

宜居城市的可持续交通需求管理 - 新加坡的整合路径

**Sustainable Travel Demand Management for
a Liveable City – Singapore’s Holistic Approach**



Loh Chow Kuang

Deputy Director, LTA Academy
Land Transport Authority, Singapore
chow_kuang_loh@lta.gov.sg

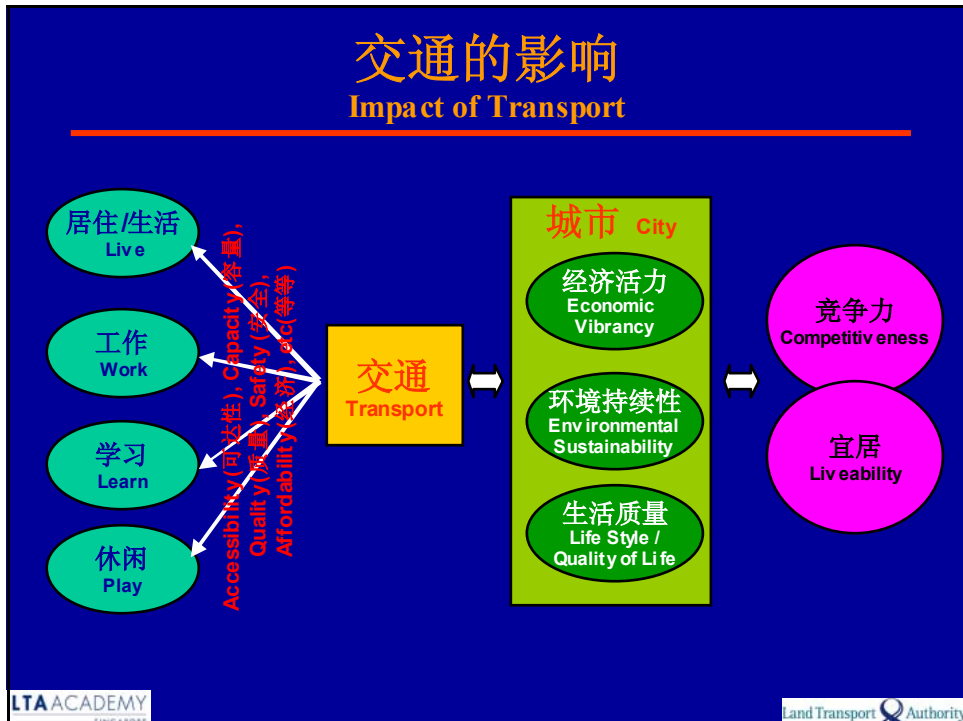
罗兆广
副院长
新加坡交通学院
陆路交通管理局

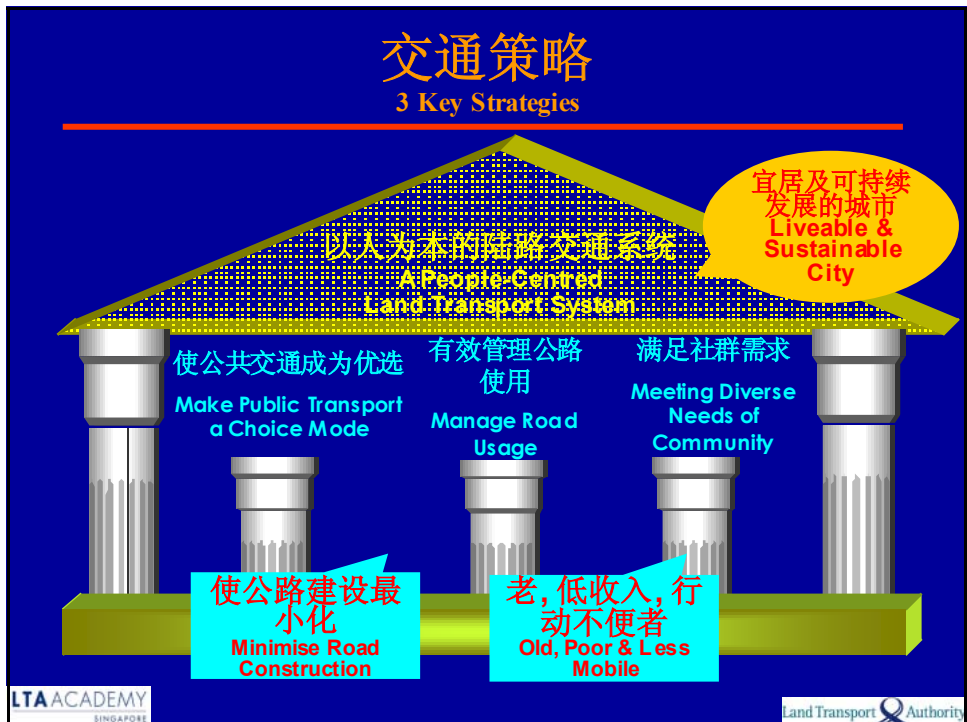
