

Road Pricing and Road Funding

From Conversation to Action

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Economic Society



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- › "... our roads are no more 'doomed' to hopeless congestion than our meat counters would be if we sold steak for the price of dog food. The 'shortages' in every case would be man-made and man-fixable by rational pricing, not hopeless, irremediable acts of God" (Elliott 1992, 527)
- › Willingness to Wait (Rationing by queues) vs. Pay (pricing)

- › Transformational changes are needed:
- › Australian land transport systems should further national goals of
 - Economic competitiveness
 - Social inclusion
 - Environmental sustainability
 - Widely engaging the community in the process
 - Accessibility for all

Reforming road (transport) pricing arrangements will

- Help us to get better value from existing land transport infrastructure
- Provide better price signals for investment development
- Provide revenue to help fund transport improvements
- Generate significant direct benefits in terms of reducing the scale of the critical national land transport issues we face

- › Tackling the critical national issues requires integrated national policies and programs that will:
 - Reduce the need to travel
 - Achieve a modal shift to lower impact modes
 - Improve the environmental performance of all modes
 - Ensure travel opportunities for all within a sustainable funding environment
- › Increased spending will be needed
- › **Make the problems help fund the solutions!**

- › “There would be few areas in economics where such a clear and rational set of policy directions have so consistently lagged in practice.”
- › “Each driver thinks of their own need to get to their destination, not considering how, by taking up space on the road, they impinge on the ability of other drivers to do so.
 - There is no means for one driver to coordinate with others, to bargain about who should have priority, so that they can all be better off.
 - This results in a predictable **'tragedy of the commons'** which is estimated to waste around \$9 billion a year in avoidable congestion costs, increasing to around \$20 billion by 2020.
 - Such costs will only increase with faster population and economic growth.”
- › “In the face of these costs, why have we stuck to the traditional 'fuel tax and rego' model for roads, when sensible pricing seems to offer such large benefits?”

The Henry Tax Review Release 2 May 2010

- › *Recommendation 61:* Governments **should analyse** the potential network-wide benefits and costs of introducing variable congestion pricing on existing tolled roads (or lanes), and **consider** extending existing technology across heavily congested parts of the road network.
 - Beyond that, new technologies may further enable wider application of road pricing if proven cost-effective.
 - In general, congestion charges should apply to all registered vehicles using congested roads.
 - The use of revenues should be transparent to the community and subject to further institutional reform.

- › *Recommendation 62:* The Council of Australian Governments (COAG) **should** accelerate the development of mass-distance-location pricing for heavy vehicles, to ensure that heavy vehicles pay for their specific marginal road-wear costs.
 - Revenue from road-wear charges should be allocated to the owner of the affected road, which should be maintained in accordance with an asset management plan.
 - Differentiated compliance regimes to enforce this pricing policy may need to be considered to balance efficiency benefits from pricing against the costs of administration and compliance for some road users.

Some Progress (Albeit Slow): ATC: Nov 7, 2008

- › State and Territory Transport and Roads Ministers met with the Commonwealth Minister Albanese to discuss a national transport policy. The ATC Joint Communique issued 7 Nov said:
 - "It (ATC) agreed that road pricing schemes need to be carefully designed and specific to their proposed locations. Jurisdictions will cooperate in modelling the congestion, network, socio-economic and emissions outcomes of various targeted pricing scenarios."
- › Ministers are now openly discussing a suite of significant and even ambitious objectives that would have been hard to imagine a year ago. Although ministers have yet to bite the bullet on road pricing, they are seriously considering a range of road pricing schemes including:
 - HOT lanes
 - cordon fees
 - **distance-based fees**
 - parking measures
 - **time-variable congestion pricing.**
- › Some of the additional transport policies needed prior to a road pricing scheme to ensure success include:
 - **improvements to public transport**, walking and cycling facilities
 - enhancement of traffic management to mitigate adverse affects
 - encouragement to use mixed-modal travel such as park and ride services.
- › Some of the other challenges, along with choosing **the right road pricing scheme (i.e., charge, regime and revenue disbursement)**, are the costs of establishing and operating the system and the interoperability of technology.

