCH ACTIVITIES:

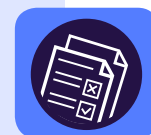
- Established a baseline for regional congestion challenges by studying existing data
- Researched evidence and lessons learned from other jurisdictions around the world that have introduced mobility pricing policies or decongestion charging
- Developed scenarios of how a decongestion charge could be implemented in Metro Vancouver to form the basis for traffic modelling and analysis, and to gather stakeholder and public input
- Modelled the forecasted impacts of decongestion charging concepts, with input variables including time, cost, directionality and location, and outputs including transportation impacts, costs and revenues, and the effects for numerous indicators of fairness
- Estimated cost and revenue implications of different charge rates by modelling and analyzing TransLink's Regional Trip Diary data in combination with the Regional Transportation Model
- Researched some technical and governance considerations for implementing a decongestion charge in Metro Vancouver

Refer to Appendix B for the research and evaluation report.

KEY COMMUNICATIONS AND ENGAGEMENT ACTIVITIES:

- Conducted **2** rounds of public opinion polling in September 2017 and March 2018 with **1,000** residents across the region
- Launched **2** multilingual public education campaigns on the Commission's work and mobility pricing in the region in **15** local distribution and **11** non-English newspapers and reaching **779,282** residents on Facebook and **35,576** website page-views
- Conducted online public engagement and in-person workshops to inform the principles, hearing from **6,078** residents and **176** stakeholders and government officials in Phase 1 and hearing from **11,474** residents and **130** stakeholders in Phase 2
- Increased accessibility by translating the online platforms into Traditional Chinese, Simplified Chinese, and Punjabi (the region's largest non-dominant languages), receiving **310** completed paper surveys from over **15** regional community offices, and conducting outreach with social service organizations
- Convened a citizen-based User Advisory Panel of **15** members representative of Metro Vancouver (selected through an external recruitment firm) to advise and provide input at key stages of the project

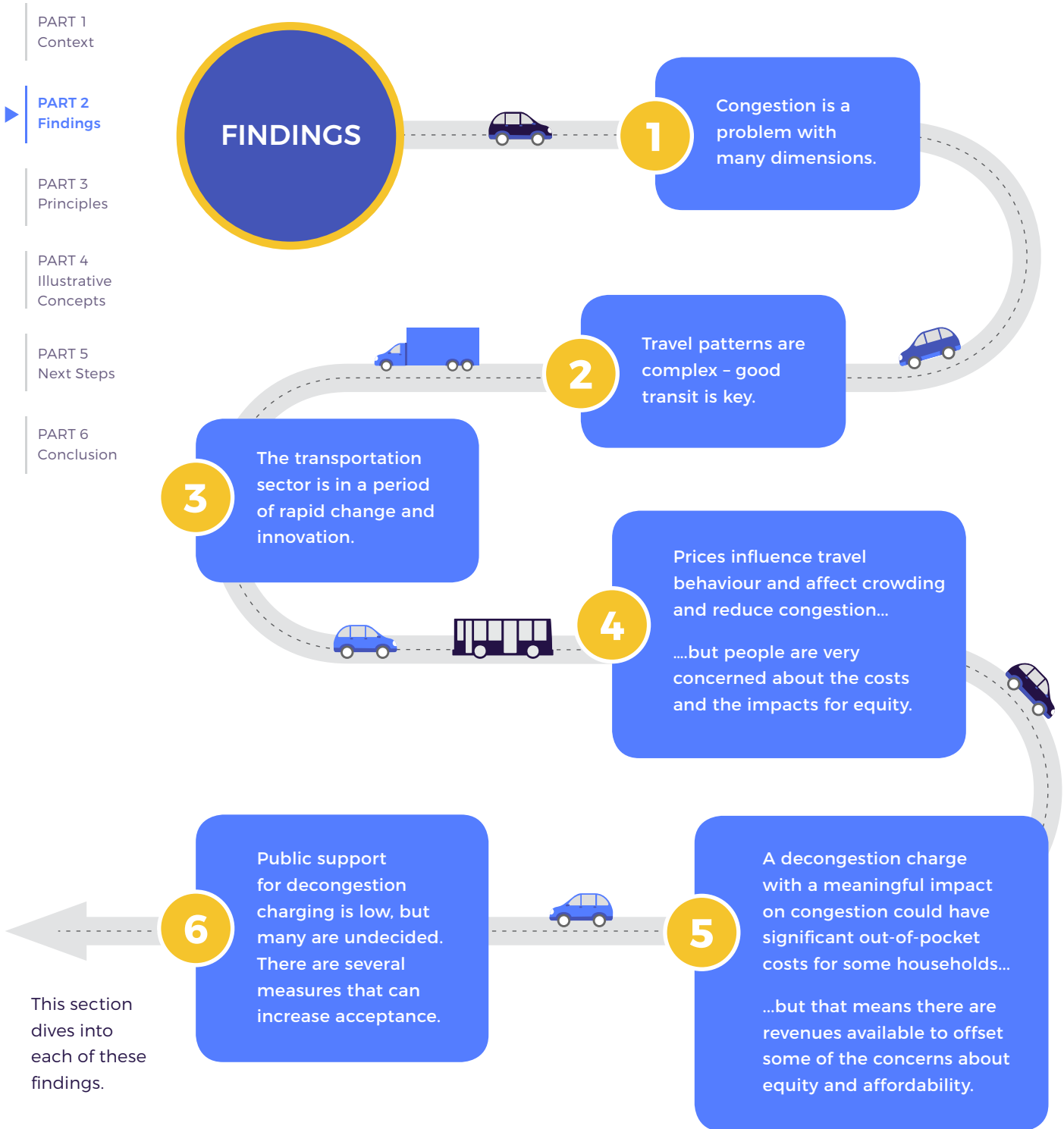
Refer to Appendix C for the communications and engagement report.



What we learned

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The graphic below pieces together our findings to show how they tell a story and form the foundation of our recommended principles in the next section.



Congestion is a problem with many dimensions.

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Congestion remains the biggest frustration of moving around in Metro Vancouver. From our March 2018 polling results, 85% of residents are frustrated with traffic delays caused by high volumes, with 82% of residents saying transportation delays cause them lost time every week. Crowding on transit came in fourth place at 71% and the cost of transit in fifth at 70%.

It is a challenge to adequately understand and represent the issue of traffic congestion through maps and numbers.



One congestion metric does not tell the whole story - we need a few metrics...

There are many ways to define and measure congestion, and sometimes these different ways will tell different stories about congestion. It's important that a few metrics are used in order to get the complete picture.



...and in order to generate these metrics, we need access to accurate and reliable data...

Access to solid data sources is essential to measuring and forecasting congestion. This includes travel times, traffic volumes, vehicle kilometres travelled (VKT), and origins and destinations of trips at fine levels of detail.



...and there will still be many nuances to defining, measuring, and explaining the congestion story.

For example, AM and PM peak times vary by location throughout the region, so a map revealing a snapshot of peak congestion doesn't always tell the whole story.

Refer to our Moving around Metro Vancouver report in Appendix A of our Phase 1 report for our baseline research on rising congestion in the region.

The unreliability of travel times is an important impact of traffic congestion, with 74% of people polled saying they are frustrated with the unpredictability. Urban areas will always experience a certain level of congestion. Many people may accept some delay as long as they know how long the delay is likely to be. The problem occurs when the actual delay is longer than our expectations and arrival times become difficult to predict. Reducing the variance of travel times can have the effect of improving average journey times, with only small reductions in total journey times.

Travel patterns are complex - good transit is key.

Around one-third of all the trips in Metro Vancouver are to and from work. The rest are for other purposes like leisure, shopping, and visiting family and friends. Even in the morning peak period, only around half the trips are commuting to and from work, and only around one-third of trips in the afternoon are commuting³.

The majority of trips are local; more than half of trips at all times of day are within the same municipality. The highest number of internal trips are made within Vancouver (75%), Surrey (71%), and Maple Ridge (70%).

Transit services vary across the region, sometimes as a result of history and geography. Often it relates to the density of housing and employment. Providing transit in higher density areas maximizes the number of riders and minimizes the cost per rider, helping to keep transit affordable.

³ TransLink Trip Diary 2011

A clear message from engagement is that many people think it would be unfair to charge for the use of roads where access to transit is not as good. More than 1,400 comments or around a quarter of all the comments received related to the availability and accessibility of transit options across the region.

Experience from other cities – as well as the analysis carried out in this project – suggests that if a decongestion charge were to be introduced, most people would pay and keep driving. Only a small number of people need to change the way they travel for there to be a meaningful reduction in congestion, and most people who change behaviour would not switch to transit. They would change destinations, share cars more, plan their trips more efficiently, and reduce their distances driven. So, while good transit is important in a growing region, the fact that some areas have poorer access to transit is not necessarily a reason to delay the introduction of a decongestion charge.

The transportation sector is in a period of rapid change and innovation.

Adding to the existing complexity of the region's transportation system, there are many unknowns and uncertainties around emerging mobility trends and technologies. The likely introduction of Transportation Network Companies – ride-hailing companies – in Metro Vancouver and new developments in electric, connected, and autonomous vehicles will open up more choices for getting around the region.

The combined impact of these innovations is likely to be a reduction in the cost of mobility. This is positive, but it will not necessarily happen in a way that is equitable or sustainable. In particular, cheaper travel by personal vehicle could lead to an increase in traffic volumes.

Increased vehicle efficiency, and particularly electrification of the vehicle fleet, while it has many environmental benefits, will lead to a reduction in revenues from fuel tax.

There are many uncertainties in how quickly this disruption will happen. The only certainty is that things will change and the way public authorities manage mobility to ensure equitable, sustainable and affordable mobility outcomes will need to change along with it.

Prices influence travel behaviour and affect crowding and reduce congestion.

People sometimes talk about transportation “needs,” but this is not strictly accurate. Where, when and how much we travel, and what mode we choose to take, will always be a function of what it costs us in time and money to make our trips. How different forms of transportation and mobility are priced sends a signal which can have an impact on people's behaviour in the long term (where we choose to work and live) and short term (what time we make a trip or by what mode). Getting those signals right can lead to positive outcomes for everyone. Getting them wrong will cause multiple problems.

Traffic congestion is a signal that the right price is not being charged for roads. A decongestion charge, when properly designed and introduced as part of a package, is one of the few measures that has proven effective in reducing urban congestion and encouraging the use of other modes. Cities with decongestion charging have seen sustained reductions in traffic volumes of 10-20%, resulting in an improvement in travel times of around a third. They have also seen co-benefits for reduced greenhouse gas emissions, improvements in air quality and traffic safety, and net revenues for reinvestment in the transportation system.

The tolls on the Port Mann and Golden Ears bridges showed the negative impacts if charges are applied in a way that is not coordinated. The removal of the tolls in September 2017 showed the impacts charges can have on travel behaviour in this region. Traffic volumes across the Pattullo Bridge have been reduced as drivers have chosen the other bridges which are now free, but total traffic volumes have increased.

