

Urban Transport: A Little Less Conversation, a Little More Action

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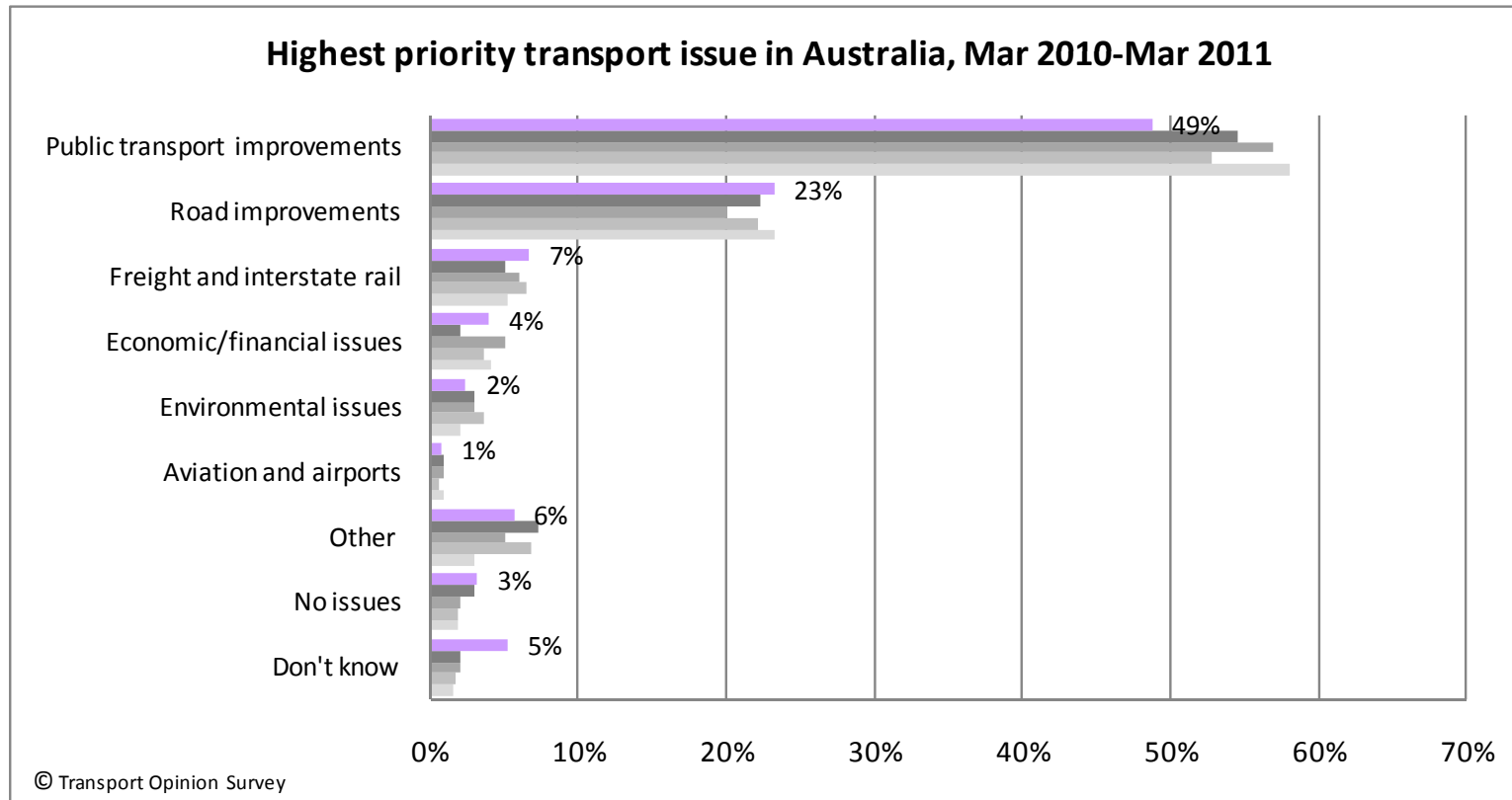
The Business
School