- › The word ‘congestion’ is used 26 times but the phrase ‘road pricing’ only once in the paragraph:
- › Reducing travel demand is an important step in reducing traffic congestion. There are several interrelated components to reducing travel demand in our cities: one is to plan for more integrated, compact and mixed land uses in order to reduce average distances travelled; another is to reduce peak work flows, including through telecommuting and flexible work hours; and another is to reduce demand **through measures such as road pricing.**

What does A Previous Premier of NSW say?

- New Premier of NSW Nathan Rees (Front page Sydney Morning Herald Sat 1 Nov 2008): “...there should be a public debate about whether or not congestion charging should be introduced for the CBD” AND
- “.. he wants cashless tolls on all of Sydney's major roads so motorists pay varying fees at different times of the day - an effective congestion tax to cut peak-hour traffic.”
- Politically, things do change and we must continue keeping society informed on the sense of pricing.

› May 31, 2011

NSW will not introduce a **congestion tax** for motorists in and around Sydney due to the lacklustre standard of the state's public transport system.

Roads and Ports Minister Duncan Gay has ruled out imposing a **tax** on motorists entering the CBD similar to a system used in London.

“There cannot be a **congestion toll** if there is no public transport, and the one thing that NSW has not got is proper public transport,” Gay says.

“It would be so unfair to put a **congestion tax** on people that have no alternative to using their car because of the mess in which the former government left the state.”

A Federal Minister Said on June 9 2011

- › **A SENIOR Gillard Government minister says a congestion tax should be considered, even though Labor rejected the idea only last year.**
- › The Henry tax review proposed charging motorists for every kilometre they drove, with higher fees levied for driving into cities during peak hour.
- › The former Rudd government rejected the idea of a road congestion tax when it responded to the review in May 2010.
- › But Infrastructure Minister Anthony Albanese said today that **a congestion tax and road charges for more frequent drivers needed to be considered**, arguing technology could be used to calculate someone's road usage.
- › "We have to also look at, not just congestion charging, but also how new technology can be used in terms of charges," he told the Australian Financial Review forum.
- › "New technology means we can have **distance tolling**, particularly where it comes to freight.
- › **"In the longer term we need to have a community debate about those issues."**
- › In a separate address to a Roads Australia summit, Mr Albanese said time-based charges levied on Sydney Harbour Bridge motorists were a good idea.
- › "Surely those sorts of measures, that have been proven to be successful in other jurisdictions, are worth looking at," he told business leaders at Walsh Bay.
- › He also spoke in favour of private toll roads, pointing out that Sydney's earliest roads were tollways.
- › **"There's a, sort of, populist thing: all pricing is bad,"** he said.

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

- › Increased Community Participation
 - Money from Government
- › Greater mobilisation of private capital
 - 20% suggested by European Commission for its Trans-European Network
- › Road user charges (will take on a greater role?)
 - **Kilometre fee development (all networks)**
 - **With/without fuel tax compensation**
 - **Congestion charges (specialised setting)**
 - **The scheme = charge, regime, revenue disbursement**
 - **Users Pay, Users Benefit**
- › In Urban Areas the matter is Congestion, in Regional and Rural Areas the matter is Distance
 - Variable User Charging is what matters (not congestion per se)

- › Our road user charging system only charges heavy vehicles and only for marginal road damage (~5% of external costs!)
- › All users should be charged for all their attributable costs
- › This could be done by
 - Variable usage charge (inc. carbon price, air pollution, accidents, base road damage costs, through a vehicle km charge)
 - Tonne-kilometre (mass-distance-location) charging for additional road damage costs of heavy vehicles
 - Congestion pricing by time and place
 - Abolition of existing excise and registration charges
 - Hypothecating revenue to a transport trust
 - Reforming public transport fare setting at the same time

Obvious Really – When was it Started?

Charges should be closely related to the amount of **use made of the roads**. It should be possible to **vary prices** to some extent for different roads (or areas), at different times of day, week or year, and for different classes of vehicle.

Prices should be stable and readily ascertainable by road users before they embark upon a journey.

Payment in advance should be possible, although credit facilities may also be permissible under certain conditions.

The incidence of the system upon individual road users should be accepted as fair.

