

# Mobility Pricing:

How to Harness Mobility Pricing to Reduce Congestion, Promote Fairness, and Support Investment in Transportation

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# What?

- 23 municipalities in Metro Vancouver, British Columbia
- Independent Commission established to evaluate regional mobility pricing
- Final Commission report published on May 24, 2018



## METRO VANCOUVER MOBILITY PRICING STUDY

FULL REPORT ON THE FINDINGS AND RECOMMENDATIONS FOR AN  
EFFECTIVE, FARSIGHTED, AND FAIR MOBILITY PRICING POLICY

Prepared by: the Mobility Pricing Independent Commission

MAY 2018



Why?



- Metro Vancouver population is growing rapidly
- Traffic congestion is threatening growth and productivity
- Traffic hot spots are occurring throughout the region
- Technological change is occurring

## Why not solve congestion by adding capacity? *“Congestion? Build more roads!”*

- Costs for new road infrastructure capacity increases non-linearly in high-density areas
- Growing cities need to accommodate for travel growth, but cars are not the most efficient mechanism
- Induced demand means **we can't build our way out!**



## We cannot make capacity match demand...

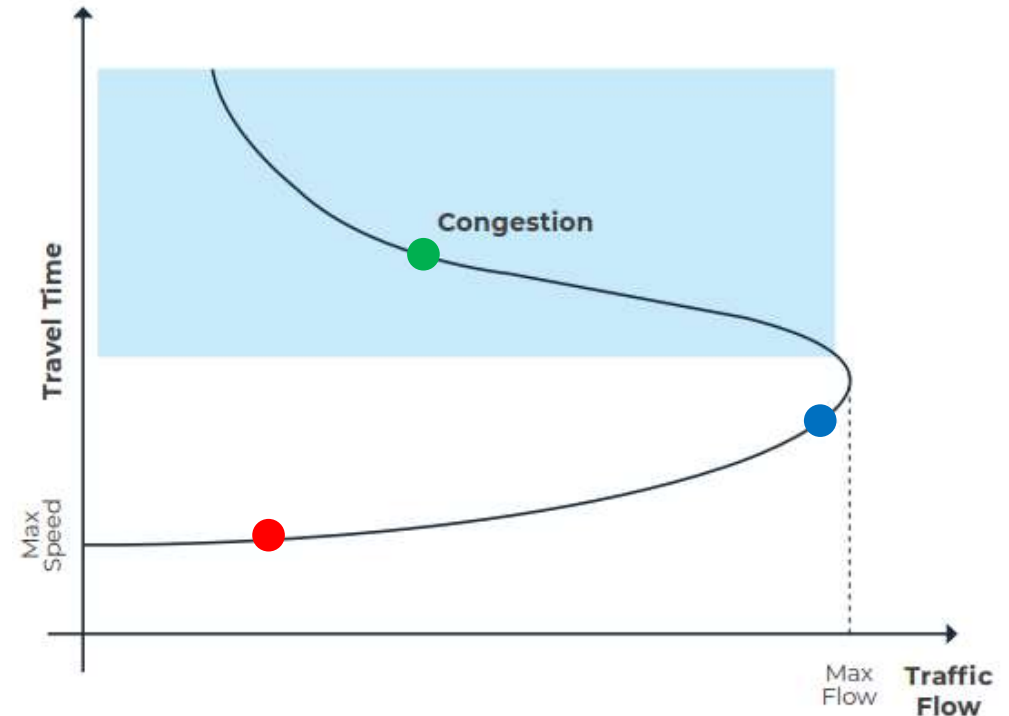
... so let's make demand match capacity through efficient pricing

Travel time:

10 minutes

16 minutes

46 minutes



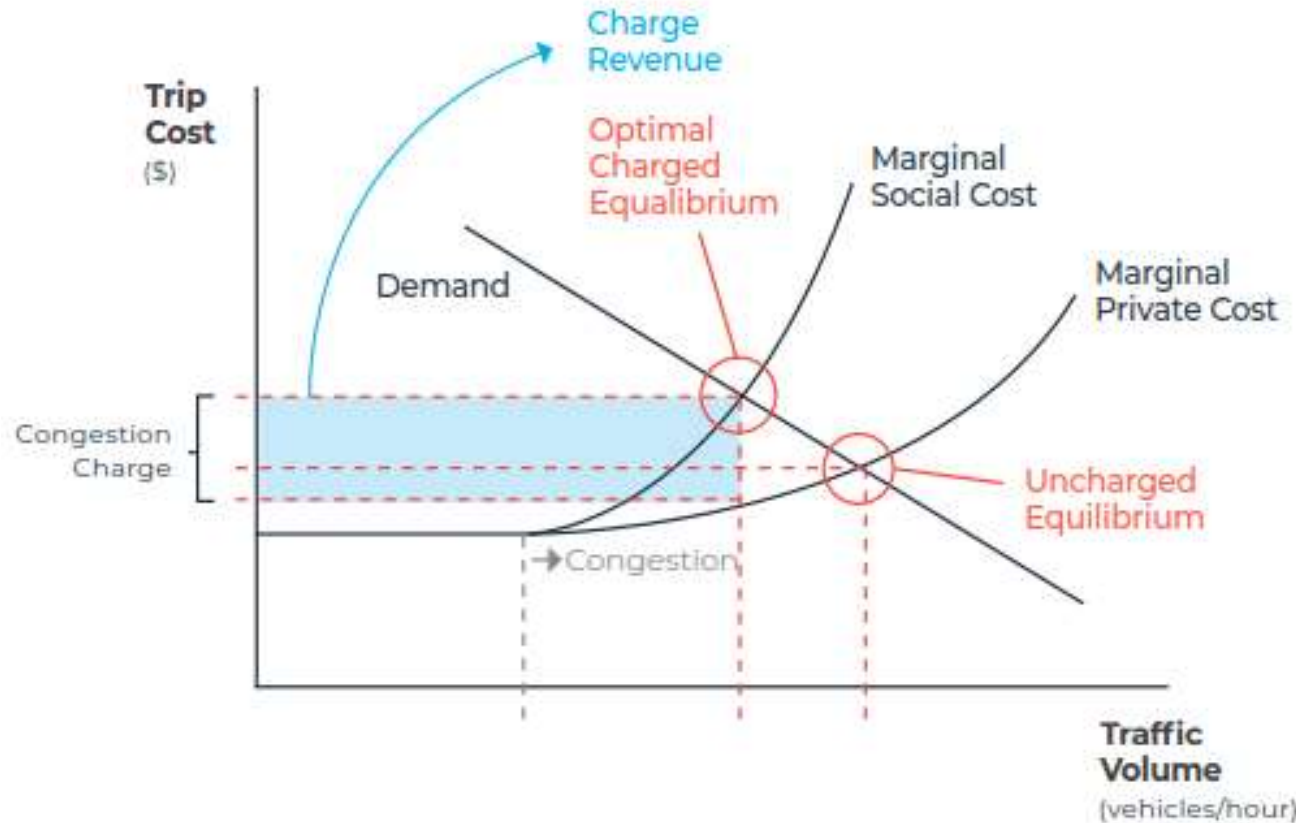
All vehicles are charged in de-congestion charging, but the objective is that the only the last 3 (green) cars choose not to drive.