The University of
Sydney

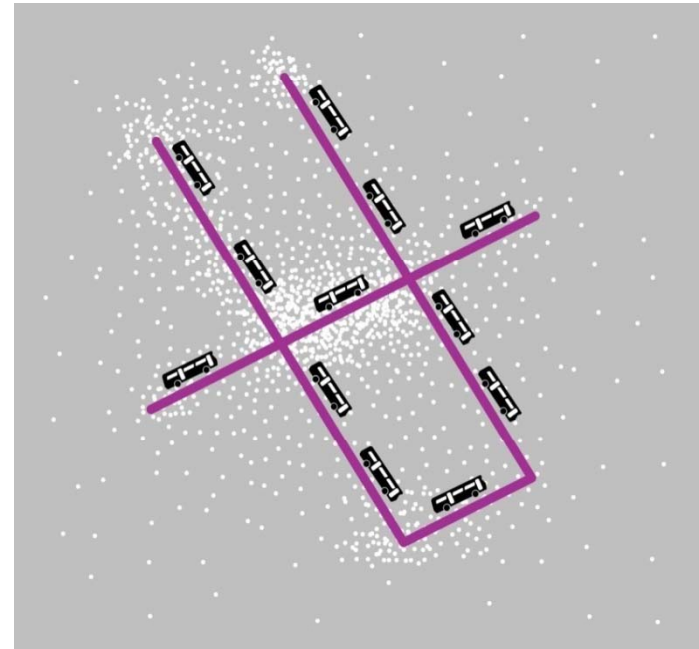


- › Commitment to Networks and Systems
 - Compared to Projects (P) and Corridors (C)
 - P & C however serve Networks, but...
 - A Physical Network must be a System
 - **Connectivity, frequency and visibility** (delivering Accessibility Benefits)
 - Applicable to Passenger and Freight Movements
- › Public Transport
- › Funding Sources
- › Reminding all about *User Pays*
- › Special Funding Instruments
 - PT Lottery?
 - Infrastructure Bonds?

What do Public Stakeholders Think?



What type of Public Transport: Coverage and/or Patronage (and Frequency)? Most people want both



... but when it's presented this way, they see why it's a tradeoff.

Source: Dr Jarrett Walker

› Goals met through *Patronage*

› Financial

- Fare return

› Environmental

- Reduced vehicle trips.
- Reduced emissions.
- Etc.

› Goals met through *Coverage*

› Social Inclusion

- Senior mobility.
- Disabled mobility.
- Other special needs.

› “Equity”

- Entitlement to a public service.
- “We pay taxes too.”

› Note: Coverage can also deliver Patronage





Can Rail Deliver the Service Capacity, Frequency, Flexibility and Connectivity per \$ that BRT can Deliver?



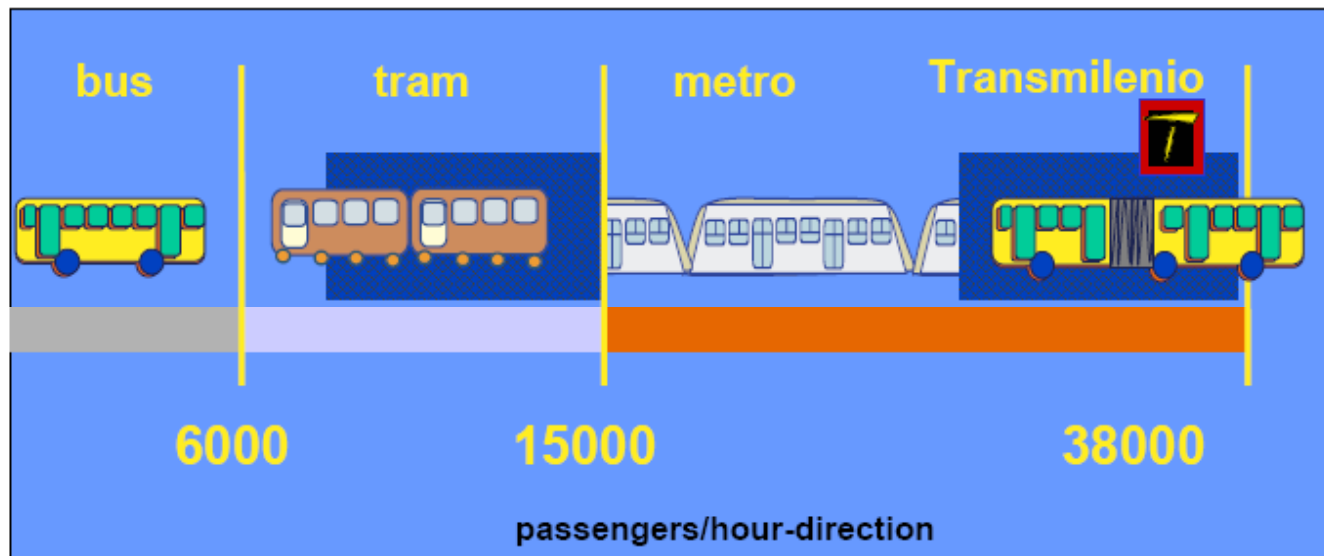
BRT Systems: Paris, Guangzhou, Bogota, Beijing