The method should be simple for road users to understand.

Any equipment used should possess a high degree of reliability.

It should be reasonably free from the possibility of fraud and evasion, both deliberate and unintentional.

It should be capable of being applied, if necessary, to the whole country and to a vehicle population expected to rise to over 30million.



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The Smeed Report on Road Pricing UK

Reuben Smeed, Michael Beesley, Colin
Buchanan

40 years on:



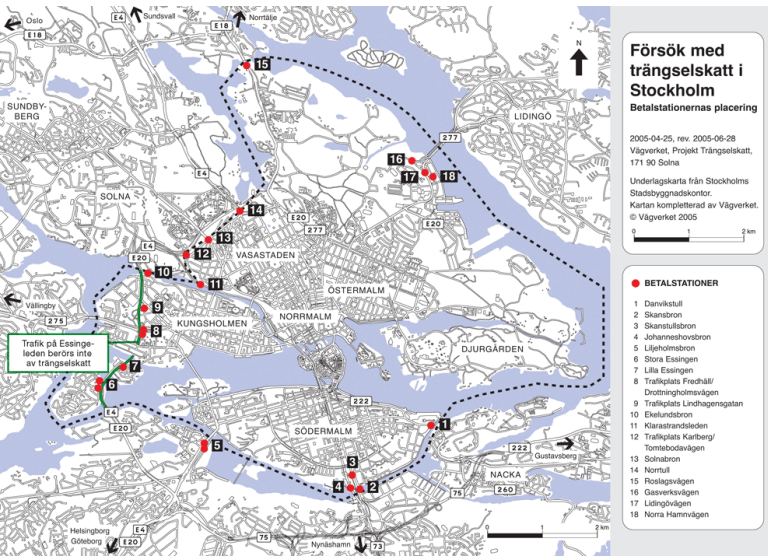


› Objective

- Decrease congestion by 26 percent (although recent claim is 18%)
- Revenue of Euro 100m
- Actual (as of March 2008)
 - 21 percent decrease
 - Revenue of Euro 130m (\$Aud214m)
 - 50,000 fewer cars per day into central London
 - Cannot state all priced off roads
 - London buses carried over 1.9 bn passengers in 06/07, 45 percent increase from 99/2000
 - Due in part to charge and investment in buses
 - About 4,000 less people entering central London in 2003
 - Small proportion of 20-25m daily journeys



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)

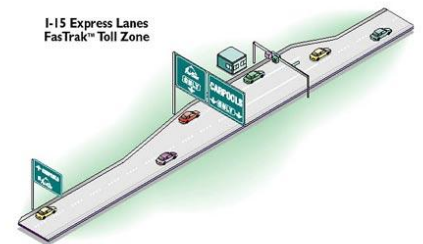
	AYE between Portsdown Road and Alexandra Road (36)	CTE after Braddell Road, Serangoon Road and Balestier slip Road (31,33,34)	CTE between Ang Mo Kio Ave 1 and Braddell Road (35)	ECP after Tanjong Rhu Flyover (30)
07:30 - 07:35	\$0.00	\$0.80	\$0.80	\$0.50
07:35 - 08:00	\$0.00	\$1.50	\$1.50	\$0.50
08:00 - 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

 financing infrastructure

 improve accessibility

 alleviate congestion

 reduce externalities

dynamic price

USA I-15

variable price

USA SR-91

Singapore

first-best pricing

Kilometre charge

Scandinavia

fixed price

toll roads

London

Germany

road segment

cordon

network



Travellers: responses to road pricing

change departure time
change route
change mode
make less trips / work at home
change destination
move to other location
find other job