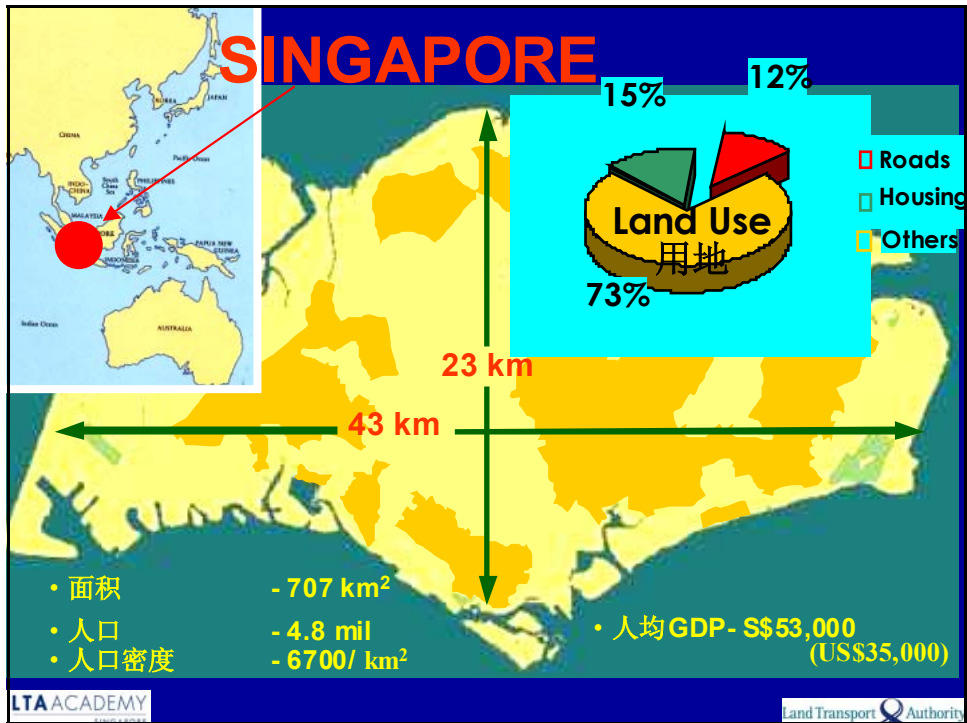
International Seminar "Green Transport for Growing Cities", 2 & 3 Sep 09, Tsinghua University, Beijing, China

主要内容 Outline

- ★ 前言 Introduction
- ★ 整合路径 Holistic Approach
- ★ 限制车辆拥有 Vehicle Ownership Control
- ★ 拥堵收费 Congestion Charging
- ★ 结语 Conclusion