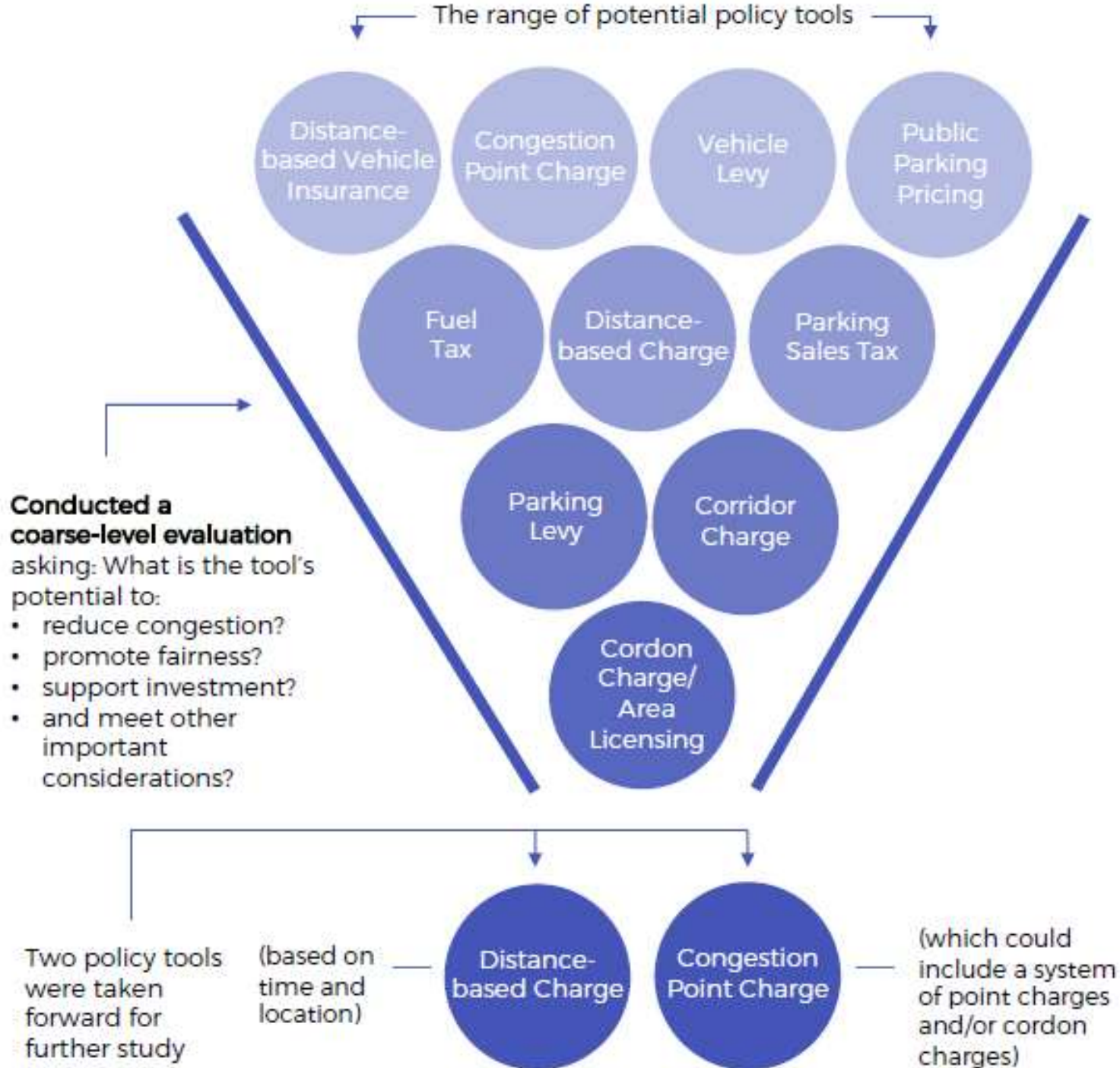
## How do you incentivize people out of their cars?