short term

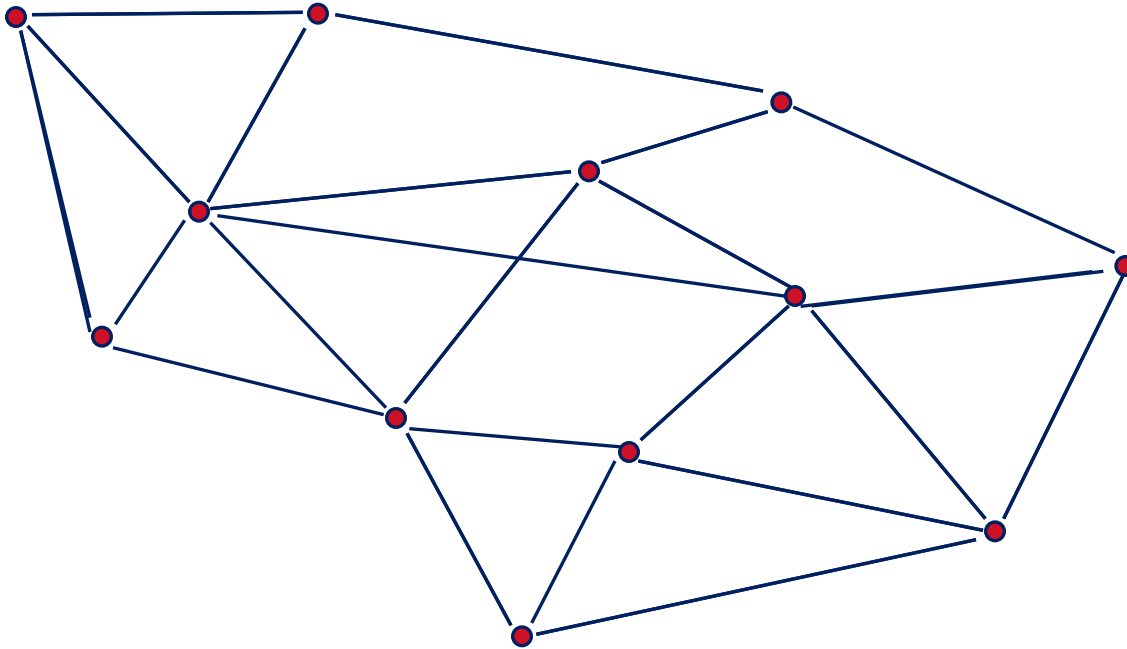
medium term

long term

› Travellers' responses 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



Where to price?

When to price?

Who to price?

How much to price?



network design problem

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

- › “The legislation relating to congestion charges should define that Helsinki Region Transport (HSL), the new municipal transport authority that will begin operating from 1 January 2010, will have the right to collect such charges,” Puoskari said Deputy chair of the Board Mari Puoskari.
- › “Then the collected funds would not flow to the provinces.
- › If the proposed congestion charges reduce the use of private cars, while increasing the use of public transport, we will need funds to develop our public transport system,”

- › A congestion fee will be charged in Vietnam's Ho Chi Minh City centre during rush hours through the introduction of an Electronic Road Pricing (ERP) system to cut down the number of cars that enter the city centre.
- › The ERP will help maintain traffic speeds on minor roads at 20 - 30 km/h while on expressways speeds will be maintained at within 45 - 65 km/h.
- › The ERP will be installed by the Tien Phong Technology Joint Stock Company for a period of six months.

› 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 (deferred but not abandoned)

- › Vehicles are charged/taxed by the distance they travel and not solely by fuel use
- › Good sense in many ways
 - Economic efficiency
 - ***Fairness***
 - Fuel taxes (as allocated – non hypothecated) increasingly delivering a shortfall in revenue to maintain, improve and construct the road infrastructure (an aside: helps public transport buses, the most popular form of PT)








- › 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 is 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.

- › The Dutch government plans to **scrap road tax as well as purchase tax on new cars** when the system is introduced. Eurlings says this will provide **a fairer system** which taxes vehicle use, rather than ownership.
 - Indeed, the minister says that more than half of Dutch road users will actually pay less under the road user charging scheme.
 - According to calculations by motoring organisations, only motorists who drive more than 18,000kms a year are likely to be worse off under the new scheme.
 - (Sydney Private cars 12,500k, Household business 15,000k, coy cars 22,000k per annum)
- › Importantly, the Dutch government has determined that the costs of operating the national road user charge will not exceed five per cent of the proceeds.
- › As of November 2009 – On target but a little delayed
- › Nov 16th Dutch Cabinet agreed to the km charge for cars:
 - **3 euro cents/km in 2012 increasing to 7 euro cents in 2017**
 - **Equiv of A\$0.05/km in 2012 (or 50c/litre)**
 - **A\$750 per annum (15,000km), cf. regn. fees (typically in Aust. around \$300-\$400)**