Why not Sydney in 2013?



Service Capacity is what matters and not vehicle (or train set) capacity

New view of transit capacity



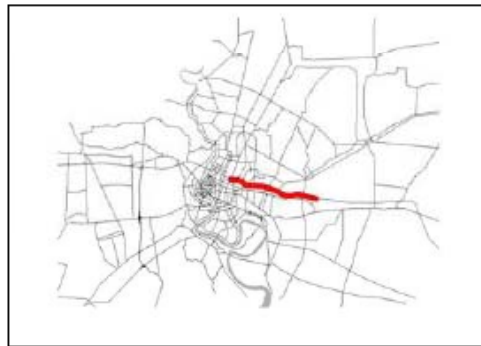
Food for Thought: Where is Value for Money?

Systems at the same cost

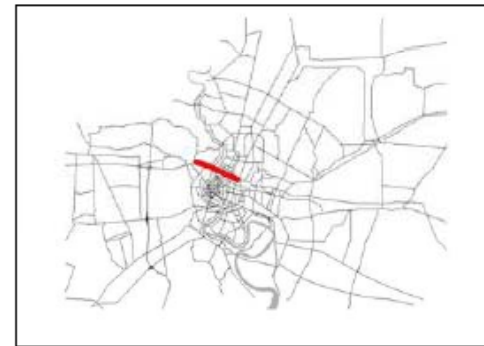
How much transit
does Bt 43 billion
(US\$ 1 billion)
buy?



426 kilometres of BRT



14 kilometres of elevated rail



7 kilometres of subway

However

**To Make PT more Attractive Requires
(at least) making the Car Less
Attractive**

Applies also to Heavy Vehicle vs. Rail Freight

Biggest Challenge - Congestion and its Cost

- › It is estimated that traffic congestion in **Australia** resulted in AU\$9.4 billion of avoidable social costs in 2005, increasing to **AU\$20.4 billion by 2020** (see BITRE 2007).
- › In the **USA**, the congestion costs (in constant 2009 dollars) continue to rise from US\$24 billion in 1982 to.
- › In **USA**, this is associated with **3.9 billion gallons of w\$115 billion in 2009asted fuel** (equivalent to 130 days of flow in the Alaska pipeline),
- › and a **\$US808 cost impost per average commuter in 2009**. This results in a predictable 'tragedy of the commons'.
- › *Dealing with Congestion and other externalities: The Henry Tax Review Release 2 May 2010*

- *The Pricing 'Solution'*



Sadly, the Pricing Debate is Laden with Emotion

- › The reference to road pricing (reform) and especially the variant correctly called congestion **charging**.
- › Immediately this is mentioned, the un (or mis-) informed commentator refers to a congestion **tax** and assumes it is added onto all existing taxes/charges.
- › There is little hope to sell the merits of reformed road pricing when the word 'tax' hits page one of the media every time we try and have a sensible debate on the need to change the current charging scheme

Request: Let's Tidy up the Language

- › A careful listening to what we are trying to say to educate the population is that we need to do something to contain traffic congestion
 - we have a real opportunity to review existing charging mechanisms
 - to align charging closer to the costs that users impose on the network through using their cars and trucks and buses (in contrast to owning their cars and trucks and buses)
 - we should be able to design a pricing mechanism that is much **fairer**
 - **that** includes a way of charging for congestion that is contributed to by users of the road network.