# Marginal social cost pricing



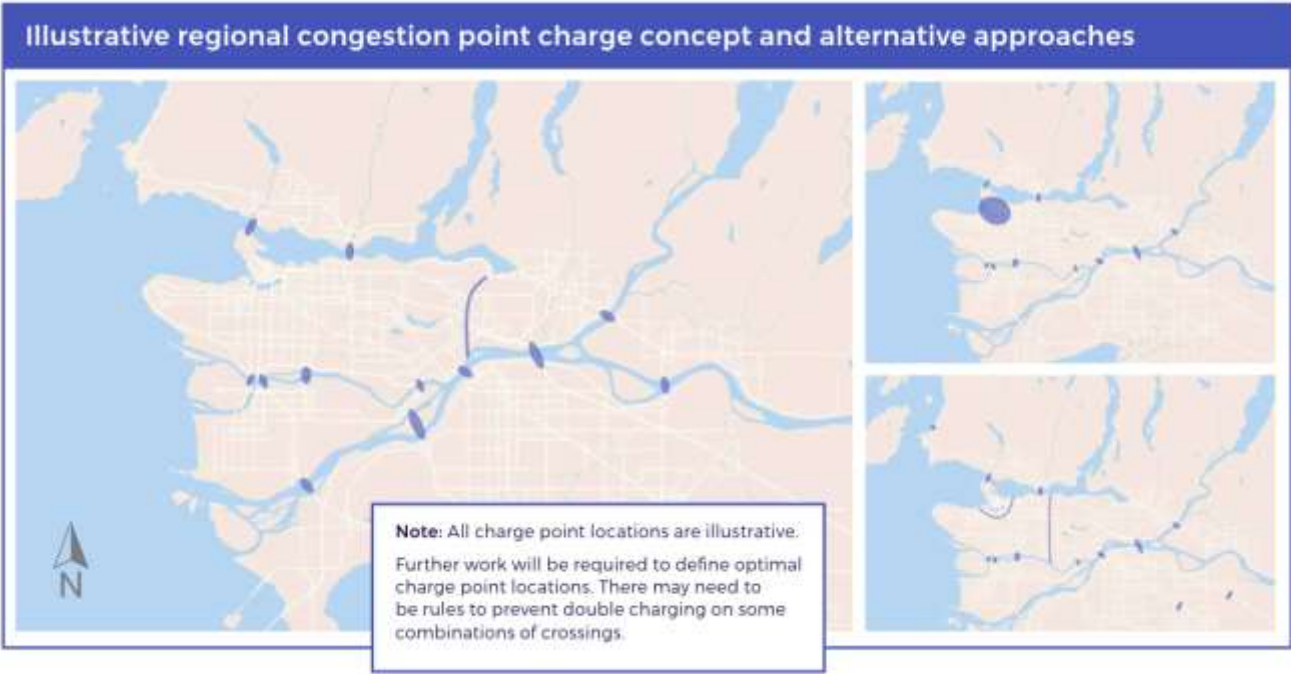
- Drivers only consider their **Marginal Private Cost** – fuel, vehicle operating, insurance, travel time
- **Marginal Social Cost** accounts for the burden each driver imposes on society in terms of congestion delay and other externalities
- A socially optimal **Congestion Charge** is priced as the difference between the Marginal Private Cost and Marginal Social Cost