城市交通转变

Transformation of the Land Transport System in Singapore

1970s




公共交通很差




交通拥堵严重

➔

现在



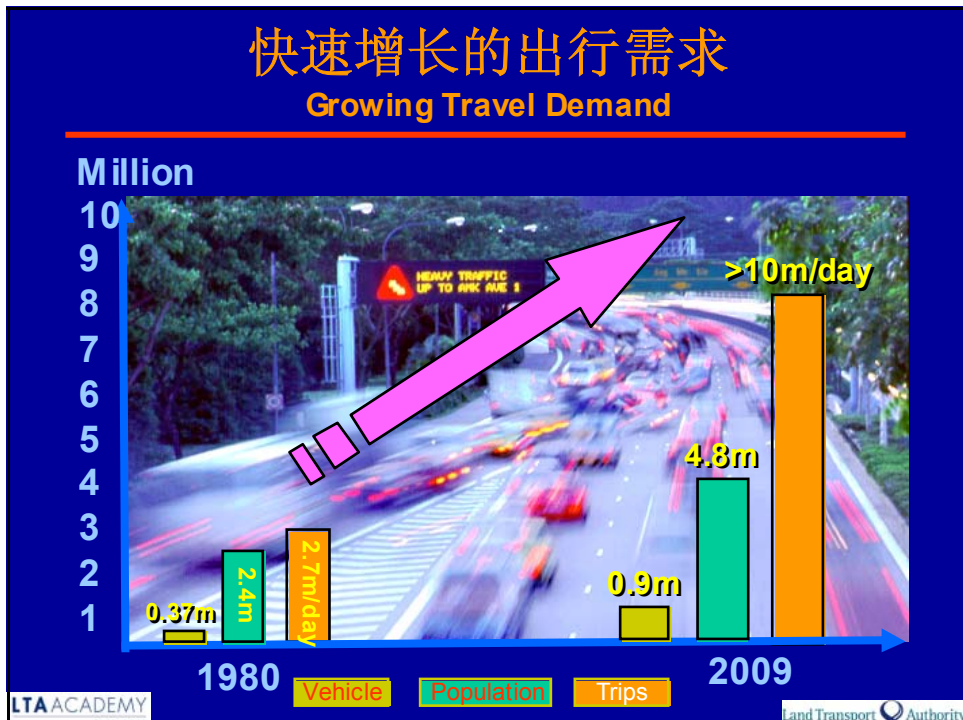
高质量的公共交通



车流顺畅的道路体系

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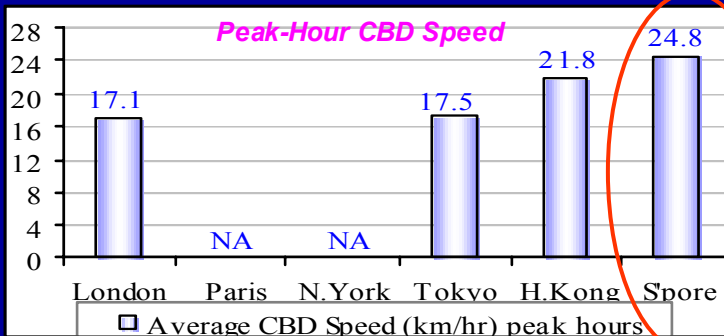
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车流顺畅的道路体系

> 95% 的高速公路和主要干道在繁忙期没有拥堵现象



Source: UITP's "Mobility in Cities Database" 2006

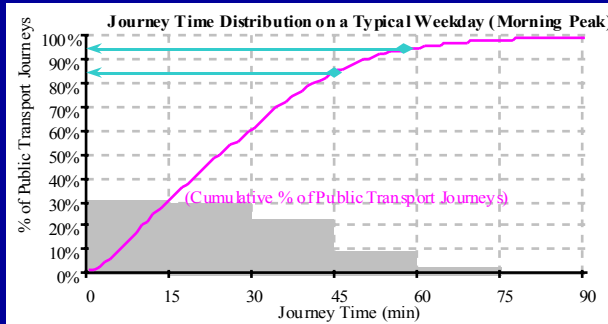
高效的公共交通

>85% 的大容量公共交通乘车时间在早高峰时段小于45分钟

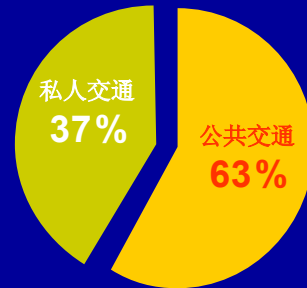
收费公众可以负担，在发达国家中处于较低水平



乘车时间分布



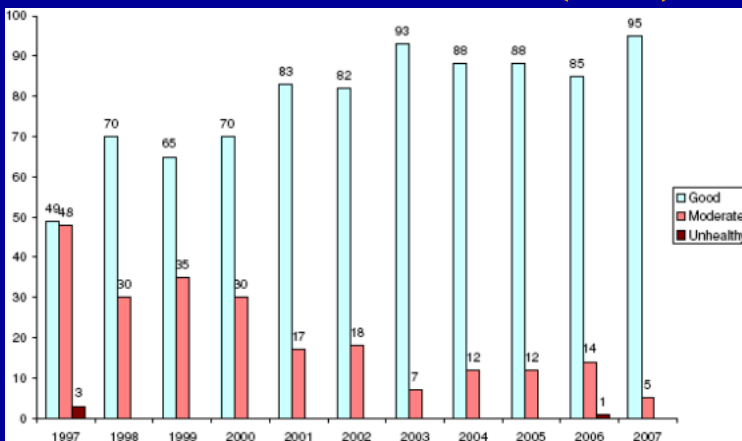
高峰期的出行比例



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污染物标准指数 (PSI)