- › Pundits who claim a congestion charge is not fair should carefully think about how fair the existing system is?
- › Why should we all pay the same registration fee for a class of vehicle when we all travel different annual kilometres on the roads, at locations where congestion varies from nothing to significant?

- › It MUST involve **dropping some charges** as we add in some new congestion-related charges, **and importantly** show how the revenue raised is put back to **useful causes** that can/will be supported by society.
- › It is possible (yes – believe me) to design a system in which many users of the roads are financially **better off** with a congestion charge (and even an emissions-related charge), where the cost of using the roads is lower when congestion is absent and vehicles are environmentally cleaner, **which will also ensure govt. gets its needed revenue**
- › **Who would disagree with this?**
- › Few indeed I suspect; however until we can get away from the clutter of emotional misleading language like ‘being slugged with a congestion tax’, what hope is there.
- › **The media in particular needs to be more responsible with its words**
- › After all, **time is money** although you would wonder sometimes when people complain about delays but will not support possible ways of aiding improved travel times. (As commuters your time on ave is worth \$16/hr but given you are at the higher wealth end I would guess around \$30+/hr, so thank you for your 90 mins)

- › **Title: Assessment of the commuter's willingness to pay a congestion charge under alternative pricing regimes and revenue disbursement plans**
- › Aim: The call to replace fixed charges with car use related charges, has placed congestion charging regimes at the centre of future variable user charging policy.
- › This project investigates the impact and acceptability of alternative charging schemes in terms of the charge level, the regime (for example, distance versus cordon), and how revenue is disbursed.

- › **The “market” price serves as an investment signal**

- › **Without variable (per mile) pricing and with a 1.0 B/C ratio, the annual investment in USA in the Interstate Road System would nearly double to \$47.0 billion.**

The Smeed Report on Road Pricing UK (Reuben Smeed, Michael Beesley, Colin Buchanan)

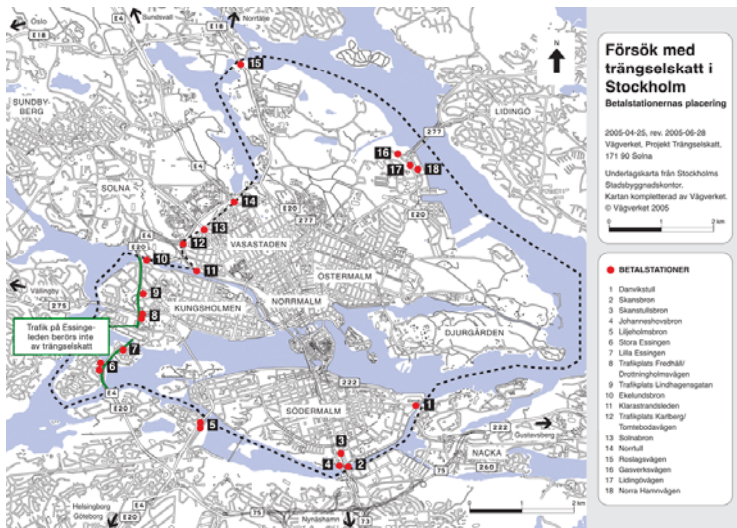
40 years on

- London, UK
- Singapore
- Stockholm, Sweden
- Milan, Italy
- Netherlands
- Oregon, USA
- Ho Chi Minh City CBD, Vietnam
- Helsinki, Finland
- Barcelona, Spain
-?