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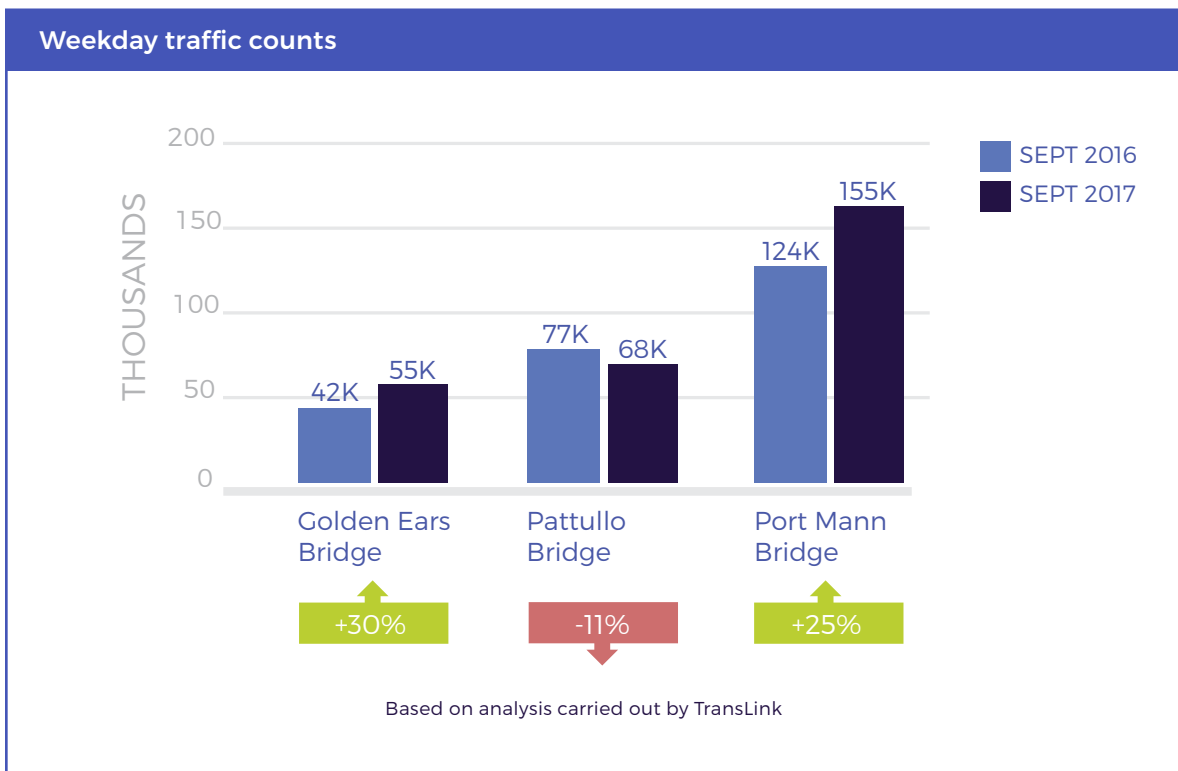
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A coordinated mobility pricing policy that includes a decongestion charge could have a role in achieving regional objectives for land use management, environment, health, and safety. As with any transportation policy, it is important to ensure that mobility pricing generates societal benefit and desirable outcomes for the region. In particular, these outcomes should contribute to, and not detract from, the achievement of goals of the Regional Transportation Strategy, and Metro Vancouver's Metro 2040 regional growth strategy and Integrated Air Quality and Greenhouse Gas Management Plan. Decisions around land use and transportation are connected and have impacts on air quality and greenhouse gas emissions. The decongestion charging concepts illustrated in Part 4 contribute to achieving the goals set out in regional policies, through encouraging mode shifts to transit and reducing both vehicle travel and greenhouse gas emissions.

There are several decongestion charging concepts that can reduce congestion and generate revenues in a fair way in Metro Vancouver. The two most promising illustrative concepts are a regional system of congestion point charges and a multi-zone distance-based charge concept. Some minimum thresholds for charge rates that need to be applied in order to have meaningful regional congestion reduction benefits have been identified. This will be presented in Part 4.

... but people are very concerned about the costs and the impacts for equity.

We heard thousands of comments expressing anxiety and opposition to a decongestion charge. Concerns revolved around affordability and included frustration and distrust about the way revenues from existing transportation-related costs are being used and managed.

The online engagement received 3,490 suggestions to inform system design and implementation. The figures on the following page display the themes categorized by the Commission's objectives and ordered by most common comments.

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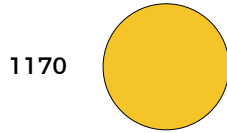
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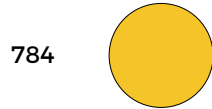
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Fairness themes from public comments

of public comments
for **distance-based
charging**



Recognize **affordability concerns** and feeling of being penalized



Improve transit and other mode infrastructure and services to provide available and accessible options before potential implementation

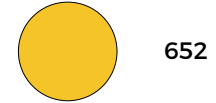
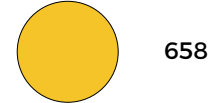


Find **equitable ways to mitigate impacts** on people who are senior, lower-income, and/or differently-abled



Provide **affordable transit** fares to support fairness concerns and incentivize mode shift

of public comments
for **congestion point
charging**



Congestion themes from public comments

of public comments
for **distance-based
charging**



Avoid 'double-dipping' by reducing other taxes and costs people already pay for transportation



Study **other ways to reduce congestion other than charging**, like more efficient road use



Apply charges only where and when congestion is a problem, like at hot spots and/or peak hours

of public comments
for **congestion point
charging**



Revenue themes from public comments

of public comments
for **distance-based
charging**



Recognize that there is **distrust in how revenues have been managed by TransLink and governments**



Ensure **accountable and transparent use of decongestion charging revenues**



Distribute decongestion charging **revenues and benefits equitably across region**

of public comments
for **congestion point
charging**



Stakeholder and government acceptability of a decongestion charge will depend on addressing concerns about affordability and equity. Given the opportunity for in-person dialogue, some nuanced suggestions emerged to mitigate these concerns, including:

- To support social equity, offer caps, discounts, and exemptions for certain groups, including seniors, persons with disabilities and lower-income residents, truckers, businesses, non-profit meal delivery services, taxis
- To mitigate affordability concerns, offer transit options, align charge rates to the availability of transit, make transit free, and reduce or eliminate the fuel tax

There was concern regarding when and where charges would be applied, highlighting access to health care, schools, child care, and business services. There is an emphasis on integrating the system design with regional and land use planning processes.

How to measure equity remains subjective, with questions on who and how much to charge: *How could we charge higher in areas with greater transit accessibility if those residents already pay higher property taxes to fund transit? What about charging tourists and visitors? How can you charge at crossings when there are no other alternatives to get across? How is it fair if only half the population is paying?*

The question on how to equitably charge goes hand in hand with how to equitably distribute the revenues across the region for transit and transportation investment.

Driving is expensive, so people with lower incomes tend to drive less than people with higher incomes. This means that people with higher incomes are likely to pay more for a decongestion charge than people with lower incomes. However, as with many other transportation costs like transit fares, people with lower incomes will likely pay a higher proportion of their income in decongestion charges.

A decongestion charge with a meaningful impact on congestion could have significant out-of-pocket costs for some households...

There is a higher level of public support for charging that targets congestion (user cost) than for charging by use (user pay). By a two-to-one margin in the public polling, residents expressed a preference for user cost charging (49%) over user pay charging (25%). This sentiment matches the online engagement (44% vs 32%) and User Advisory Panel results.

There is lower stakeholder support for applications that do not meaningfully reduce region-wide congestion. Reasons include impacts of traffic diversions, limited behaviour shifts to other transport modes, being over-simplistic (like charging only at peak periods), and only targeting certain areas (like downtown Vancouver). There is higher support for targeted approaches, although understanding that they could be expensive, complex, and unpredictable for drivers (like multi-zone distance-based charging or charging at hot spots).

Analysis shows that the economic benefits of decongestion charging are derived from the ability to reduce congestion, and that the charges needed to achieve such a reduction are likely to be understood by many as high. Lower charges that might be considered more affordable can generate revenues but produce little or no congestion benefits. **The paradox is that the lower the charge, the more it can be described as a “tax grab” – only at relatively higher charges do the congestion benefits start to appear.**

It is possible to design a decongestion charge that only raises revenues without any meaningful impacts on congestion. But the costs of raising those revenues will be significant. With little or no decongestion benefits, the overall economic case for such a decongestion charge is hard to justify.

...but that means there are revenues available to offset some of the concerns about equity and affordability.

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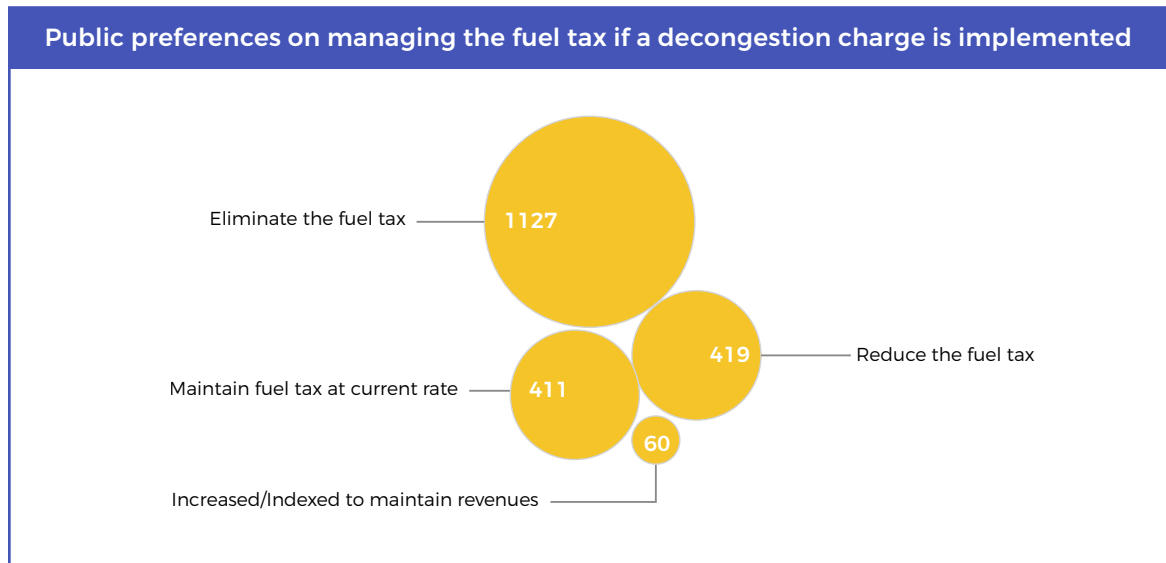
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The decongestion charging concepts that have been explored have the potential to raise net revenue. How these revenues are used will be a very significant factor in how equitable the charge is. Examples could include returning revenues through balancing against other mobility pricing fees, removing other taxes or offering targeted rebates to people on low incomes.