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国际竞争力 / 适合人居排名

新加坡是世界第二个经济最具竞争力国家



Source: IMD World Competitiveness Yearbook 2008

新加坡是亚洲最适合人居的国家
来源: 2008 Mercer's 生活质量调查报告



新加坡的整合路径

Singapore's Holistic Approach

一体化的土地
利用和交通规划
Integrate land use/
transport planning

控制车辆拥有
Car ownership control

税务和附加注册费
Custom Duty &
Additional Registration Fee

管理道路使用
Manage road usage

燃油税
Petrol Duty

减少汽车使用量
Reduce Car Usage

增加公共交通使用量
Increase Public Transport Usage

积极的金融和
行业管理框架

扩展轨道交通

改善公共汽车服务

提倡公交优先

一体化的公交网络

一体化的票务系统

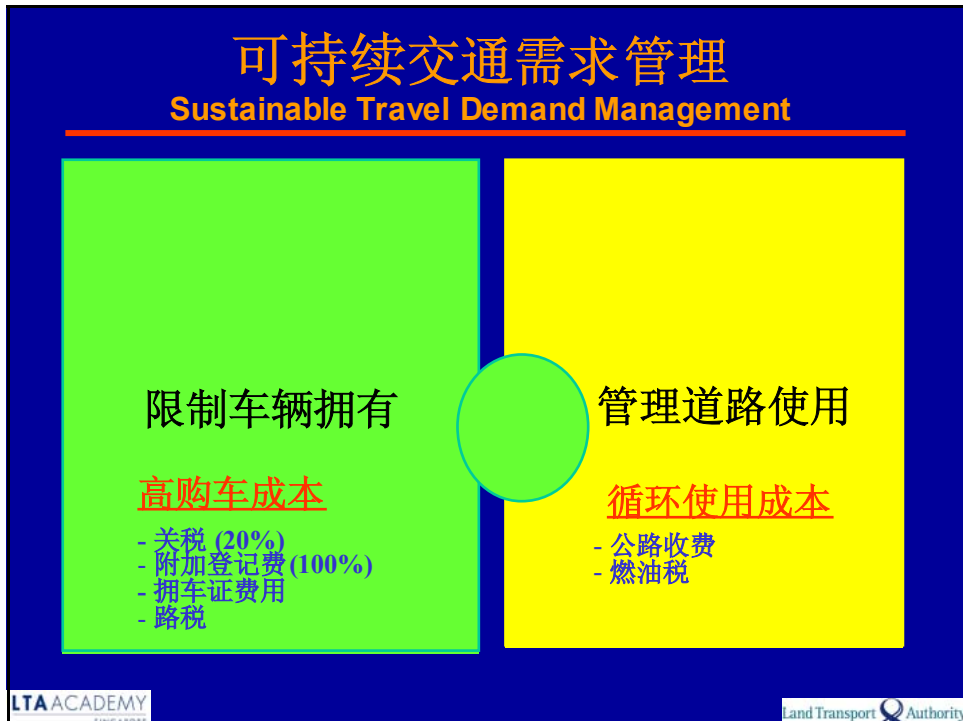
可承受的票价

转换和乘客基础设施

先进信息

高质量的出租车





限制车辆拥有 - 车辆配额制

Vehicle Quota System (VQS)

- 1990年开始实施，把车辆数量的增长控制在**3%**以内(从2009年控制在**1.5%**以内)
- 管制车辆数目增长，使它维持在国内公路网络所能容纳限度，不造成公路更加拥挤
- 所有的新车都必须购买**拥车证**
(Certificate of Entitlement or COE)
- 拥车证的费用的变化基于市场的需求和供给