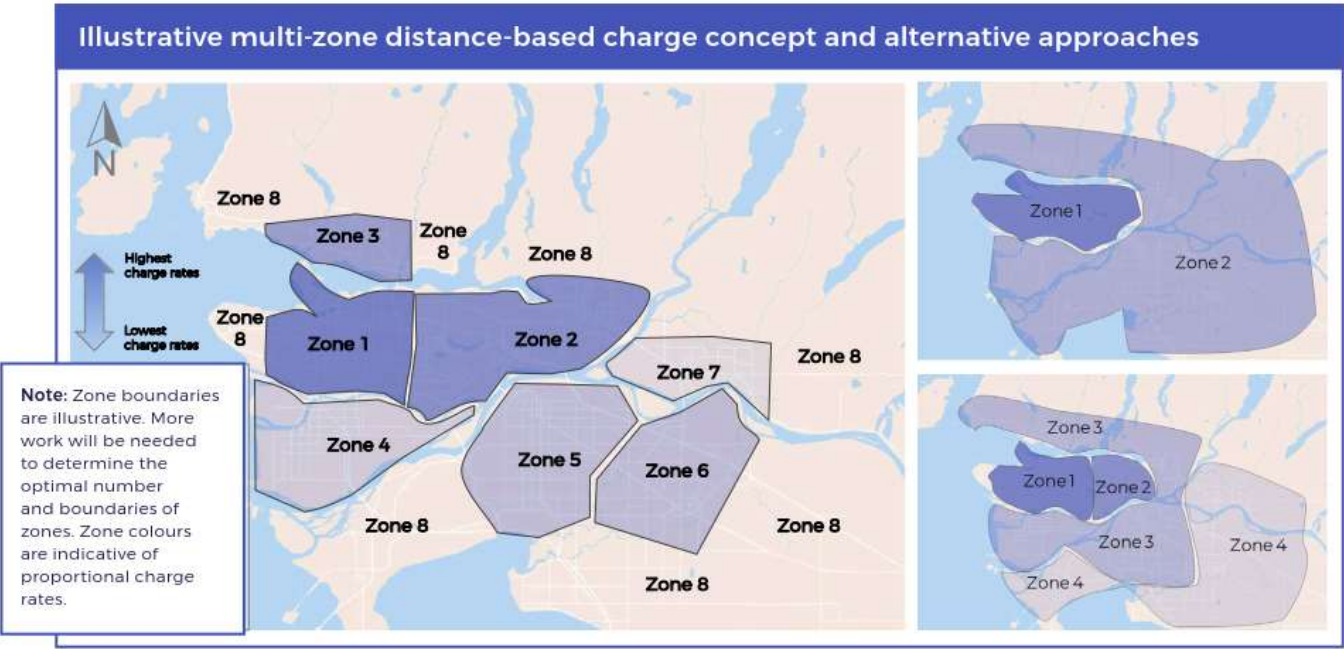




System of **point charges** used to approximate Marginal Social Cost pricing



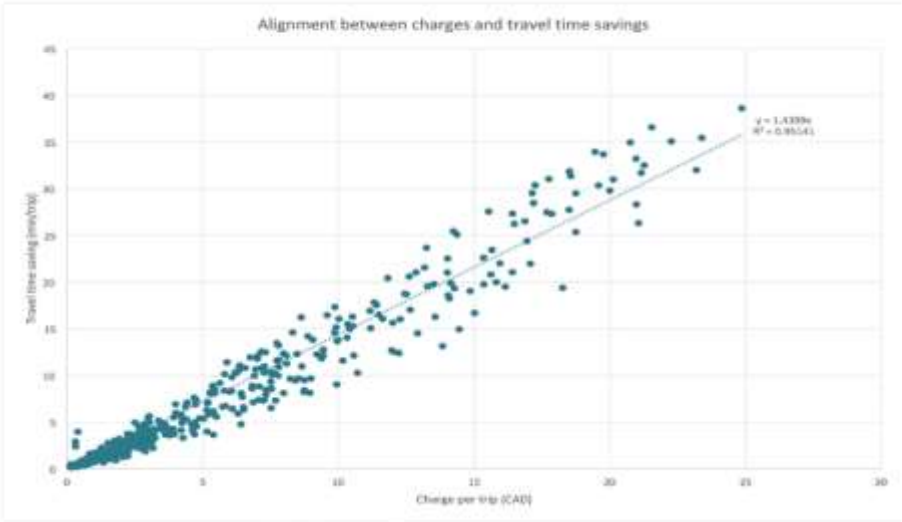
**Distance-based charges** used to approximate Marginal Social Cost pricing





System of **point charges** used to approximate Marginal Social Cost pricing

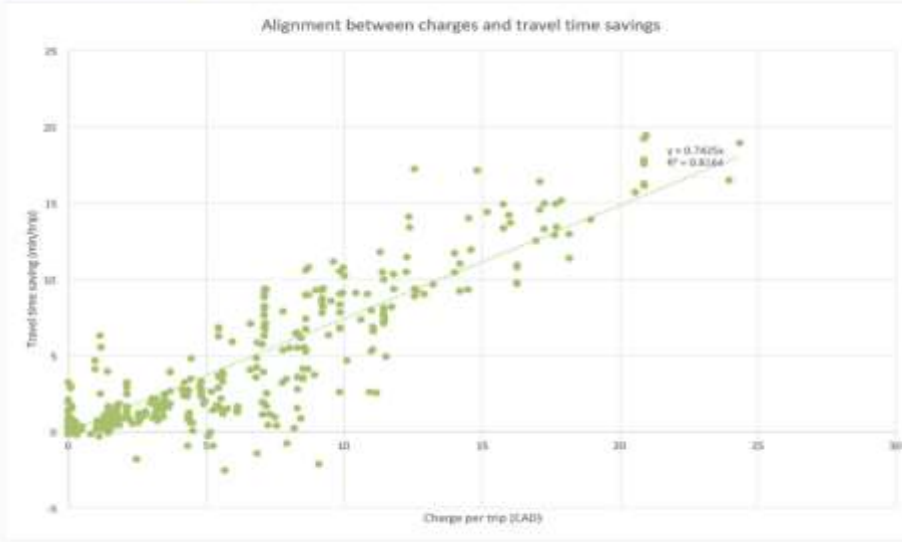
Marginal Social Cost



The marginal social cost (MSC) rate is designed to ensure that there is strong alignment between the charge paid per trip, and the travel time savings achieved for that trip.