There was consensus among the public from polling and engagement to reduce existing taxes if a decongestion charge is implemented. 1,566 comments that expressed a preference through the online engagement platform are displayed in the graphic below:



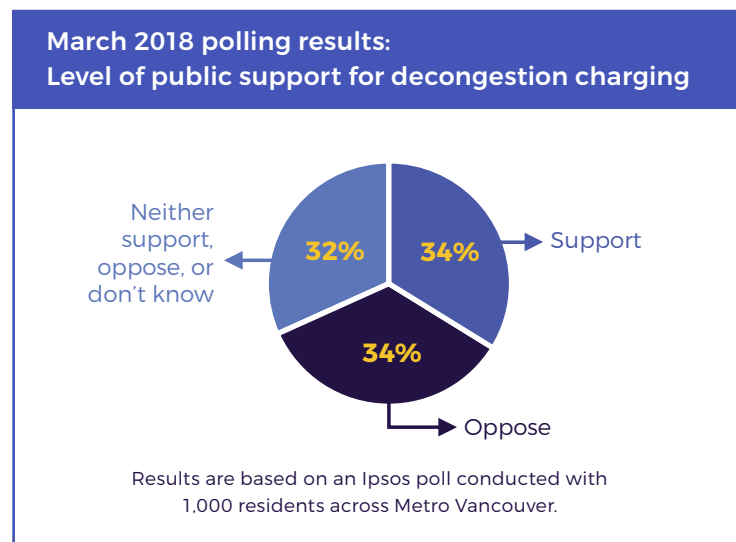
55% of polled residents gave 'reducing driving costs (i.e. insurance, parking fees, fuel taxes)' as their top priority to use decongestion charging revenues. 35% supported using revenues to reduce transit fares.

Public support for decongestion charging is low, but many are undecided. There are several measures that can increase acceptance.

Skepticism and low support for a decongestion charge were heard throughout the project with comments including 'it will not work,' 'this is another tax grab,' 'this is unaffordable,' and 'it is penalizing.'

Residents tend to be more willing to support a decongestion charge if it supports transportation investment or makes paying for transportation more fair. Comments in support of a decongestion charge spoke to benefits from reduced traffic and commute times, behavioural shifts to other modes of transport, and environmental benefits from reduced vehicle use.

Polling shows that public opinion on decongestion charging is evenly split.



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With so much of the population still undecided, time and education will be important. Polling in March 2018 shows that awareness levels are still low for mobility pricing (30%), decongestion charging (14%), congestion point charging (13%), and distance-based charging (31%). The *It's Time* project may have been the first time many people heard about decongestion charging or considered its impacts. Polling also showed that 70% of residents are interested in staying informed on mobility pricing, and 68% think it is worthwhile to study ways to make transportation pricing more efficient and fair. This is an increase from the September 2017 poll.

The level of support in Metro Vancouver is comparable with that found in other jurisdictions which have considered a decongestion charge. As policy designs are communicated to the public, there is often a negative reaction, leading to low levels of support. Around 39% of people in London and 21% of people in Stockholm were in favour before those systems were implemented. Concerns are often driven by expectations of high costs, a perceived lack of viable transportation options, as well as a lack of confidence in the benefits of congestion reduction. Acceptance typically increases after implementation, which can be attributed to these factors:

- Travel times improve more than people expected (benefits are realized)
- Negative consequences, like paying the charges or shifting travel habits, prove less problematic than anticipated
- People adapt and accept a new status quo, no longer evaluating the policy as a “change”

Public support for a comprehensive mobility pricing policy that includes a decongestion charge will depend on addressing public concerns on:

- Affordability
- Transit options
- Equity
- Accountability in managing revenues

There are unique considerations for First Nations that need to be included in future research and engagement.

The Commission chair and vice-chair met with the Union of BC Indian Chiefs and a few representatives from local First Nations to share information and begin understanding unique concerns about decongestion charging from an Indigenous lens. Transportation, health, and cultural services are not available on reserve and in rural communities, and a decongestion charge will impact the communities' ability to access these resources. There are also limited transit and HandyDart options, and car sharing options do not service certain reserves and communities.

Key flags to consider are whether and how it would be appropriate to apply a decongestion charging system as the road network is situated on unceded Indigenous land, and how First Nations would pay into and receive the benefits. Additionally, existing engagement with First Nations on transportation has not met expectations and more dedicated and meaningful effort is required.

PART 3. PRINCIPLES FOR A MOBILITY PRICING POLICY

What we recommend

PART 3. PRINCIPLES FOR A MOBILITY PRICING POLICY

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Based on the findings in Part 2, the Commission has put together the following set of principles to guide the development of a coordinated regional mobility pricing policy for Metro Vancouver. The principles are interdependent and are not offered in any order of priority or relative importance.

Note: Some of these principles have been used to narrow down the range of potential decongestion charging concepts to those illustrated in the following section. This process is described in the boxes under the relevant principles.

An effective, farsighted, and fair regional mobility pricing policy for Metro Vancouver should:



Congestion

- A. Deliver meaningful reductions in traffic congestion
- B. Ensure everyone pays a fair share
- C. Coordinate all the ways we pay for mobility, including new and emerging services



Fairness

- A. Be consistent and explainable
- B. Support equity
- C. Align prices for road use with access to transit



Support investment

- A. Ensure accountability in the way revenues are used
- B. Not have raising revenue as its primary aim



Other considerations

- A. Deliver positive economic benefits
- B. Protect individual privacy
- C. Be predictable, but adaptable
- D. Support goals for regional growth, climate change, and the environment
- E. Continue to be explored with the public and stakeholders

Congestion



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Traffic congestion is a real and growing concern in Metro Vancouver. There are many measures that need to be taken to counter the threat of growing congestion, and a coordinated mobility pricing policy that includes a decongestion charge should be an integral part of any such strategy. But it is unclear who holds overall responsibility for coordinating action on reducing congestion.

Mobility pricing is only part of the solution, and it will need to be considered in a broader context with other tools and measures and against other policy objectives for a socially, economically, and environmentally sustainable region. There are many bodies at the municipal, regional, provincial, and federal levels involved in operating our transportation network, and it is not always clear how responsibility for addressing traffic congestion is coordinated. Clarifying this responsibility will be an important part of making a decongestion charge work to address growing congestion.

The Commission recommends that the following principles be applied when considering congestion:

PRINCIPLE A

A decongestion charge should deliver a meaningful and region-wide impact on traffic congestion. This must be guided by appropriate congestion reduction targets for Metro Vancouver.

Congestion is an issue across the region, and so a mobility pricing policy should seek to have regional benefits. If reducing congestion is an important motivation, the reduction must be visible to drivers and other road users in the form of reduced travel time delays and increased reliability. That means a decongestion charge will need to be set at a level to achieve behaviour change. Many people will experience those charges as high, so there needs to be a careful balance between this and the other objectives of fairness and supporting investment.

The design of a decongestion charge should seek to minimize rerouting that could cause new congestion hot spots and adversely affect local air quality and safety.

The region does not currently have an agreed definition of congestion or any targets for reduction. This means the Commission has not been given any guidance on what a meaningful reduction of congestion might be, which is important for understanding what a decongestion charge might look like.

The Commission proposes that a target be set based on three metrics:

- Total regional congested time savings
- Visible congested time savings – the proportion of households experiencing a large reduction in congestion time
- Positive net economic benefits, which take into account the household costs and also the inconvenience to people changing behaviour

Region-wide, meaningful congestion reduction can be used to eliminate some decongestion charging concepts:

- In order to achieve region-wide congestion reduction, point charges need to be located at strategic points across the network. This excludes charges with only local scope, such as charges at just certain bridges, or at or around urban centres
- Region-wide congestion reduction is achievable in all the distance-based charge systems we studied, but it is difficult to achieve meaningful reductions using flat-rate all-day charges

PRINCIPLE B

Everyone who uses the transportation system should pay something for it. It should cost more if using the road causes congestion. It is important to find the right balance between paying for use and paying for congestion.

One aspect of fairness is that everyone should be contributing something to the transportation system – so-called “user pay.” We already do this with fuel taxes, transit fares and through property and income taxes. Another aspect of fairness is that those trips contributing more to traffic congestion, by travelling in congested locations at congested times in a way that takes up more space per person, should pay more – “user cost.” While the justification for a decongestion charge does not rest on the experience of individual drivers, an important dimension of fairness could also be that people who pay should benefit from time savings.

Achieving a balance between paying for use and paying for congestion can be used to eliminate some decongestion charging concepts:

- User Cost is a priority, and charges should be higher in locations and at times where congestion is greater
- Flat-rate all-day charges do not align well with user-cost; charges that vary by time and location align better
- Distance-based charges allow for a more targeted balance between user pay and user cost when charge rates are varied across multiple zones
- A User Pay component can be achieved by additions of fuel/energy taxes to a congestion point charge

PRINCIPLE C

A decongestion charge should be coordinated with all the other ways we pay for mobility in Metro Vancouver – including new and emerging mobility services – to achieve regional mobility goals.

As discussed in Part 2, the way people pay for transportation has an impact how, where, when, how often, and how much they travel. Coordinating the price signals sent by a decongestion charge with transit fares, parking fees, and fees for existing and emerging transportation services could be a powerful way to achieve goals for efficient, affordable, and sustainable mobility. More work is required to fully understand how this should be done.

The public and stakeholders have suggested that reducing transit fares might contribute to relieving traffic congestion. Some very preliminary analysis suggests there could be synergies between a coordinated introduction of a decongestion charge and the reduction of some transit fares. There is also potential to use parking pricing to influence congestion in parts of the region that has not yet been fully explored.

An integrated mobility payment system, covering transit fares, parking, decongestion charging, and even bike and car share, taxis, and services offered by transportation network companies could introduce new possibilities for people to track their spending on transportation and could overcome some of the inflexibility of monthly transit passes. It also offers interesting potential for financial incentives to be offered in addition to charges.

Fairness



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Fairness needs to be considered across many different dimensions. Consideration of fairness should apply to everyone, irrespective of how they choose to travel.

The Commission has heard many different concerns about fairness, including those regarding geographic differences across the region, the different needs of groups within society like seniors, people with disabilities, children, students, tradespeople, people providing social services, commercial drivers, as well as people with different incomes.

Many of these concerns about new ways to pay for using roads are valid, but many of them could equally be applied to the ways we already pay to use transit. A discussion about the fairness of paying for mobility needs to apply consistently across all modes of transportation.

The Commission recommends that the following principles be applied when considering fairness:

PRINCIPLE A

Differences in mobility pricing charges across users must be consistent and explainable.