City of London (17 Feb 2003 to present)



Stockholm (10 SEK = \$Aud1.73) ToD




Time	(SEK) Amount
06.30-06.59	10 kr
07.00-07.29	15 kr
07.30-08.29	20 kr
08.30-08.59	15 kr
09.00-15.29	10 kr
15.30-15.59	15 kr
16.00-17.29	20 kr
17.30-17.59	15 kr
18.00-18.29	10 kr
18.30-06.29	0 kr




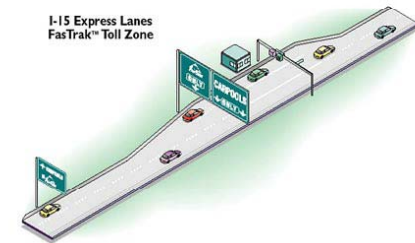
EXPRESSWAYS				
Monday to Friday : 07:30 - 20:00 (24 Hrs)				
	AYE between Portsdown Road and Alexandra Road (36)	CTE after Braddell Road, Serangoon Road and Balestier slip Road (31,33,34)	CTE between Ang Mo Kio Ave 1 and Braddell Road (35)	ECP after Tanjong Rhu Flyover (30)
07:30 - 07:35	\$0.00	\$0.80	\$0.80	\$0.50
07:35 - 08:00	\$0.00	\$1.50	\$1.50	\$0.50
08:00 - 08:05	\$0.50	\$1.50	\$1.50	\$1.30
08:05 - 08:30	\$0.50	\$1.50	\$1.50	\$2.00
08:30 - 08:35	\$1.00	\$2.30	\$1.00	\$1.50
08:35 - 08:55	\$1.50	\$3.00	\$1.00	\$1.50
08:55 - 09:00	\$0.80	\$2.00	\$1.00	\$1.00
09:00 - 09:25	\$0.00	\$1.00	\$0.50	\$0.50
09:25 - 09:30	\$0.00	\$0.50	\$0.50	\$0.50
09:30 - 10:00	\$0.00	\$0.00	\$0.00	\$0.00





		Toll Schedule		Westbound			
		Effective November 1, 2001		Riverside Co. Line to 55			
	Sun	M	Tu	W	Th	F	Sat
Midnight							
1:00 am							
2:00 am			1.00				
3:00 am							
4:00 am			1.90				
5:00 am			3.20			3.10	
6:00 am			3.30			3.20	
7:00 am			3.60			3.50	1.45
8:00 am	1.45		3.30			3.20	1.70
9:00 am			2.65				2.05
10:00 am							
11:00 am	2.05						
Noon							
1:00 pm			1.70				2.30
2:00 pm	2.30						
3:00 pm							
4:00 pm						2.05	2.45
5:00 pm	2.45						
6:00 pm						2.40	2.05
7:00 pm						1.70	
8:00 pm	2.05						
9:00 pm			1.00				
10:00 pm							
11:00 pm							