车辆配额制特点

VQS Features

- 增长百分率以去年车辆数目为根据
Percentage growth based on vehicle population at the end of previous year
- 现年估计车辆报销数目
Estimated de-registration in the current year
- 调整上年估计车辆报销数目
Adjustment for under / over-estimation of de-registration in previous year
- “拥车证”分5个组别 **5 COE Categories**
 - **A组 ($\leq 1,600$ cc 汽车和德士 car/taxi)**
 - **B组 ($> 1,600$ cc 汽车 car)**
 - **C组 (货车和巴士 goods vehicle & bus)**
 - **D组 (摩托车 Motorcycle)**
 - **E组 (公开一种类不拘 Open)**

车辆限额制特点 VQS Features

- “拥车证”有效期 COE Validity:
 - 10年 10 years for all vehicles except
 - 德士: 8年 8 years for taxi
 - 可更新 5年或 10年 Renewable for 5 or 10 years
- 如果“拥车证”不更新, 车辆将报销
Vehicle will be de-registered if COE is not renewed

拥车证投标系统

COE Bidding System

- 公众公开投标 (自 2001年 6月开始)
Open public tender (since June 2001)
- 每月两次 Twice a month
- 投标时可查阅实时信息:
Access to real-time information during bidding exercise
 - 限额 Quotas
 - 所收到的投标 Quota Bids received
 - 现行“拥车证”价格 Prevailing COE price

拥车证公开投标

COE Open Bidding

OCTOBER 2008 2nd Open Bidding Exercise has ended on 22/10/2008 16:00 hrs

RESULTS FOR OCTOBER 2008 2ND OPEN BIDDING EXERCISE

Category	Quota	QP(\$)	PQP(\$)
A Car (1600cc & below) & Taxi	1,846	10,989	12,364
B Car (Above 1600 cc)	1,100	7,589	12,577
C Goods Vehicle & Bus	270	11,503	13,627
D Motorcycle	420	1,609	1,538
E Open	769	12,001	

QP: Quota Premium
PQP: Prevailing Quota Premium

Category	Received	Successful	Unsuccessful	Unused
A CAR (1600CC & BELOW) & TAXI	1,258	1,395	163	0
B CAR (ABOVE 1600CC)	934	755	179	7
C GOODS VEHICLE & BUS	296	242	54	0
D MOTORCYCLE	462	378	84	15
E OPEN	1,224	737	487	0

Received: Total Bids Received
Unused: Unused Quota carried forward

Source: Land Transport Authority

LETTERS

- Please visit <https://lta.gov.sg> to email/renewise your bid or call 63821 485 on your bid status.
- How to bid
- Latest bidding results
- Quota, quota allocation and previous bidding results

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非繁忙时间用车 Off-Peak Car

- 允许更多的人以更低成本拥有小汽车而不造成交通拥堵
- 车主购车时可以享受税务回扣（最高大1万七千新元）和年度路税折扣
- 平时晚上7点到第二天早上7点，周六或公共假期前夕，周日或公共假日全天，这些时段免费
- 在其他时段每天20新元执照费
- 电子执照 Electronic licence

周末/非繁忙时间使用的
红色车牌

Private Vehicle	Private Vehicle Base (Top) Private Vehicle Front (Bottom)	Off-Peak Car Scheme
SZA 5792B	EJ8436L	SO 9485K
SE2226B	EJ8436L	
SBH3158E		



拥堵收费 Congestion Pricing

世界首创的公路收费制

1975年开始实施

从1998年开始



Area Licensing Scheme (ALS) 限制区执照



Electronic Road Pricing (ERP) 公路电子收费

限制区执照

1975 - Manual Road Pricing



- Area Licensing Scheme (ALS) for CBD or Restricted Zone started in June 1975 with 28 Gantries
- Scheme extended to Expressways in May 1995.
- High manpower needs, limitation in varying road pricing charges, inconvenient to motorists.