Transit fares using the current zone structure have some relation (however imperfect) to distance travelled, that is, how much of the transit system people use. The transit fare review has looked at options including a closer relationship between the fare paid and the distance travelled and varying according to the type of transit used. The relationship between road use and how we pay for it, and in particular the differences between how we pay for road use and how we pay for transit, are not clear and explainable. Many of the concerns about the fairness of a decongestion charge, for example the impacts on people with low incomes, could equally apply to transit fares.

A decongestion charge that is designed to charge in relation to the economic costs of congestion will result in people paying different amounts. Differences in the cost of decongestion charges across users are fair to the extent that they are justified by congestion benefits, explainable by consistent application of transparent pricing principles, and that the differences favour those with least ability to pay. There may be circumstances where this could lead to excessively high charges, in which case caps, discounts, or rebates could be considered.

It will likely be reasonable that some groups – for example, people with disabilities in possession of a SPARC parking placard – could receive an exemption or discount from decongestion charges.

How charges are applied to commercial users needs to be considered very carefully. Commercial vehicle operators want to see improvements in congestion and particularly journey time reliability, but they would also value a system that allows them to allocate costs transparently and accurately to their end customers. It could be appropriate to consider special forms of charging that apply specifically to commercial users of all kinds.

PRINCIPLE B

The design of a decongestion charge should seek alignment of charges with access to transit. This can be supported by targeted transit improvements.

It is possible to design a decongestion charge that is aligned with access to transit. It would also be possible to introduce targeted improvements, for example, in the form of new direct bus services connected to park and ride facilities, to further improve this alignment.

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It is important to remember that if a decongestion charge were to be introduced, most people would pay and keep driving. Only a small number of people need to change the way they travel for there to be a meaningful reduction in congestion. Most people who change behaviour will change destinations, share cars more, plan their trips more efficiently, and reduce their distances driven. So, while good transit is important in a growing region, the fact that some areas have poorer access to transit is not necessarily a reason to delay the introduction of a decongestion charge.

Systems that seek to address congestion will generally be more aligned with transit access, as urban density, congestion, and transit services are generally correlated.

PRINCIPLE C

A mobility pricing system should be designed in a way that seeks to promote equity. Any revenues from a decongestion charge above those needed for agreed transportation investments should be used to address concerns about the affordability of mobility for people on lower incomes.

Action is required on many fronts to address affordability in our region, most of which lie outside the mandate of the Commission. This should be an important theme of work in the next regional transportation strategy beginning in 2018.

Although people on higher incomes are likely to pay more under any decongestion charge concept, lower-income households will pay a larger proportion of their incomes – the same is true for existing transit fares and fuel taxes. Because people on higher incomes generally drive more at congested times of day, a system that focuses on congestion could be more equitable than one that charges the same rates irrespective of when we drive.

Systems having a meaningful impact on congestion are likely to produce more revenue than is required for current transportation investment priorities. These excess revenues could be used in various ways to address affordability concerns, and we suggest further research be carried out on:

- Reducing the fuel tax and/or other taxes that currently contribute to the regional transportation system
- Providing a tax credit to lower income households
- Reducing transit fares

Some systems could produce substantially more revenues. In this case, consideration could be given to a more comprehensive review of the ways we pay for transportation, including through transit fares, property taxes, parking taxes, the Hydro levy or even income taxes. This could address a broader picture of equity and affordability in a way that is unlikely to be achieved through targeted measures to address only the effects of a decongestion charge.

Although there is a lot of support among the public, stakeholders, and government officials for mitigating the impacts for people on low incomes, some stakeholders cautioned against measures that might reduce the impacts of a decongestion charge.

Support investment

The first use of revenues raised from a decongestion charge should be to pay for investments as part of an approved regional transportation investment plan.



The Commission's Terms of Reference set out the requirement for revenues to support transportation investment.

Revenues could also be used to increase equity or to offset other ways we pay for the transportation system, as discussed above.

The Commission recommends that the following principles be applied when considering supporting investment:

PRINCIPLE A

The entity that collects and manages revenues from a decongestion charge must ensure accountable, effective, and transparent use of those revenues.

The public and stakeholders have raised concerns about transparency and efficiency in the way revenues are used for transportation investment in the region at all levels of government. Without endorsing or refuting the legitimacy of these concerns, the Commission agrees that it will be important for whatever entity is in charge of collecting and allocating revenues to do so in a way that is accountable, effective, and transparent. This will require some level of independent scrutiny.

PRINCIPLE B

Raising revenues should not be the primary purpose of a mobility pricing policy.

While net revenues can be raised through a decongestion charge, those revenues come at a direct cost, which could be anything between 10 and 50% of the gross revenues. Costs should be kept to a minimum, but will always be more than, for example, the costs of collecting the fuel tax. In short, a decongestion charge is not an efficient way to raise revenues if that is the primary purpose. The logic of decongestion charging is that it can achieve other benefits, primarily improved journey times through meaningful reductions in congestion.

The efficiency of charge collection can be used to eliminate some decongestion charging concepts:

- Some concepts the Commission studied, for example charging a dollar per bridge, had costs that were more than half the gross revenues. The illustrative concepts presented in Part 4 have costs that are around 25% or less of gross revenues.
- The range of cost estimates for distance-based charges is larger at this time, reflecting greater uncertainty. It is anticipated that these uncertainties can be addressed with further analysis.

Other considerations

There are other aspects, beyond the three objectives of reducing congestion, promoting fairness, and supporting investment that need to be considered:



PRINCIPLE A

A decongestion charge must deliver positive total economic benefits for the region.

The total economic benefits of public policies are measured by monetizing all the effects, both positive and negative. They are a measure of how the regional economy in Metro Vancouver will benefit or be harmed by pursuing a particular policy. For decongestion charging, the major benefits include reductions in delays, improvements in travel time reliability, and emission reductions. The costs include implementation, operation, and the inconvenience to people who choose to change their behaviour. Achieving positive economic benefits is a minimum requirement for a decongestion charge. Economic benefit calculations are however blind to equity and fairness considerations and not all effects can always be monetized.

Not all of the decongestion charging systems we examined necessarily produce positive economic benefits, but it is possible to design systems that produce substantial benefits.

Total economic benefits can be used to eliminate some possibilities:

- Total economic benefits are driven by several parameters, both positive and negative. In the case of concepts that are well aligned with congestion, these benefits will depend on the level of the charge. Lower charges give lower congestion benefits, but also lower costs of adaptation for individuals. Higher charges give greater benefits, but also greater adaptation costs.

PRINCIPLE B

The design of a mobility pricing policy should support provincial and regional environmental and land use objectives, as well as considering implications for health and road safety.

Many stakeholders were interested in the potential for a more coordinated mobility pricing policy that includes a decongestion charge to make a positive contribution to objectives around greenhouse gases and criteria air contaminants. Research shows that a reduction in vehicle kilometres travelled (VKT) would support these objectives and provide further benefits for public health, noise reduction, and road safety.

The design of a mobility pricing policy also needs to support (or, at a minimum, not detract from) regional land use objectives.

PRINCIPLE C

A mobility pricing system needs to be stable and predictable but can and should evolve over time to more effectively address congestion.

Systems should also be capable of adapting over the longer term to changing patterns of congestion as a result of population growth, new infrastructure, external changes like increased automation or electrification of the vehicle fleet, or new possibilities for vehicle sharing.

Research shows that, depending on the technology deployed, decongestion charging has good potential for flexibility, and other cities like Singapore and London have evolved their systems and rates over time.

PRINCIPLE D

A mobility pricing system must recognize and respect an individual's interests and rights to privacy and use of personal information.

Research shows that it is possible to address concerns about privacy through the design and implementation of a system that meets all privacy laws, regulations, and best practices, but this will warrant close and careful attention.

PRINCIPLE E

There will need to be further communication and engagement around a mobility pricing policy, with dedicated resources and programming for inclusive outreach to Metro Vancouver's diverse residents.

There is strong demand for continued public education and engagement on mobility pricing. It is a complex topic to communicate, and it is likely to remain high-profile and controversial.

Future communication and engagement must be inclusive and designed to understand all viewpoints. Underrepresented voices can be unintentionally excluded, but those people are often impacted disproportionately. With the Commission's commitment to inclusive participation, the *It's Time* communication and engagement program had dedicated funding to reach the region's multicultural and socioeconomically diverse communities.

This funding set a strong precedent, and demand, for continued inclusive practices. It also showed high returns on investment on inclusive programming.

PART 4. ILLUSTRATIVE CONCEPTS FOR A DECONGESTION CHARGE

What it could look like

PART 4. ILLUSTRATIVE CONCEPTS FOR A DECONGESTION CHARGE

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The Commission has analyzed a series of possible decongestion charging concepts and concludes that a system that meets the principles outlined above could be implemented in two broad ways:



A regional congestion point charge with charge points at or close to some or all of the regionally important crossings, complemented by further point charges at locations within the Burrard Peninsula



A distance-based charge with two or more zones with varying charge rates throughout Metro Vancouver

Based on analysis using outputs from the Regional Transportation Model and other sources, the two systems produce similar results in terms of congestion reduction, household costs and revenues. Distance-based charging appears to have considerable flexibility for refinement, for example, in targeting congestion and aligning with transit access and a broader mobility pricing policy. But there is some uncertainty as to the maturity of the available technology that suggests a more cautious implementation timescale would be warranted. Congestion point charging uses mature technology that could be implemented quickly with relatively little risk, but some of the flexibility and potential to integrate into a broader mobility pricing policy would be lost.

In summary, if decision-makers consider that the regional congestion problem and the need for revenues is acute, congestion point charging provides a good solution. If these issues are not acute, and more time can be taken to develop a more flexible solution, distance-based charging would be an opportunity for the region to lead the world in sustainable congestion management.

More analysis and iterations will be needed before finalizing a decongestion charge system that balances the many factors that need to be considered. The following concepts are offered as illustrations of charge levels needed to achieve meaningful reductions in congestion, and best estimates of their impacts based on traffic modelling.

SETTING CHARGE RATES WITHOUT A CONGESTION REDUCTION TARGET

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In the absence of a target for congestion reduction, charge rates have been determined using a combination of two methods: marginal social cost pricing and minimum congestion reduction thresholds.

Marginal social cost pricing

Developing baseline charge rates was grounded in economic theory and the concept of marginal social cost pricing. Charges are set according to the level of congestion experienced and achieve the optimum outcome for society. That means that charge rates would vary on different parts of the road network by time of day, according to the exact level of congestion. These variable time and location charges are simplified and applied at congested points (congestion point charging) or as a per kilometre charge over a wider zone (distance-based charging).

Minimum congestion reduction threshold

Applying the theory of marginal social cost pricing will ensure that the optimal economically efficient charge rates are set for each of the congestion point charges or distance-based charging zones.

However, analysis suggests that setting the rates in this way will likely exceed the politically desired or required level of congestion reduction.