**R-squared = 0.95**

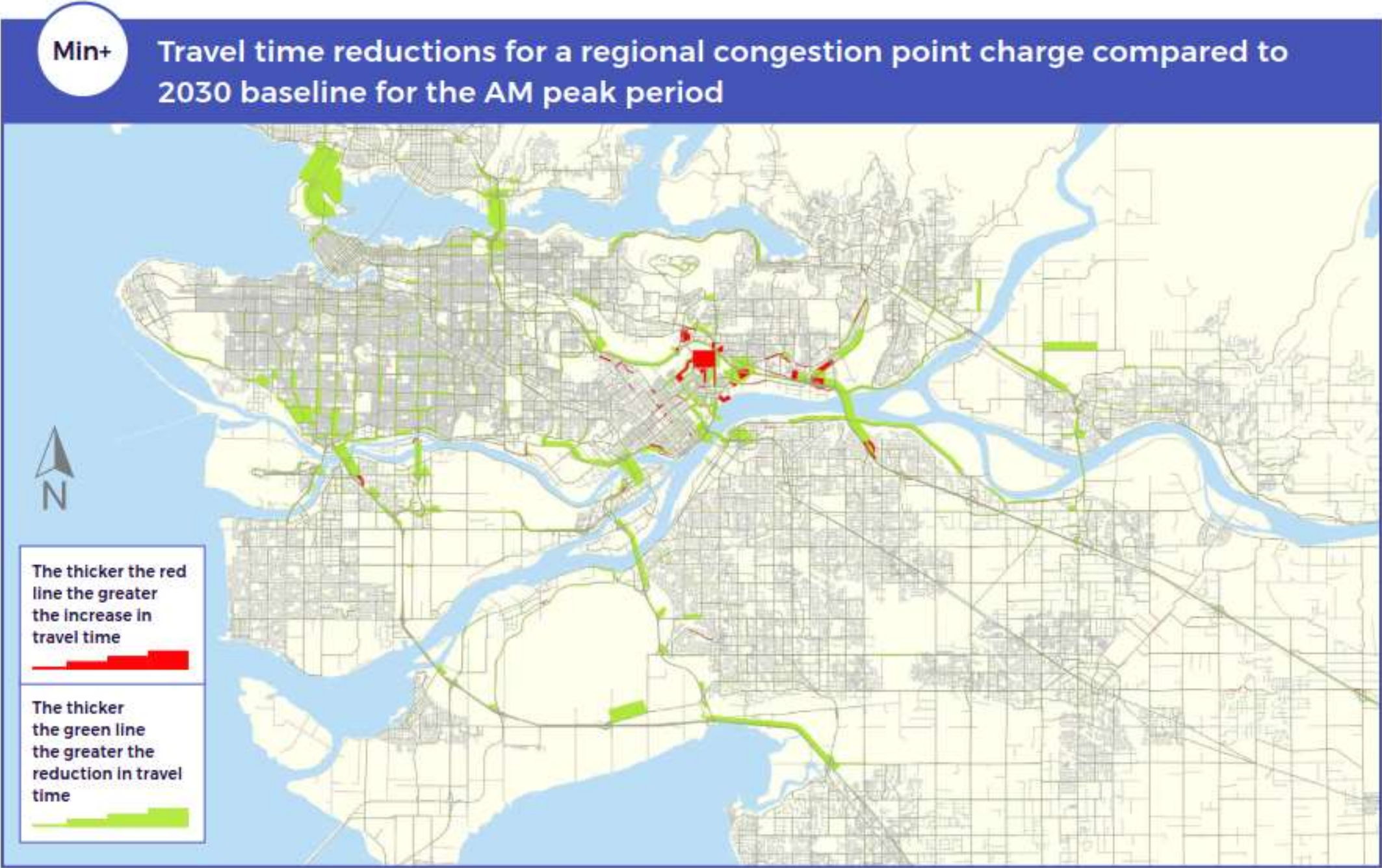
Bridges (MSC)



Applying the approximated MSC rates to bridges achieves a better alignment between the charge paid per trip and the travel time savings of that trip. The rates vary between bridges, as well as by time of day and direction of travel, with higher charge rates associated with higher congestion.