- 2012 3 Euro Cents per km increasing to 6.75 Euro (□) cents per km in 2018
- 3 euro cents is an average but varies by class of vehicle based on energy efficiency (A,B, C...).
- Hybrid approx 0.5-1 Euro (□) cent per km
- In 2012 it applies to only 20% of cars (lottery), with 100% covered by 2018
 - Also will be a flat rate per km per class up to 2018.
- From 2018 a peak rate will start but only in Amsterdam
 - Lower base (non-peak) rate when introduce peak rate
 - Must be revenue neutral
- 58% of people in entire country will be better off
- Randstadt - congestion is predicted to reduce by 58%

- › The charge for electrical cars will be in 2012 0.4 ¢/km and in 2018 0.8 ¢/km.
- › This in contrast to an SUV, which will be costing 6.1 ¢/km in 2012 and 15.0 ¢/km in 2018.
- › So there are large differences between cars, depending on their CO2 emissions.



Soort auto	Tarief bij start conform wetsvoorstel	Tarief na volledige invoering
 Zeer zuinige auto bv. elektrische auto	0,4 ct/km	0,8 ct/km
 Kleine stadsauto (benzine) bv. Smart	0,6 ct/km	1,4 ct/km
 Middenklasser (benzine) bv. Renault Megane	1,7 ct/km	4,0 ct/km
 Grote middenklasser (benzine) bv. Volvo V70	3,6 ct/km	9,2 ct/km
 SUV (diesel) bv. BMW X5	6,1 ct/km	15,0 ct/km

- › NXP Semiconductors and IBM have announced the final results of a landmark road pricing trial conducted in the Netherlands, which demonstrated that with the help of technology, drivers can be motivated to change their driving behaviour, reducing traffic congestion and contributing to a greener environment. Key findings of the trial included:
 - 70 per cent of drivers improved their driving behaviour by avoiding rush-hour traffic and using highways instead of local roads.
 - On average, these drivers in the trial saw an improvement of more than 16 per cent in average cost per kilometre.
 - A clear system of incentives is critical to changing driving behaviour.
 - Instant feedback provided via an On-Board Unit display on the price of the road chosen and total charges for the trip are essential to maximising the change in behaviour.

Oregon's Road User Fee Pilot Program – “concept proven”

- › Oregon Department of Transportation has published the final proof-of-concept report (early 2009) of the Oregon Mileage Fee Concept and Road User Fee Pilot Program
 - implemented to test a new revenue platform that would replace the gas tax as the fundamental way the state pays for road works and maintenance.
- › The road user fee was paid at the pump, with minimal difference in process or administration for motorists, compared to how they pay the gas tax.

- › **It is all about how the Revenue is Allocated**
- › Governments already participate in Hypothecation to varying degrees
 - Parking charges
 - Developer Levies
 - Workplace parking levies
- › Earmarking has pluses and minuses
 - **Pluses**
 - Applies benefit theory of taxation (trace of impact)
 - Ensures a minimum level of expenditure for desirable govt functions
 - Ensures continuity for specific projects
 - Can help in overcoming resistance to new taxes or increased rates
 - **Minuses**
 - Hampers effective budgetary control
 - Can lead to misallocation of funds (excesses and under provisions)
 - Imparts inflexibility to revenue structure (especially in volatile times)
 - Risk of remaining in place long after need
 - Removal of a portion of fiscal action from periodic review and control impinges on policy-making powers

- › London Low emission zone (LEZ) for heavy goods vehicles
 - 4 Feb 2008 introduced
 - The vehicles affected by the LEZ are older diesel-engine lorries, **buses**, coaches, large vans, minibuses and other heavy vehicles that are derived from lorries and vans, such as motor caravans and motorised horse boxes.
 - 1 July 2008:
 - **Lorries over 3.5 tonnes, buses and coaches driving in the zone are now required to meet an emissions standard of Euro III for particulate matter or face a £200 daily charge.**
- › Generalised emissions charges
 - Rate, location, time
- › EcoPass Pollution Charge
 - Milan trial 2 Jan 2008 for 12 months