In the absence of a clear congestion reduction target, we have set a minimum threshold that would meaningfully reduce congestion. This minimum congestion reduction threshold is based on a combination of regional travel time savings, visible congested time savings, and net economic benefits.

Refer to Appendix B for the full details of how the minimum congestion reduction threshold has been developed and set.

For each decongestion charging concept, two charge rates are illustrated:

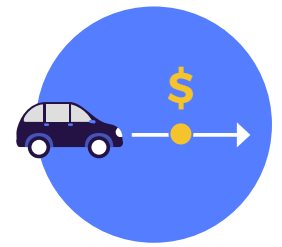
Min

Minimum: one that would achieve the minimum level of meaningful congestion reduction as described above (where the charge rates are approximately half – 50% – of the marginal social cost charge rates) and

Min+

Minimum+: one that would produce a slightly higher level of congestion reduction (where the charge rates are about three-quarters – 75% – of the marginal social cost charge rates).

Regional congestion point charges



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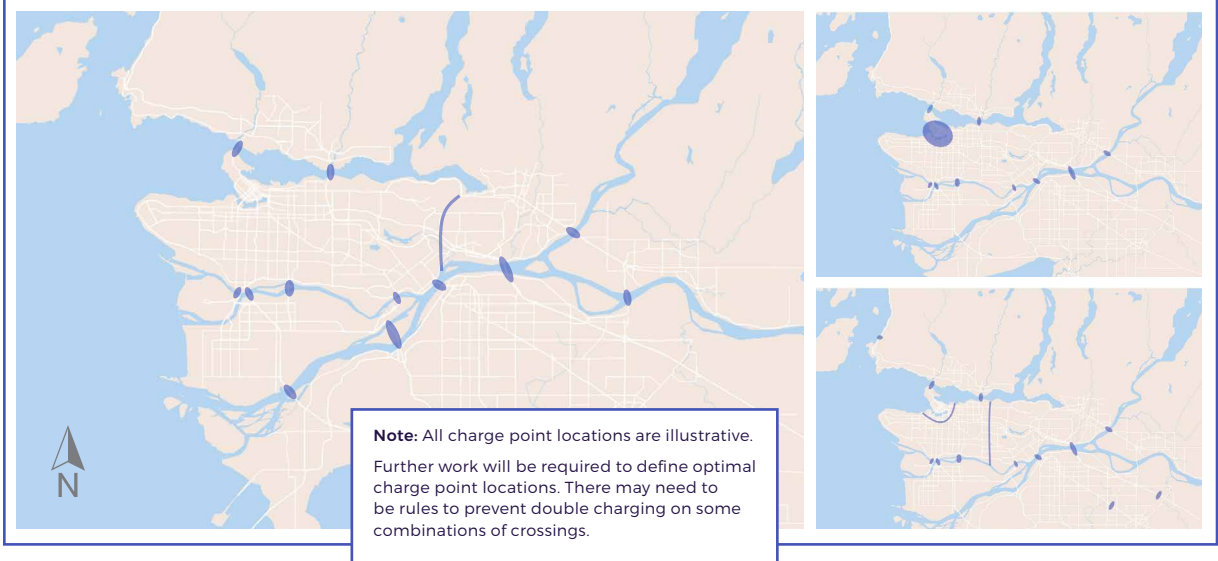
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One possible approach is a congestion point charge system with charge points on or close to 12 major crossings throughout the region. Because there is congestion in areas away from bridges, particularly within the Burrard Peninsula, these points should be complemented by further points at other strategic locations.

For the purposes of this analysis, charge points have been located along North Road (the boundary between Burnaby/New Westminster and Coquitlam/Port Moody), but alternative approaches that could be worth pursuing are also illustrated below.

Further work will be required to find optimal locations for all charge points.

Illustrative regional congestion point charge concept and alternative approaches



Charge rates

Charge rates have been set at 50% and 75% of the marginal social cost of congestion at the given location and time, so charges vary by time of day, location, and direction of travel. Higher charges reflect higher levels of congestion. **All charge rates are preliminary and for the purposes of this illustration.** Rates are given for peak and off-peak periods. The duration of AM and PM peak periods would need to be determined. There may need to be “shoulder periods” of intermediate charge levels to avoid sudden large rate changes between peak and off-peak charges.

For both of these concepts, it is assumed that the regional fuel tax of \$0.17 per litre remains in place in order to achieve a balance between paying for use and paying for congestion, as described in congestion principle B.

Charge levels used for the illustrative regional congestion point charge concept

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Min

Min+

Charge concept	Direction of travel	Time of Day	Congestion Point Charge Location					
			Lions Gate and Iron-workers	Arthur Laing, Oak and Knight	Queensborough, Pattullo, and Port Mann	George Massey and Alex Fraser	Pitt River and Golden Ears*	North Road
Min	Inbound (towards Downtown Vancouver)	AM Peak	\$3.55	\$3.59	\$4.25	\$2.68	\$2.80	\$2.60
		Off Peak	\$1.06	\$0.91	\$0.74	\$0.76	\$0.54	\$0.36
		PM Peak	\$4.92	\$3.54	\$3.54	\$3.05	\$2.41	\$1.03
	Outbound (Away from Downtown Vancouver)	AM Peak	\$4.30	\$2.24	\$2.17	\$2.18	\$2.72	\$0.85
		Off Peak	\$0.86	\$0.81	\$0.65	\$0.55	\$0.52	\$0.41
		PM Peak	\$4.59	\$3.92	\$5.52	\$3.51	\$4.15	\$2.27
Min+	Inbound (towards Downtown Vancouver)	AM Peak	\$5.32	\$5.38	\$6.37	\$4.03	\$4.19	\$3.90
		Off Peak	\$1.59	\$1.36	\$1.11	\$1.13	\$0.81	\$0.54
		PM Peak	\$7.38	\$5.30	\$5.30	\$4.58	\$3.61	\$1.54
	Outbound (Away from Downtown Vancouver)	AM Peak	\$6.45	\$3.36	\$3.25	\$3.27	\$4.08	\$1.27
		Off Peak	\$1.29	\$1.21	\$0.98	\$0.83	\$0.78	\$0.62
		PM Peak	\$6.89	\$5.87	\$8.27	\$5.27	\$6.23	\$3.41

*For Golden Ears bridge, southbound is inbound, northbound is outbound, selecting the higher peak flows.

Price capping should be explored as part of further research in order to address trips that cross multiple charge points in a single journey. The charge rates for some example trips using this illustrative concept can be found later in this section.

How do the regional congestion point charge concepts perform?

Depending on whether the *Minimum or Minimum+* concept is pursued, the regional congestion point charge approach has the potential to generate regional congestion reductions in the range of 20-25% and improve travel time reliability by 17-20% compared to the 2030 baseline. The estimated median weekday cost to households that pay into this system (without ever altering their behaviour) is in the range of \$5.00-8.00 per day, and \$1,800-2,700 per year⁴.

Capital costs to establish congestion point charges are in the range \$150-350 million, with annual operating costs in the range \$110-200 million. Annualizing the capital costs of on-street charging infrastructure over 35 years and including revenue from the fuel tax, such a system could deliver annual net revenues in the range of \$1.1-1.5 billion.

Greenhouse gas emissions from road transport would be reduced by 2-3%.

⁴Costs incurred by households that will pay the decongestion charge without ever adjusting their driving behaviour. These are an overestimate, as many households will be able to reduce costs by changing travel behaviour on some days. Annual estimates are based on an annual expansion factor of 335, which is consistent with expansion factors used elsewhere in transportation demand modelling, but a one-day travel pattern for a household may not be representative for their "average" behaviour and thus some errors are made by annualizing the daily household travel patterns. Refer to Appendix B for the full details of these metrics and methods.

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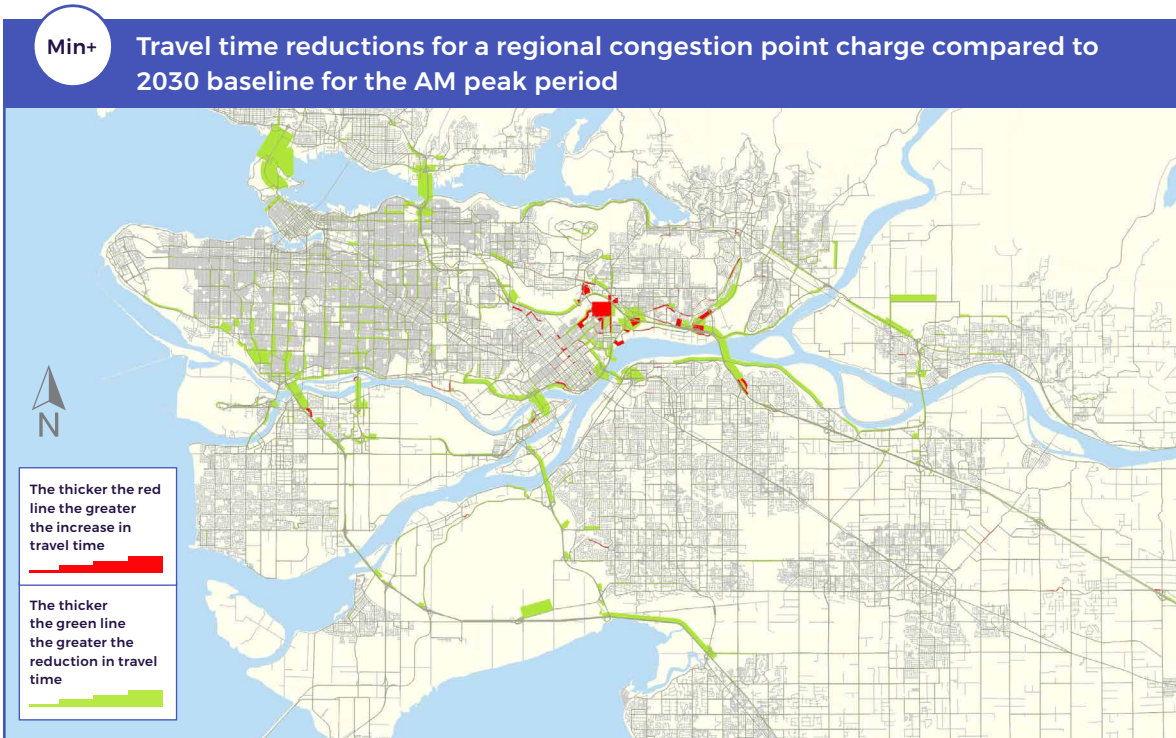
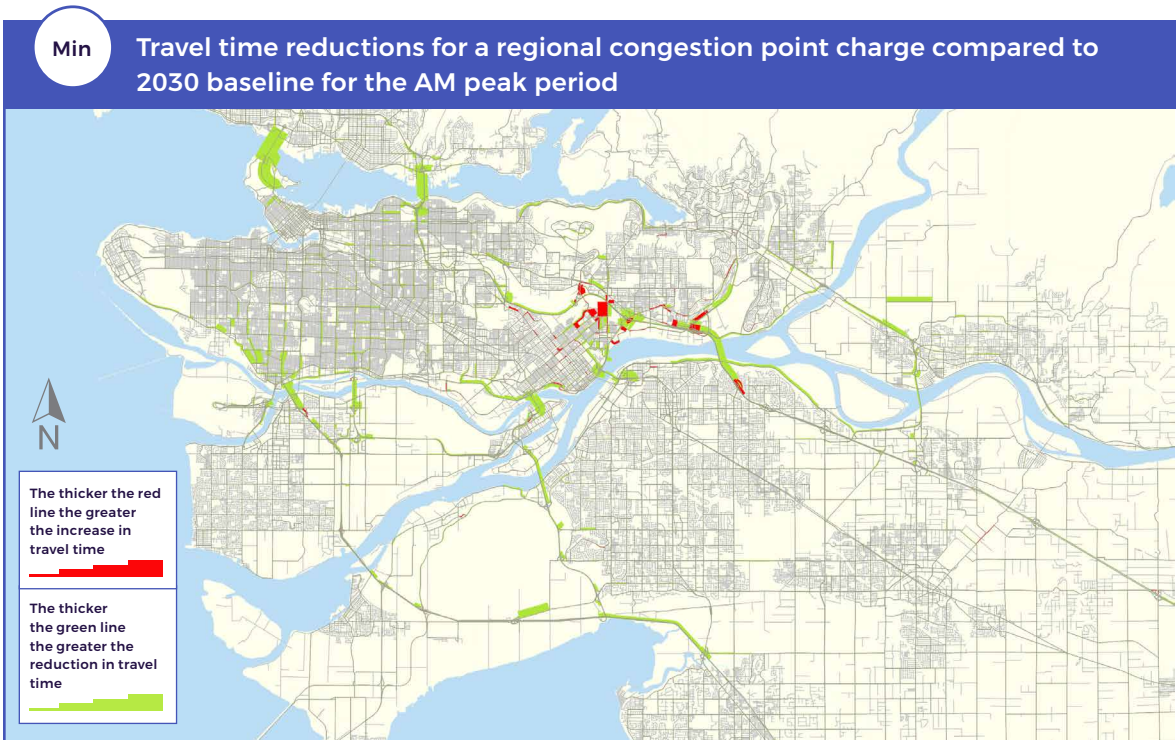
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The numbers in the table on the next page are best estimates based on the modelling and analysis done to date. As concepts are further refined and updated data on Metro Vancouver travel patterns becomes available, these estimates will need to be updated.