公路电子收费 (ERP)

1998 - Electronic Road Pricing (ERP)

全自动,以人为本,公平、可靠

车内读卡器及现金卡



收费闸门



监控系统



中央电脑系统

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公路电子收费(ERP)

共有 66 个收费闸门
分布在中央商务区、
主干道、高速公路

\$1-\$5 per Car



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拥挤管理措施

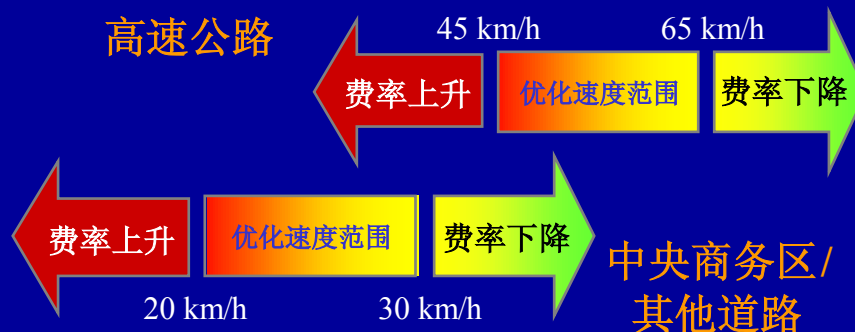
A Congestion Management Tool

- ERP rates are pegged to PCU (Pax Car Unit)
 - Car – 1
 - Taxi -1
 - Buses – 1.5 to 2
 - Light Goods Vehicle – 1
 - Heavy Goods Vehicle – 1.5 to 2
 - M/cycle – 0.5
- Set based on traffic conditions
 - Vary by time and location
- Starting from S\$1.00 per PCU
- Review/Revise quarterly to maintain an optimal speed range
- Only emergency vehicles are exempted



动态的ERP费率

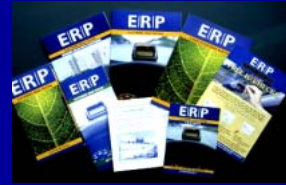
- 根据交通状况，ERP费率每3个月检讨一次
- 确保优化使用道路空间，车速在优化的范围



政策变动, 宣传等

ERP Implementation - Policy Changes, Publicity, etc

- Free fitting of In-vehicle Units on 670,000 vehicles
- Strengthen enforcement powers
- Vehicle tax incentives:
 - Lower vehicle ownership taxes & road tax
 - Road tax rebates over 5 years
- Manage impact on businesses
 - Phasing-in of ERP rates for taxis and commercial vehicles over 3-4 years
- Public Education/Publicity
 - Special ERP hot-line,
 - Wide media coverage
 - Brochures for all vehicle owners, etc
- Improve public transport
 - Eg new express bus services



成本/收益 Costs/Benefits

- **Area Licensing Scheme**
 - Capital Cost = S\$7m (mostly for the Park-and-Ride Scheme)
 - Operating Cost (1975-1989) = S\$10m
 - Fee Collection (1975-1989) = S\$157m
- **Electronic Road Pricing**
 - Capital Cost = S\$200m (incl free IUs for 700,000 vehicles)
 - Fee Collection = S\$100m/year
 - Operating Cost = S\$20m/year (only 20% of total fee collection)

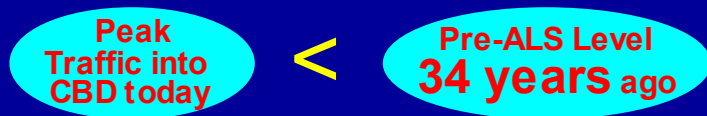
Revenue-Cost
Ratio = 9.2

Cost Recovery
~ 3 year

No major new roads needed
in CBD despite significant growth
in traffic and developments

交通影响 Traffic Impact

- 44% drop in traffic entering CBD after ALS
- 22% increase in speed within CBD after ALS
- 10-15% drop in traffic entering CBD after ERP
- Significant reduction in through-traffic and multiple trips into CBD
- Surge in traffic immediately before/after charging period and along by-passing roads.



公共交通影响

Impact on Public Transport

Peak Modal Split

	Bus	Car/Van
Before ALS	33%	56%
After ALS	46% ↑	46% ↓
	Bus/Train	Car/Van
Today	62% ↑	31% ↓

价格弹性 Price Elasticity of Demand

Post -ERP Elasticity

- CBD/Arterial Roads = **0 to -0.42**
- Expressway = **-0.16 to -0.44**
- Higher elasticity values when:
 - ERP charge was removed
 - ERP rate was increased to the upper range around S\$3