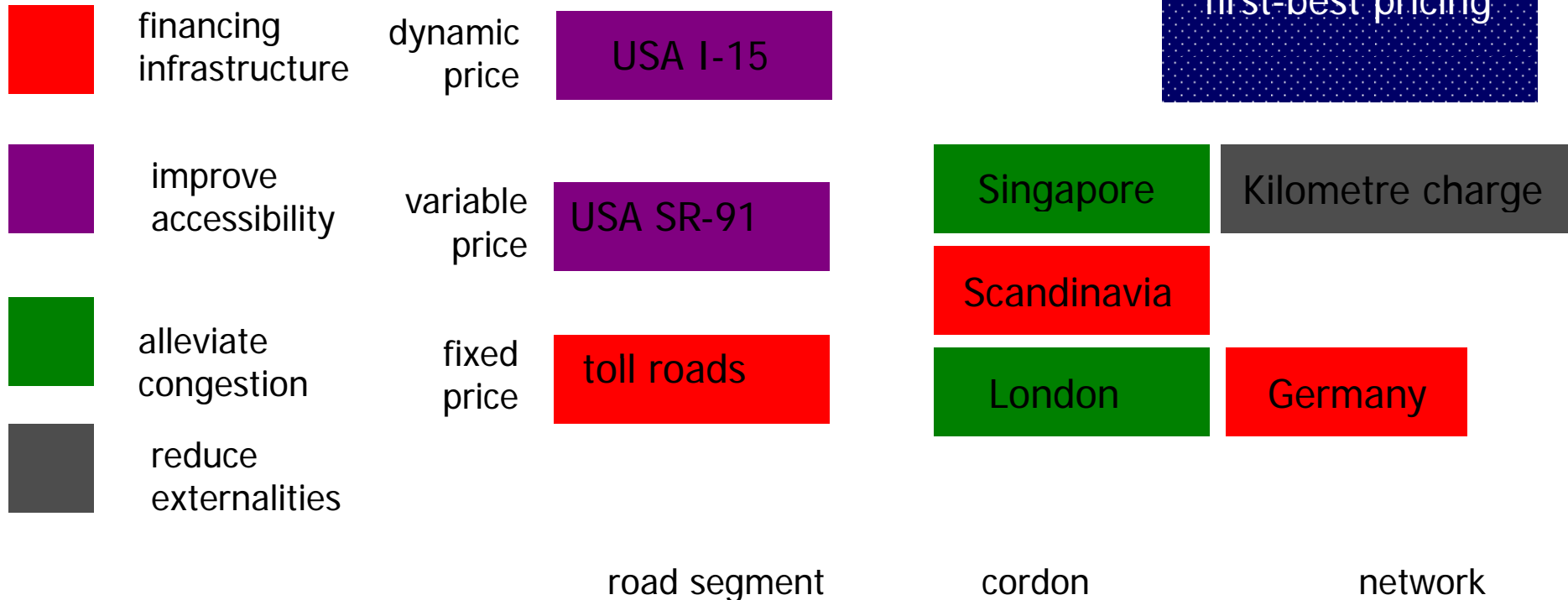
		Toll Schedule		Eastbound			
		Effective November 1, 2001		55 to Riverside Co. Line			
	Sun	M	Tu	W	Th	F	Sat
Midnight							
1:00 am							
2:00 am							
3:00 am			1.00				
4:00 am							
5:00 am							
6:00 am							
7:00 am							
8:00 am	1.35			1.70			
9:00 am							
10:00 am	2.05						2.05
11:00 am							
Noon						2.50	
1:00 pm	2.40	2.25		2.50	3.90	2.40	
2:00 pm		3.25		3.35			
3:00 pm		3.50		3.75			
4:00 pm		4.25		4.75			
5:00 pm	2.05	4.75					
6:00 pm	3.50	3.65	3.75	3.95	4.25	2.05	
7:00 pm		2.50		3.55	3.95		
8:00 pm				2.25	3.55	1.70	
9:00 pm		1.70			2.25		
10:00 pm		1.00			1.70		
11:00 pm							





Road pricing measures

Objective



Heavy Vehicle Charging Regime Research (ITLS with GHD-Meyrick)

National Transport Commission Road Freight Study

Scenario 1 of 8





Suppose that your company had to carry 60 tonnes of computers in the next few weeks for a similar origin/destination to that you described before.

For the job, you have two different truck types that could be used, each of which have two options.

There is also a rail option, which includes information on the truck used to get to and from the rail line (i.e. access and egress).

Please enter the number of trips required per truck (where part trips are allowed), consider each of the five alternatives, rank them from best to worst, and indicate if each of them is acceptable.

Pricing system:
Distance Location

Vehicle characteristics	 Six Axle Semi-trailer	 Four Axle Semi-trailer	 Four Axle Semi-trailer	 +
Annual registration charge per vehicle	\$516	\$573	\$573	
Number of trips required	3	3	3	truck trips and 1 train trip