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Evaluation criteria	Units	Regional congestion point charges	
		Min	Min+
Economic benefits			
Total net economic benefits	\$ million/year	\$220	\$290
Congestion			
Total regional congested time savings	% change from baseline in 2030	-20%	-25%
Travel time reliability	% change from baseline in 2030	17%	20%
Visible congested time savings ⁵	% households that will achieve >10 mins savings per day	25%	44%
Revenue			
Total net revenue ⁶	\$ million/year	\$1,050	\$1,460
Household costs			
Median daily costs for households that pay	\$/household/day	\$5-6	\$7-8
Median annual costs for households that pay	\$/household/year	\$1,800-2,000	\$2,500-2,700
Median household charges as a % of annual income	Low (<\$50K/yr)	5-6%	7-8%
	Med (\$50K-\$100K/yr)	2-3%	3-4%
	High (>\$100K/yr)	1-2%	1-2%
Amount needed to correct equity imbalance ⁷	\$ million/year	\$170	\$250
Environment, health, and contribution to the regional transportation strategy and regional growth strategy			
GHG emissions (all modes)	% change from 2030 Baseline	-2%	-3%
Total VKT (all modes)	% change from Baseline in 2030	-4%	-6%
VKT/capita (private car)	% change from Baseline in 2016	-12%	-14%

High income households would on average pay more in decongestion charges than low income households, but low income households would pay a greater amount in proportion to income. The same is true of many other fees and costs. The figures under *Amount needed to correct equity imbalance* represents the amount of money that would need to be returned to medium and low income households if the goal were to create a fully equitable system in the sense that everyone would pay the same as a proportion of income.

Refer to Appendix B for the full details of the consequences and trade-offs of the congestion point charge concepts.

The following considerations for further refining the regional congestion point charge concept were identified by the Commission:

- The optimal location of charge points
- Ways to address impacts for people on low incomes, including the return of revenues
- The application of discounts and exemptions
- Price capping to mitigate high costs borne by some road users (especially for *Minimum+*)
- Ways to address vehicle trips that benefit from reduced congestion but do not pay (i.e. trips that do not cross a charge point)
- Ways to mitigate boundary effects, for example, through the application of discounts or exemptions applied to households that live in close proximity to the charge points
- Targeted transit investment and park and ride to ensure that viable alternative transportation options are available
- Options for reducing the fuel tax
- The possibility of using excess revenues to reduce transit fares
- Considerations for new and emerging transportation services like transportation network companies and automated vehicles

⁵ Of the households experiencing significant daily congestion, what proportion will achieve visible congestion time savings per day.

⁶ This includes revenue from the fuel tax which is included in the congestion point charge concepts.

⁷ This figure represents the amount of money that would be needed to offset the income inequity.

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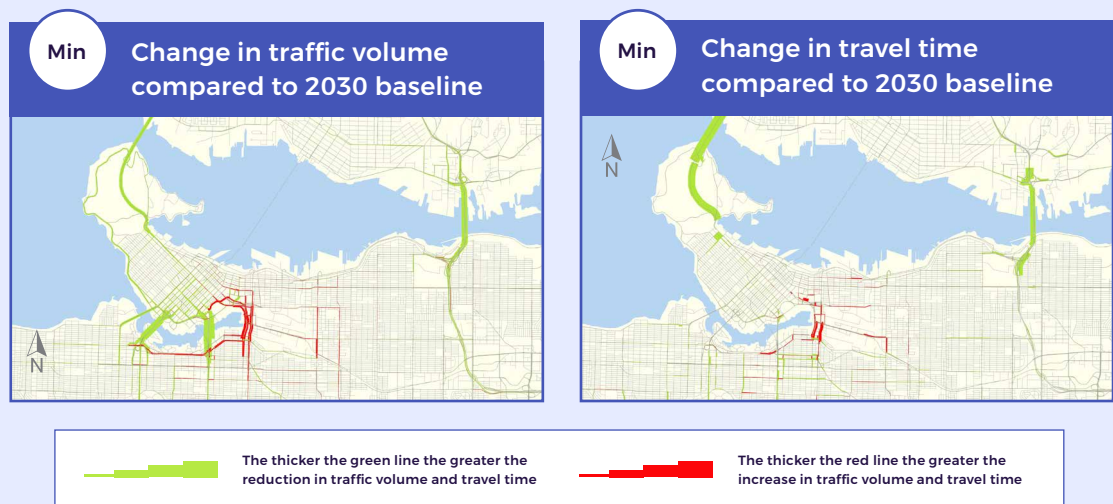
WHY NOT INCLUDE THE FALSE CREEK BRIDGES?

We analyzed the impact of charging on the three bridges over False Creek – Burrard, Cambie, and Granville – as part of a regional congestion point charge concept.

The result of these charges in the transportation model was traffic diversion to the already congested areas around Main Street and Quebec Street, as shown in the maps below.

The effect of this diversion was a small reduction in the overall congestion benefits of the regional congestion point charge concept. Adding a charge on the False Creek bridges does not have an impact on travel times crossing these bridges because there is little or no congestion on the bridges in the first place.

The following two maps illustrate the effects of placing decongestion charges on all bridges, including the False Creek bridges:



Adding charges to the False Creek bridges creates some significant negative consequences. That should not rule out the exploration of alternative charge concepts in this area. A downtown cordon as part of a regional congestion point charge concept is one option worth further research.

WHY NOT CHARGE A 'BUCK-A-BRIDGE' FOR ALL BRIDGES?

During the course of the *It's Time* project, we received many comments and suggestions around the notion of charging \$1 per bridge for all bridges. The rationale for this suggestion is that the rate is low, and that it's spread evenly across all bridges. An analysis of the impact of charging a dollar a bridge for the 12 bridges included in the regional congestion point charge concept drew the following conclusions:

- **There is no impact on congestion:** In order to have meaningful congestion reduction benefits, charge rates need to be high enough in the peak periods to change behaviour. Our research demonstrated that charging only a dollar per bridge is too low to have any meaningful impact on traffic levels, meaning there would be no improvements in congestion.
- **It's a very inefficient way to raise revenue:** Annual gross revenue of charging a dollar per bridge is estimated at \$390 million. However, annual system costs are estimated at \$210 million. Therefore the estimated annual net revenue is \$180 million (only 46% of gross revenue).

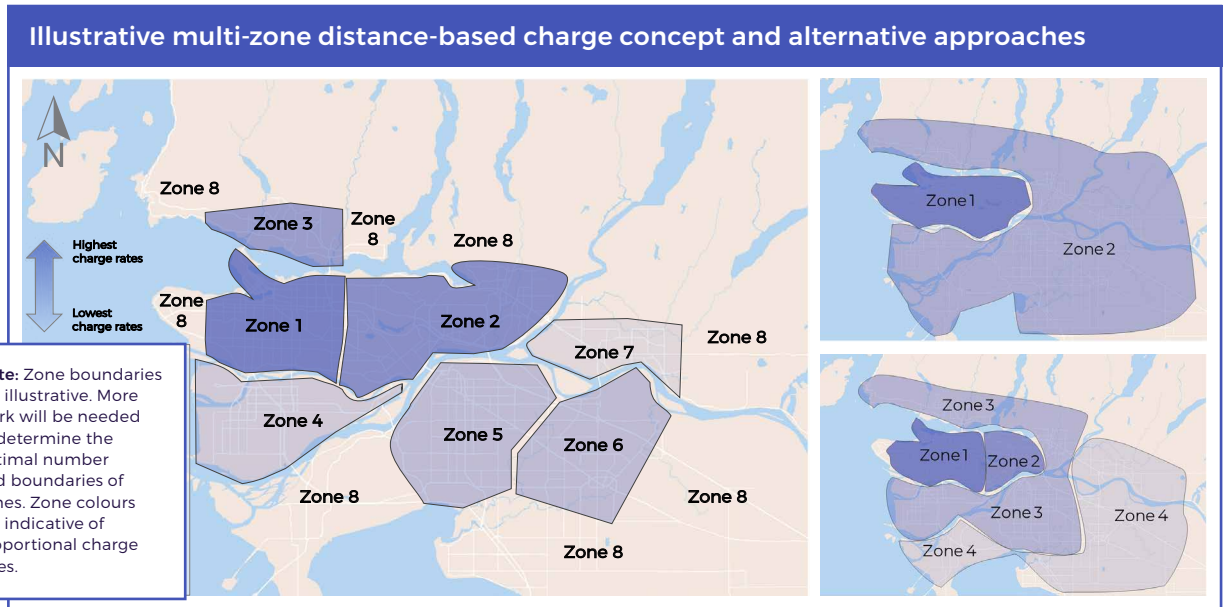
Multi-zone distance-based charges

A second approach is a multi-zone distance-based charging system, with the number and exact boundaries of zones still to be determined and refined. Charges vary by zone and time of day.