ERP 成功因素

Road Pricing in Singapore - Critical Success Factors

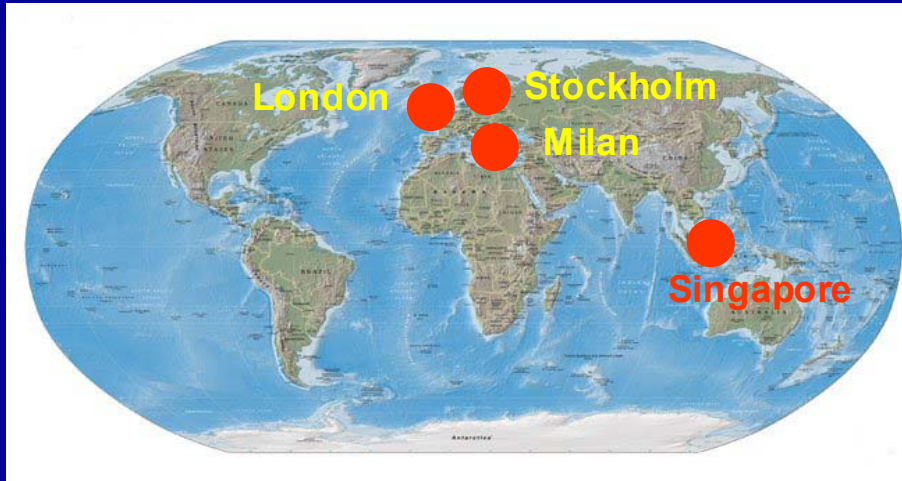
- Strong Government commitment
- Purely a congestion management tool
- Non-revenue generating objective
- No privacy intrusion
- Transparent and trustworthy
- Fair, equitable and user friendly
- Package approach
 - Improve public transport
 - Provide alternatives
- Minimise impact on businesses
- Public education/Publicity
- Legislation and enforcement
- Prevention of violations and frauds
- Address foreign vehicles



其他国家的拥挤收费

Worldwide

- Congestion Charging Scheme



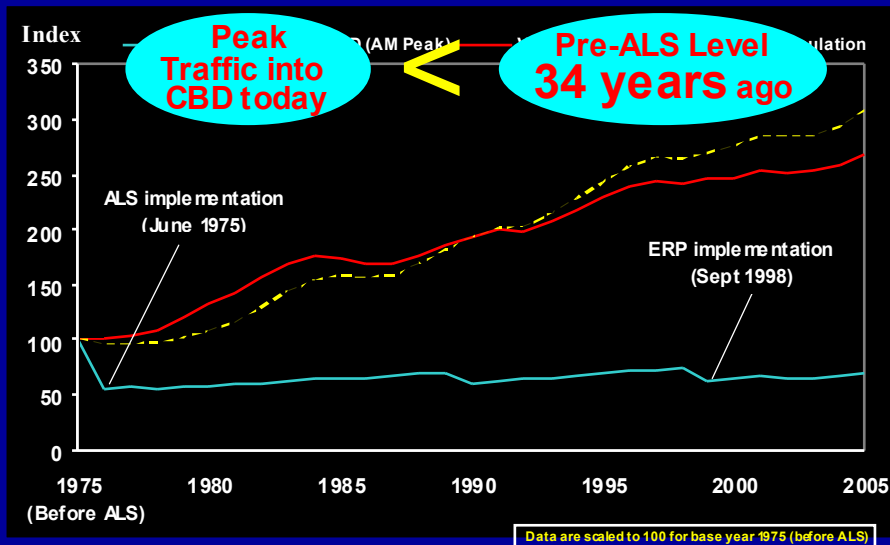
国际观点

International Perspectives

- Uniqueness of Singapore's road pricing system in comparison with similar schemes in London/Stockholm:
 - **Non-financial objective, purely for congestion management**
 - **Pricing is pegged to PCU and varies by vehicle type, time and location, based on per-pass basis**
 - **Pricing is reviewed/revised every 3 months**
 - **Automatic on-the-spot deduction of charges from the smartcards in vehicles**
 - **Evening pricing for outbound traffic**
 - **No privacy intrusion**
 - **Only emergency vehicles are exempted**
 - **Operating cost is the lowest or only 20% of the total fee collection**

Singapore's ERP is an innovative, if not near perfect implementation of the economic theory of congestion pricing

ALS / ERP / VQS 的效果



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Thank You
谢谢

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