› Ecopass Tariffs:

- Class I: Clean fuel - free
- Class II: Euro 3,4 – free
- Class III: Euro 1,2 cars and goods vehicles– 2 Euro's per day, 50 Euro's first 50 days, 60 Euro's second 50 days
- Class IV: Pre-Euro petrol cars and good vehicles, Euros 1,2,3 diesel cars, Euro 3 diesel goods vehicles, Euro 4,5 diesel buses– 10 Euro's per day, Euro 125 and 150 first and 2nd 50 days
- Class V: Pre-Euro diesel cars, Euro 1,2 diesel goods vehicles, Euro 1,2,3 diesel buses, mopeds, scooters motorbikes – 10 Euros/day, 250 and 300 Euros 1st and 2nd 50 days

- › Blended Charging
 - Incremental Introduction
 - Can be implemented in various ways:
 - Maintain full fuel tax rates
 - Reduce fuel tax rates by varying percentages (to ensure revenue neutrality for revenues not earmarked to roads)
 - Charging rates per kilometre determined by revenue needs (a reasonable starting position)
 - Considerations of equity and efficiency – permissible cross-compensation
 - e.g., in congestion contexts – delayer compensates the delayed.
 - Since the charge is applied at point of sale of fuel, it is very easy to vary the fuel charge component

Some impacts of existing schemes

› Traffic reduction

- 14-23% from schemes intended to reduce congestion (e.g. London, Stockholm), often growing over time (NO OTHER INITIATIVE CAN CUT CONGESTION THIS MUCH, THIS QUICKLY)
- Less from schemes with lower charges, where revenue raising was the main purpose

› Impact on travel speeds

- Relatively bigger than traffic reduction

› Impact on local business in charge area = Minimal

› Impact on emissions

- › Favourable but usually < than congestion impact

› Impact on public acceptance

- Usually weak before implementation then majority support

Example of Charge under Revenue Neutrality: Cars

	Current Tax regime	Distance Based Blending
Fuel price, comprising:	\$1.05	\$0.95
State Tax	\$0.11	\$0.00
Fed Tax	\$0.40	\$0.40
Non-tax	\$0.54	\$0.54
Fuel efficiency (l/100km)	10	10
Distance Travelled p.a.	15,000.00	15,000.00
Total fuel bill	\$1,575.00	\$1,417.50
Regn charges	\$150.00	\$150.00
Fuel bill components:		
State taxes	\$157.50	\$0.00
Federal taxes	\$600.75	\$600.75
Balance	\$816.75	\$816.75
Total Km based charge:		
Revenue neutral		157.50
Cents Per km		1.05
Total annual cost	\$1,725.00	\$1,725.00

- › A BCS has all the appeals of efficiency, fairness and revenue growth
 - Huge political mileage if partial replacement of fuel tax
- › It can be tailored to suit the local situation – economically and politically
- › Kilometre-based charging is coming regardless:
 - Tolls roads in Sydney
 - The entire Regional network in the Netherlands
- › Australia is well placed
 - Interoperable electronic tolling in Sydney/Melbourne/Brisbane
 - Hence extensive exposure and experience with electronic pricing (and widespread acceptance in Capital Cities)
 - A huge amount of intellectual knowledge of advance intercommunication systems
 - Vehicle, Road operator, Banking system, Telecommunications provider
- › It is coming
 - No longer is the Issue Why or What
 - But When (How has essentially been resolved)
- › Whatever happens it must demonstrate **value for money** and **benefits to users**