For the purpose of this analysis, eight zones with different distance-based charge rates have been developed, but alternative approaches that could be worth pursuing are also illustrated below.

Further work will be required to identify the optimal number and locations of zones.



Charge rates

Charge rates have been set at 50% and 75% of the marginal social cost of congestion at the given location and time, so charges vary by time of day and between zones. **All charge rates are preliminary and for the purposes of this illustration.** Rates are given for peak and off-peak periods. The duration of AM and PM peak periods would need to be determined. There may need to be “shoulder periods” of intermediate charge levels to avoid sudden large rate changes between peak and off-peak.

For both the *Minimum* and *Minimum+* concepts it is assumed that the regional fuel tax of \$0.17 per litre (or approximately 1.8 cents/km) is eliminated.

Charge levels used for the illustrative multi-zone distance-based concepts									
Charge concept	Time of Day	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8
Min	AM Peak	\$0.25/km	\$0.20/km	\$0.17/km	\$0.12/km	\$0.11/km	\$0.14/km	\$0.08/km	\$0.02/km
	Off Peak	\$0.07/km	\$0.02/km	\$0.02/km	\$0.02/km	\$0.02/km	\$0.02/km	\$0.02/km	\$0.02/km
	PM Peak	\$0.27/km	\$0.22/km	\$0.15/km	\$0.11/km	\$0.14/km	\$0.12/km	\$0.10/km	\$0.03/km
Min+	AM Peak	\$0.38/km	\$0.30/km	\$0.25/km	\$0.17/km	\$0.16/km	\$0.20/km	\$0.11/km	\$0.03/km
	Off Peak	\$0.11/km	\$0.03/km	\$0.03/km	\$0.03/km	\$0.03/km	\$0.03/km	\$0.03/km	\$0.03/km
	PM Peak	\$0.40/km	\$0.32/km	\$0.23/km	\$0.17/km	\$0.20/km	\$0.18/km	\$0.15/km	\$0.04/km

Price capping should be explored as part of further research in order to address large distances driven by some users in a single day. The charge rates for some example vehicle trips under this illustrative concept can be found later in this section.

How do the multi-zone distance-based charge concepts perform?

Depending on whether the *Minimum or Minimum+* concept is pursued, the multi-zone distance-based charge has the potential to generate regional congestion reductions of 20-25% and improve travel time reliability by 18-23%. The estimated median weekday cost to households that pay into this system (without ever altering their behaviour) is in the range of \$3-5 per day, and \$1,000-1,700 per year⁸.

There are many uncertainties surrounding the costs of implementing and operating a distance-based charge and more work will be needed. Based on estimates from available sources that are more than ten years old, capital costs to establish distance-based charging, including on-board units in all vehicles in Metro Vancouver, are in the range of \$400-700 million, with annual operating costs in the range of \$300-500 million. Technology for distance-based charging is developing rapidly and it is anticipated that these costs can be reduced. Annualizing the capital costs of on-board units over 7.5 years, it is expected that such a system could deliver annual net revenues in the range of \$1-1.6 billion (this includes the loss of revenue from the fuel tax, which is assumed to have been replaced).

⁸ Costs incurred by households that will pay the decongestion charge without ever adjusting their driving behaviour. These are an overestimate, as many households will be able to reduce costs by changing travel behaviour on some days. Annual estimates are based on an annual expansion factor of 335, which is consistent with expansion factors used elsewhere in transportation demand modelling. Refer to Appendix B for the full details of these metrics and methods.

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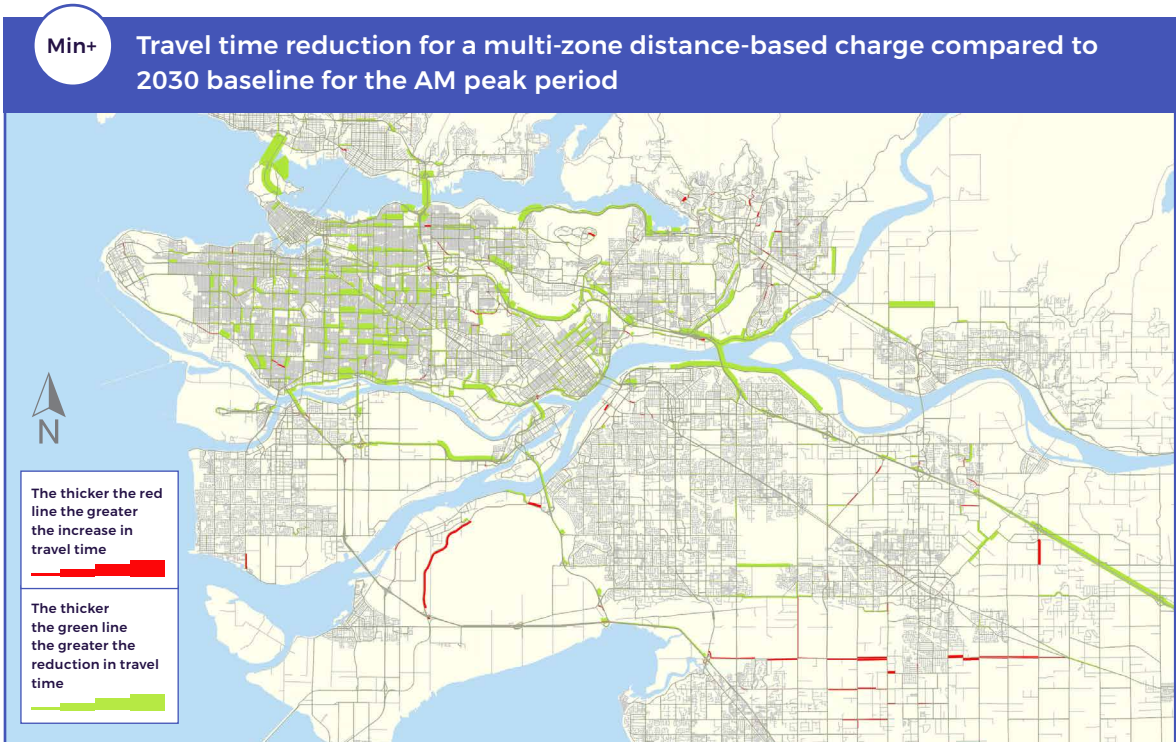
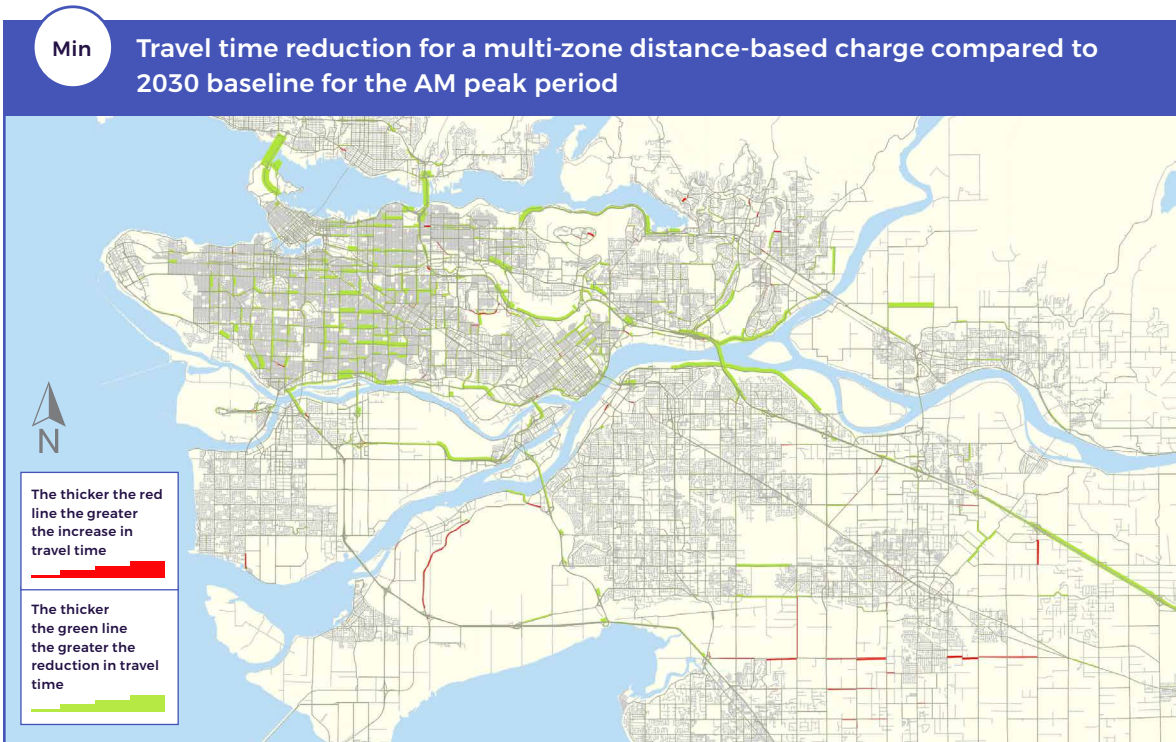
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The numbers in the table on the following page are best estimates based on the modelling and analysis done to date. As concepts are further refined and updated data on Metro Vancouver travel patterns becomes available, these estimates will need to be updated.

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Evaluation criteria	Units	Multi-zone distance-based charges	
		Min	Min+
Economic benefits			
Total net economic benefits	\$ million/year	\$180	\$350
Congestion			
Total regional congested time savings	% change from baseline in 2030	-20%	-25%
Travel time reliability	% change from baseline in 2030	18%	23%
Visible congested time savings ⁹	% households that will achieve >10 mins savings per day	25%	41%
Revenue			
Total net revenue ¹⁰	\$ million/year	\$1,030	\$1,640
Household costs			
Median daily costs for households that pay	\$/household/day	\$3-4	\$4-5
Median annual costs for households that pay	\$/household/year	\$1,000-1,200	\$1,500-1,700
Median household charges as a % of annual income	Low (<\$50K/yr)	2-3%	3-4%
	Med (\$50K-\$100K/yr)	1-2%	1-2%
	High (>\$100K/yr)	1%	1-2%
Amount needed to correct equity imbalance ¹¹	\$ million/year	\$230	\$345
Environment, health, and contribution to the regional transportation strategy and regional growth strategy			
GHG emissions (all modes)	% change from 2030 Baseline	-3%	-4%
Total VKT (all modes)	% change from Baseline in 2030	-5%	-6%
VKT/capita (private car)	% change from Baseline in 2016	-13%	-14%

High income households would on average pay more in decongestion charges than low income households, but low income households would pay a greater amount in proportion to income. The same is true of many other fees and costs. The figures under *Amount needed to correct equity imbalance* represents the amount of money that would need to be returned to medium and low income households if the goal were to create a fully equitable system in the sense that everyone would pay the same as a proportion of income.