Type of Road	Trip characteristics and associated costs	Option A	Option B	Option A	Option B	Truck for getting to and from the rail line	Train
Freeway and Arterial	Time for this part of trip	1 hr, 6 mins	1 hr, 14 mins	1 hr, 6 mins	1 hr, 14 mins	9 mins	Train time 120 minutes
	Fuel cost for this part of trip	\$68.06 (\$0.97 per litre)	\$76.22 (\$0.97 per litre)	\$42.77 (\$0.97 per litre)	\$47.90 (\$0.97 per litre)	\$4.40 (\$0.97 per litre)	Train cost \$228.00 (Rail access and fuel component ~ \$91.00)
	Cost of road access charge for this part of trip	\$8.93 (\$0.10 per KM)	\$10.00 (\$0.10 per KM)	\$8.93 (\$0.10 per KM)	\$10.00 (\$0.10 per KM)	\$1.10 (\$0.11 per KM)	
Local	Time for this part of trip	20 mins	20 mins	20 mins	20 mins	9 mins	
	Fuel cost for this part of trip	\$17.36 (\$0.97 per litre)	\$15.78 (\$0.97 per litre)	\$10.91 (\$0.97 per litre)	\$9.92 (\$0.97 per litre)	\$3.30 (\$0.97 per litre)	
	Cost of road access charge for this part of trip	\$7.43 (\$0.63 per KM)	\$7.43 (\$0.63 per KM)	\$8.14 (\$0.69 per KM)	\$8.14 (\$0.69 per KM)	\$3.80 (\$0.76 per KM)	
	Cost per tonne for fuel costs + access charges	\$5.09	\$5.47	\$3.54	\$3.80	\$2.15	
	Total fuel cost + access charge for all trips	\$305	\$328	\$212	\$228	\$129 (including rail access and fuel)	
Please rank the alternatives (1=best)		4	5	1	2	3	
Is this alternative acceptable?		<input type="checkbox"/> No	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes	<input checked="" type="checkbox"/> Yes	<input checked="" type="checkbox"/> Yes	

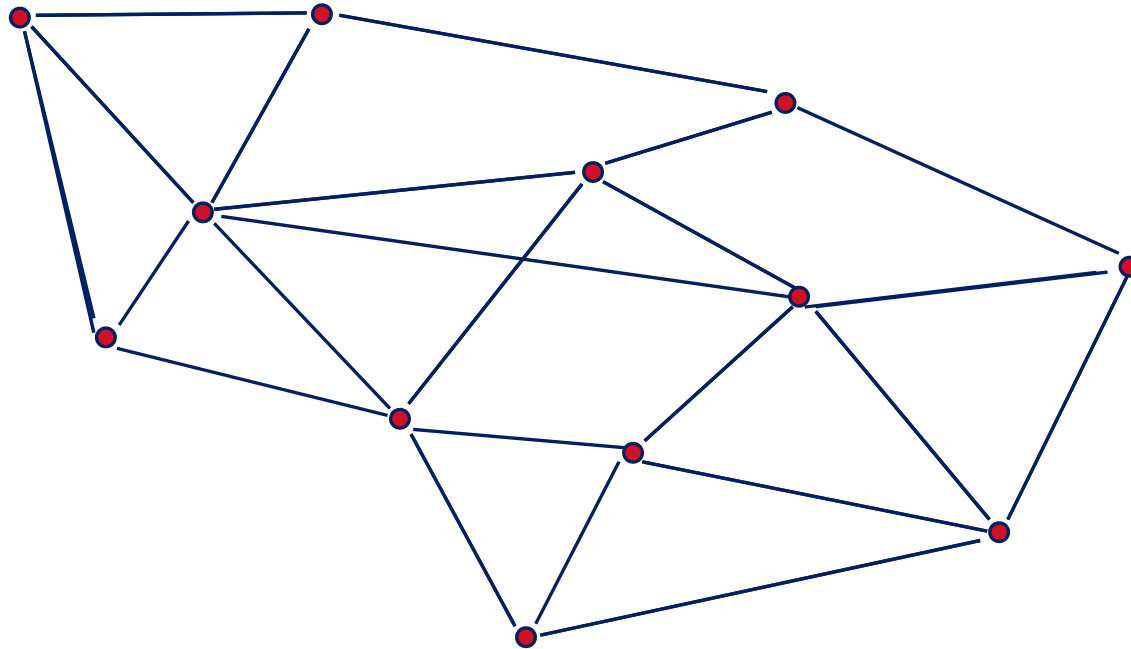
[Reread introduction](#)

Note: these costs are for fuel and access charges which may change with pricing systems. They exclude other costs such as labour, which won't change.

[Next](#)

› Variable User Charging (VUC)

- Capturing all the key externalities (exposure charging)
 - Congestion
 - Air pollution
 - Greenhouse gas emissions
 - Safety (insurance linked: e.g., South African Approach)
- The world is 'slowly' recognising through action VUC
 - Most recently:
 - The Oregon Proof-of-Concept Program
 - The Netherlands in 2011-2012



Where to price?