Indicators	Base levels 2009	\$10 cordon charge to enter Melbourne CBD	10c/km variable user charge – metro area	Increase petrol price to \$2 per litre (diesel not changed)	Rail and bus fares reduced by 50%	Fuel efficiency improvement by 25%
<i>Government revenue (\$)</i>						
Cordon/Congestion Charge Revenue	-	\$106.1m	\$2.291bn	-	-	-
TGovtExcise	\$1.351bn	-0.073%	\$111.32m	\$1.492bn	-0.412%	-21.84%
TGovtPark	\$264.7m	-1.476%	-3.590%	-2.615%	-2.74%	0.88%
TgovtPT	\$577.5m	0.922%	22.16%	16.413%	-30.57%	-6.202%
<i>Total end user cost (\$)</i>						
TEUC.MoneyC @	\$5.390bn	1.957% (105m)	36.873% (\$1.99bn)	27.930% (\$1.501bn)	-3.347% (-\$202m)	-12.28% (-\$662m)
TEUC.TimeC @	\$4.856bn	-0.066% (-\$0.4m)	-7.023% (-\$341m)	-5.171% (-\$205m)	-2.659% (-\$160m)	2.346% (\$28m)
<i>Consumer surplus (\$)</i>	\$5.526bn	-0.939% (-\$52m)	-127.55% (-\$4.01bn)	-98.143% (-\$4.120bn)	29.96% (\$1.656bn)	45.425% (\$2.51bn)
<i>Commuter Mode growth*</i>						
TTrain	11.47%	0.400%	24.170%	14.549%	14.549%	-6.833%
TBus	2.829%	0.455%	24.250%	31.240%	31.240%	-6.735%
TLight Rail	5.176%	2.179%	11.261%	2.632%	-2.632%	-3.31%
TBwy	0.4059%	15.717%+	14.571%	3.502%	-3.502%	-4.299%
TCO2 (kg)	6.183bn	-0.073%	-8.406%	-6.751%	-0.412%	-21.804%
TVKM (km)	24.971bn	-0.075%	-8.041%	-6.473%	-0.418%	4.132%

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.

- › 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 of **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.



Critical policy/program problems

- Congestion
- GHG emissions
- Social exclusion
- Energy security/price
- Safety/health



Road pricing reform



New land transport policies and programs that will

- Reduce the need to travel
- Encourage travel by lower impact means
- Improve the environmental performance of travel
- Provide travel opportunities for all





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Thank You



- › Compromise on tolled roads (if no network based VUC)
 - A Super HOT lane and Premium Tolls etc.
 - Keep the car users happy!
 - Premium tolls
 - Toll differential used to support public transport
 - Win win?
- › No Car Lanes
 - Real prospects to manage congestion
 - Bus and Truck mix when low frequency bus service (which is Sydney)

- › Infrastructure is a ***System, a Network***
- › Passenger transport should be seen as passenger logistics in a supply chain
 - It does not begin and end at a rail station/bus stop
 - ***Accessibility*** is the key issue
 - Modal neutrality
 - Too much emotion/ideology and technological bias
 - Major institutional barrier
 - Choose mode only after the system analysis has been done
 - ***Think system and not project***
 - Projects are what people build/deliver.
 - They should be an outcome of a system analysis

- We cannot estimate congestion simply by measuring network delay.
- We must examine congestion's influence on choices firms and hhlds make about locn and travel.
- Congestion costs must always be balanced against access benefits.
- Example of a Car trip (next slide) -
 - out of 36 mins Door to Door maybe removing congestion will reduce travel time by 4 mins to 32 min?
 - So how big a issue is it really? Real or perceived?
- Lets not forget freight movement in cities - could be biggest concern in lost productivity?



Congestion: Is the Debate Misplaced?

<i>Trip Segment</i>	<i>Distance kms</i>	<i>Time mins</i>	<i>Speed kph</i>	<i>Distance Share %</i>	<i>Time Share %</i>
<i>Walk to car</i>	0.01	0.2	3	0.1	0.6
<i>Drive to collector</i>	0.25	1.3	12	2.4	3.5
<i>Drive to arterial</i>	0.5	1.9	16	4.7	5.2
<i>Drive to freeway</i>	2.00	6.0	20	18.9	16.6
<i>Drive on congested freeway</i>	6.00	14.4	25	56.6	39.9
<i>Drive on arterial</i>	1.50	4.5	20	14.1	12.5
<i>Drive in parking structure</i>	0.25	1.9	8	2.4	5.2
<i>Walk to office</i>	0.10	6.0	1	0.9	16.6
<i>Total/ave</i>	10.61	36.1	18	100	100

- › **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?



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Commitment to Networks and Systems