Refer to Appendix B for the full details of the consequences and trade-offs of the multi-zone distance-based charge concepts.

The following considerations for further refining the multi-zone distance-based charge approach were identified by the Commission:

- The optimal number and location of charging zones
- Ways to address impacts for people on low incomes, including the return of revenues
- The application of discounts and exemptions
- Price capping to mitigate high costs borne by some road users (especially for *Minimum+*)
- The current state of the rapidly developing technology for distance-based charging and particularly how occasional users of the system without on-board equipment would be treated
- The possibility of using excess revenues to reduce transit fares
- Targeted transit investment and park and ride to ensure that viable alternative transportation options are available
- Considerations for new and emerging transportation services like transportation network companies and automated vehicles

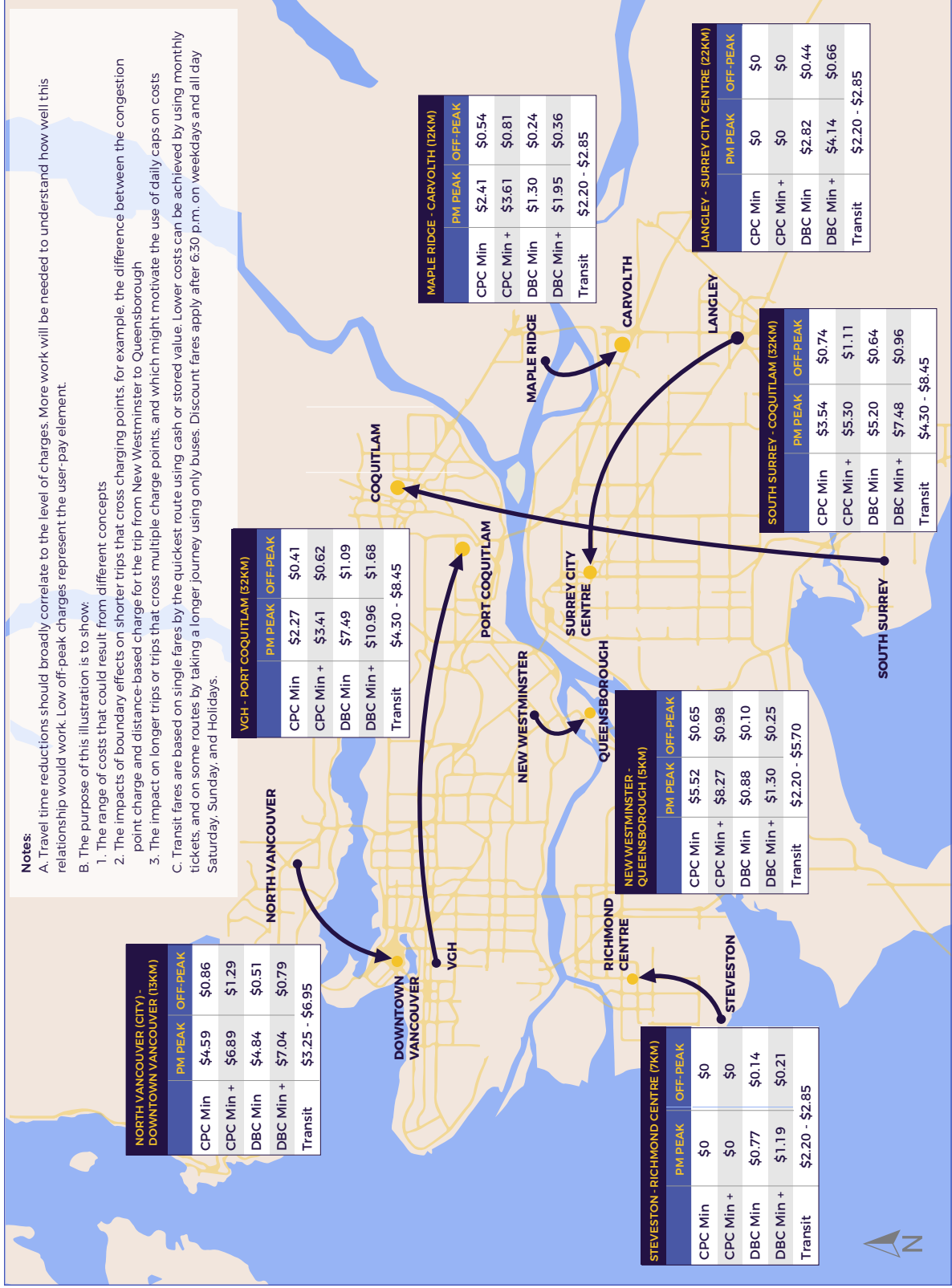
⁹Of the households experiencing significant daily congestion, what proportion will achieve visible travel congestion savings per day.

¹⁰Includes revenue from the fuel tax - which has been eliminated for these concepts.

¹¹This figure represents the amount of money that would be needed to offset the income inequity.

Example vehicle trip charges

Most trips made in the region are relatively short and local – and this is true in both the central and more outlying parts of the region. However, some trips are much longer, and the illustrative concepts outlined above will have different cost impacts on different vehicle trips, depending on where and when they take place. Below are some examples of uncapped vehicle trip charges using the illustrative concepts, along with existing transit fare rates for comparison:



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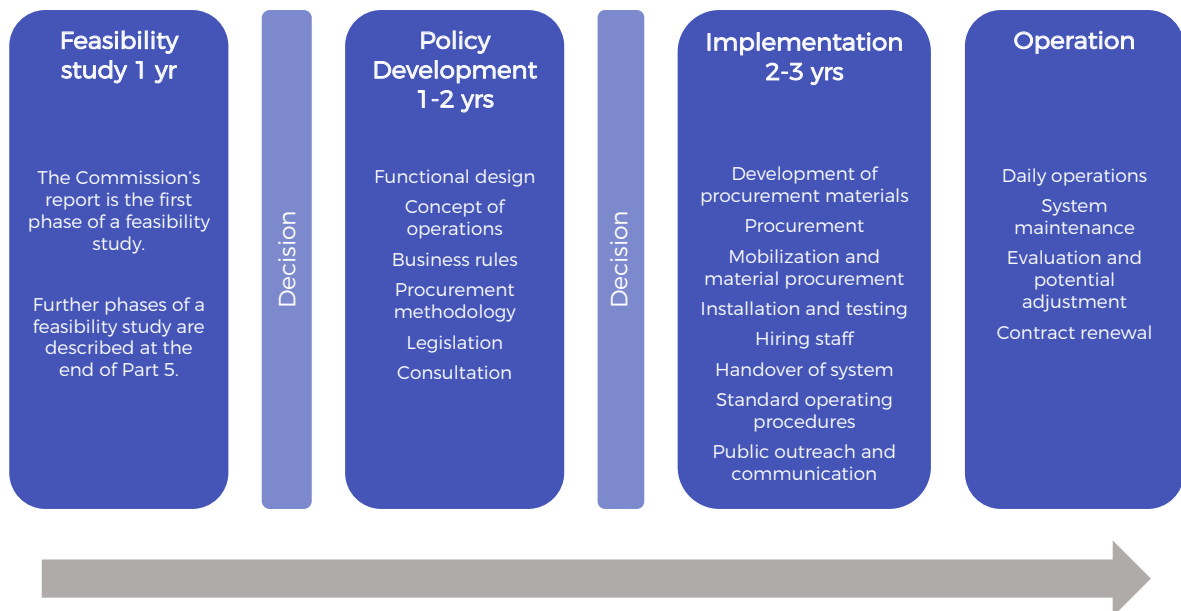
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Pathways to implementation of a decongestion charge

This report can be considered the first phase of a feasibility study. It suggests principles that should be followed in formulating a mobility pricing policy and describes some high-level decongestion charging concepts that show interesting results. More work will be needed to develop them into something that can be implemented. That is estimated to take around six to twelve months.

After the completion of a feasibility study, there will need to be a decision on whether to proceed to a policy development phase, including the development of enabling legislation. This is estimated to take a further 1-2 years. At the end of this phase, a decision to implement will be required before proceeding to the implementation phase, which could take an estimated 2-3 years.

In all phases, there may be technical or policy reasons for pursuing a longer timeline. In particular, the greater uncertainties involved in distance-based charging suggest a longer timeline might be appropriate.



Roles and responsibilities

At appropriate points within the process, different organizations will have different roles.

The role of the region, through the Mayors' Council and TransLink, will be in the early phases to collaborate with partners to prepare a new regional transportation strategy that:

- Establishes targets for congestion reduction
- Sets out a regional policy approach to mobility pricing
- Identifies and evaluates regional transportation investments to ensure geographic alignment with a decongestion charge

At this phase, the provincial government will need to engage as owner and operator of parts of the region's transportation network.

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If the Mayors' Council decides it wishes to implement a comprehensive mobility pricing policy that includes a decongestion charge, the role of the provincial government will be significant. At a minimum, it will need to set out appropriate legislation and regulations for such charges in Metro Vancouver.

A decision will need to be made about the governance of a regional system of mobility pricing and where responsibility for both policy decisions and the collection and distribution of revenues should lie.

Work outstanding to complete the feasibility study

Availability of data and the timeline of the project means that the Commission was not able to conduct some important research and analysis. The following studies should be prioritized in the second phase of a feasibility study:

- Further iterations and development of the illustrative concepts, including further study of the potential to coordinate with transit fares and other forms of mobility pricing
- A thorough assessment of affordability and equity impacts including the role of caps and discounts and the opportunities for returning or redistributing revenues
- Impacts for business, particularly transport-intensive businesses
- A first assessment of available technology for distance-based charging

Further scoping studies that could also be relevant at a later stage:

- Medium- and long-term impacts of mobility pricing on regional land use planning
- Integrated transportation payment systems (Mobility as a Service)
- Alternative governance models for the collection and distribution of mobility pricing revenues

Refer to Appendix A for more detail on next steps.

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The Mayors' Council and TransLink Board asked the Commission to study how a comprehensive mobility pricing system could be implemented in Metro Vancouver that could:



Manage congestion



Promote fairness



Support investment

If all that is desired at this stage is a way to cover costs of transportation investments, then a coordinated system of mobility pricing that includes a decongestion charge is probably not the way forward. But if the region is willing to take on some complex discussions, then mobility pricing offers a way to manage congestion and raise revenues that could be transformative as part of a strategy to support efficient, affordable and sustainable mobility for the people of Metro Vancouver.

It's time to continue this conversation so our region and its residents can continue to thrive.