When to price?

Who to price?

How much to price?



network design problem

Satellite-based variable road user charging

- › Previous Dutch Transport Minister, Camiel Eurlings, announced in March 2008 that satellite-based road user charging will be implemented throughout the Netherlands to reduce congestion.
 - The 'kilometre price' proposed is to be differentiated by **location, environmental properties of the vehicle, and time of day** (effectively a peak/off-peak or congestion charge).
 - It was planned to be introduced for **all vehicles on all roads in the entire country**, starting with lorries in 2011 and phasing in a scheme for cars from 2012 to 2016.
 - Currently deferred but work behind the scenes ongoing.

Travellers: responses to road pricing

change departure time
change route

make less trips / work at home
change destination

move to other location
find other job

short term

medium term

long term

Travellers: responses to road pricing

- › Travellers' responses (coping strategies) depend on the
 - **availability of alternatives**
 - If no time-varying road pricing fee --- then no departure time changes
 - If no location-varying road pricing fee --- then no route changes
 - If **no public transport available** --- then no mode changes
 - "...It is almost certain that if we took 10 or 15 percent of peak-hour cars off of Toronto's roads and a large portion decided to use peak hour transit our transit system would strain and possibly fail us. London and Stockholm added buses and train cars prior to the onset of charging" (page 16, ETC Vol 3, issues1, March 2008)
 - If not able to work from home --- then no trip changes

A System Food for Thought: How many buses could a heavy rail project buy?

- › **Key Response to System Congestion Charging: is there is not enough PT capacity to handle the modal switch.**
- › Have you ever thought about how many buses could be purchased for the same amount of money invested in a major metropolitan rail project?
- › Let us reasonably assume that heavy rail projects being proposed in some major metropolitan areas will cost \$5billion, which in my view is conservative (given the Hensher rough rule of thumb to double the costs and you are close to reality),
- › and that a single bus unit costs on average \$350,000.
- › Simple arithmetic suggests we could have on our roads an extra **14,250** buses.
- › There are currently slightly less than 4000 buses operating the Sydney metropolitan area, so this would increase the total fleet to 18,250, or 4.56 times.
- › Now what if there were two heavy rail projects? Our estimate is that we could buy **28,500** extra buses, increasing service capacity by **7.125** times.

Food for Thought: How many buses could a heavy rail project buy?

- › Would this make traffic congestion worse?
- › *Yes if it had no impact on car use (even if no congestion charge)*
- › But with an extra 28,500 (or even 11,400) buses it is hard to believe that they would not have significant impact on reducing car use,
- › since such buses can really focus on **connectivity** and **frequency**,
- › both of which are central to achieving the objectives of patronage growth (which has desirable financial and environmental outcomes),
- › and **coverage** which delivers equity and social inclusion outcomes.

- › **Challenge #1:** Will we ever be able to attract enough car users out of their cars by any amount of injection of investment into public transport (PT) to relieve congestion on our roads?
- › **Challenge #2:** If yes to Challenge #1, what sort of PT investment will make a difference?
 - Hint: Sydney is a City of Cities with a complex network that is crying out for PT connectivity, coverage, frequency and visibility
- › **Challenge #3:** What role should a revamp of the price for using the car play in a (traffic) congestion-relieved future?
 - Can we really expect to reduce traffic congestion by investing in PT without a serious reform to road pricing (and I do not mean simply congestion charging)?

- › **Challenge #4:** What we need to do in sorting out the pricing challenge is not to add a congestion charge on top of existing charges, but to undertake a complete overhaul of the entire charging regime, with options to replace some of the fixed charges (e.g., annual registration) with a usage charge based on kilometres driven by location (and vehicle emissions), so that those who obtain the greatest benefits (such as time savings) should contribute proportionally. How might we initiate this?
- › **Challenge #5:** The Emotion of Language is a real hindrance
- › **Challenge #6:** Pricing Reform applies equally to Heavy Vehicles – but how to get buy in and what are implications for Supply (Value) Chains?