**R-squared = 0.82**





# Equity and fairness concepts

**Equity:** How evenly are costs and/or benefits distributed?

**Vertical equity:** Distribution between various income groups

**Horizontal equity:** Distribution in other dimensions: gender, geography, modes of transport

**Fairness:** Perceptions of fairness are individual, and not everyone agrees on which properties of a policy make it fair (or unfair)...but transfers can help make things fairer



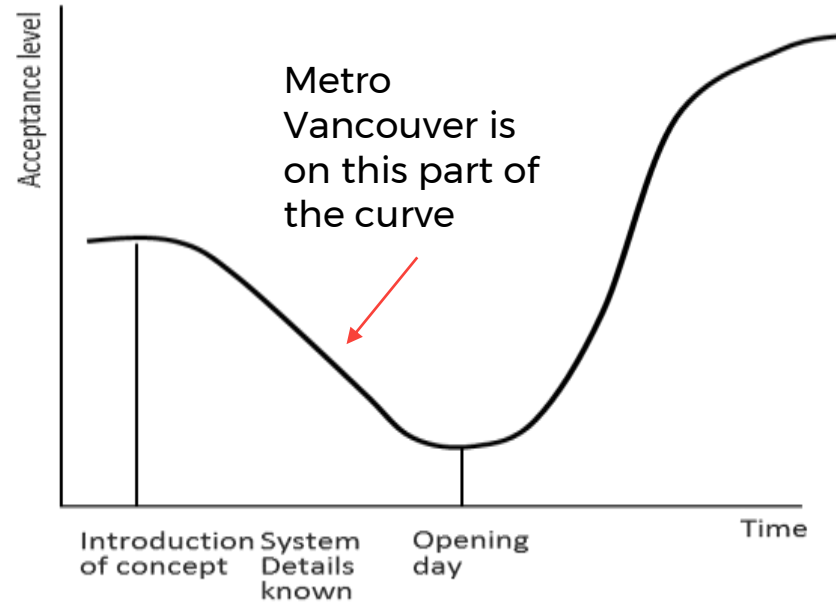
**Congestion**

**Revenue**

**Fairness**

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 <sup>5</sup>	% households that will achieve >10 mins savings per day	25%	44%
Revenue			
Total net revenue <sup>6</sup>	\$ 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 <sup>7</sup>	\$ 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%

# Public acceptance



## Rob Shaw: Horgan government wants nothing to do with Metro's mobility pricing

ROB SHAW Updated: May 29, 2018



## After a cool reception, scheme to charge Metro drivers to reduce congestion needs more work

GORDON HOEKSTRA Updated: May 29, 2018



## Editorial: Congestion fees a tough sell

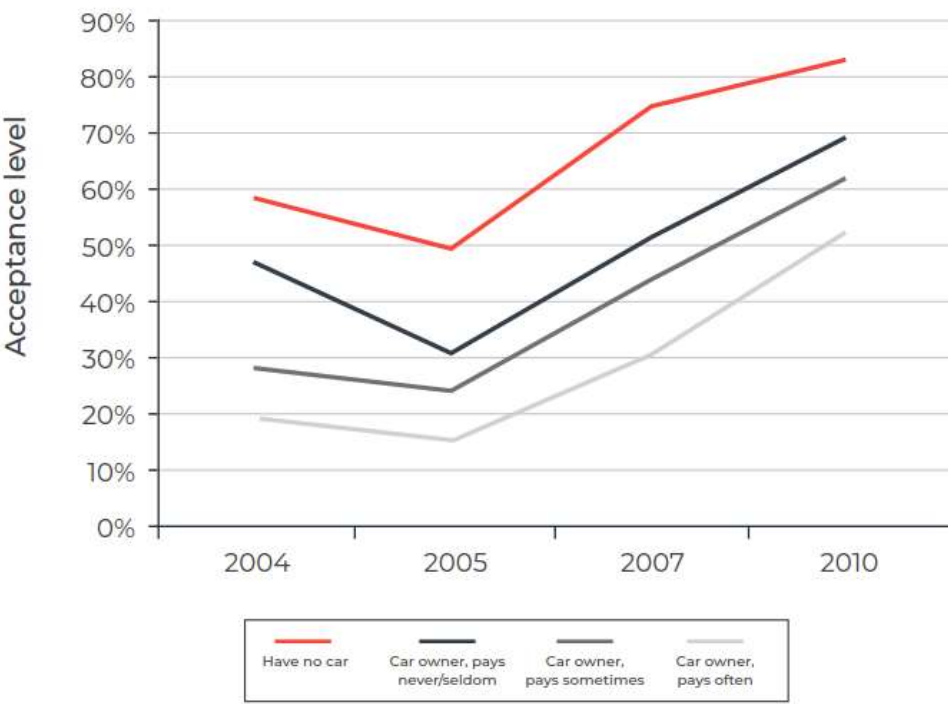
A plan that has drivers paying more not to be stuck in traffic is hard to imagine.

Tri-City News  
MAY 29, 2018 02:46 PM



# Does it work?

19





# What did we learn?

- Every city is different and there is no one-size fits all solution
- Detailed analysis can be done quickly with some basic tools and iterative process
- It's not possible to maximize all design objectives
- However, it's possible to develop solutions which generate large net economic benefits and can be used to correct equity imbalances



**Singapore  
ERP**

**Central London  
Congestion  
Charge**



**Stockholm  
Congestion Tax**

**Gothenburg  
Congestion Tax**





# Thank you!

*wsp.com*

# Singapore ERP



Location	Singapore
Policy	Congestion Charge
Pricing framework	Point charges, varied by time of day and location
Technology	RFID
Implementation year	1998

Effect on traffic & environment	Traffic volume	-44% after ALS, -10% to -15% after ERP compared to ALS, -20% to -30% for other extensions of the system
	Travel times	Speed criteria charge levels between 20-30 kph and 45-65 kph
	Environment	n.a.
Economic impact	Investment cost	250 million CAD (including 68,000 tags)
	Operating cost	16 million CAD/year (20%-30% of revenues)
	Revenue	200 million CAD/year
	CBA	63 million CAD/ year

# Central London Congestion Charge



<b>Location</b>	London, United Kingdom
<b>Policy</b>	Congestion Charge
<b>Pricing framework</b>	Point charges with variable pricing
<b>Technology</b>	ANPR
<b>Implementation year</b>	2003

<b>Effect on traffic &amp; environment</b>	Traffic volume	-16% (all vehicles entering the zone), -30% chargeable vehicles, +25% busses, +13% taxis, +49% bicycle  -21% (2002-2008)
	Travel times	- 30 % delays
	Environment	CO <sub>2</sub> -16,4%, NO <sub>x</sub> -13,4 %, PM10 -15.5% within the zone
<b>Economic impact</b>	Investment cost	300 million CAD
	Operating cost	170 million CAD/year, in recent years 85 million CAD/year
	Revenue	440 million CAD/year (in 2014)
	CBA	140-190 million CAD/year

# Stockholm Congestion tax



Location	Stockholm, Sweden
Policy	Congestion Charge
Pricing framework	Point charges with variable pricing
Technology	ANPR
Implementation year	2007 (following a trial)

Effect on traffic & environment	Traffic volume	-20% (across the cordon)
	Travel times	-33 % delays
	Environment	CO2 -13%, NOx -8 %, PM10 -13% within the zone
Economic impact	Investment cost	270 million CAD
	Operating cost	25 million CAD/year (in 2016)
	Revenue	150 million CAD/year (in 2016)
	CBA	100 million CAD/year