



# Congestion Pricing: International Experiences and Implications for China

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# Objectives of Congestion Pricing

- ❖ Reduce traffic volumes
- ❖ Reduce delay, increase travel speeds
- ❖ Increase time reliability
- ❖ Reduce emissions
- ❖ Provide more resources for public transport

# Principles of Congestion Pricing Implementation

- ❖ Charges should relate closely to road usages
- ❖ Charges should vary with location, time, and modes, which are readily ascertainable
- ❖ The incidence of the system upon motorists should be fair
- ❖ In advance and automatic payment should be possible
- ❖ The drivers' privacy and rights should be protected
- ❖ The pricing system should be easy to understand
- ❖ It should be reasonable free from the possibility of fraud and evasion
- ❖ Equipment should possess a high degree of reliability
- ❖ Occasional users and visitors should be accommodated rapidly and at low cost

# Singapore Case (ALS Experience)

- ❖ On June 2, 1975, Singapore implemented a manual area licensing scheme (ALS) in its 2.0 square-mile restricted zone (RZ) with initially 24 vehicular entry points.
- ❖ S\$3/day or \$60/month
- ❖ Company registered vehicles cost double
- ❖ Taxis, buses, motorcycles, and carpooling vehicles carrying 4+ persons were exempted
- ❖ 7:30AM to 9:30AM Monday - Saturday
- ❖ 43 percent decrease in the traffic volume in the morning peak hours
- ❖ No mirror image for the evening peak hour congestion
- ❖ June 1, 1989: 4:30PM-7:30PM, later shortened to 4:30PM-6:30PM, Monday-Friday, inbound traffic reduced by 44 percent during evening hours
- ❖ January 3, 1994: 7:30AM-6:30PM, Monday-Friday and 7:30AM-3:00PM, Saturday; S\$2 part-day fee for 10:15AM-4:30PM Monday-Friday and 10:15AM-3:00PM on Saturday; smooth out congestion through pricing

# Singapore Case (ERP Experience)

- ❖ April-September 1998, Singapore implemented an electronic road pricing (ERP) system
- ❖ Initial capital cost of S\$197 million, about S\$100 million covered the initial supply of in-vehicle unit (IU) transponders for free during a 10-month period of grace, S\$97 million was for the design, development, installation of ERP equipment, central computer system, etc.
- ❖ The IU accepts prepaid smart debit cards before each trip and is debited at the antenna-equipped gantry locations found near the RZ
- ❖ All vehicles (excluding emergency services) are levied on a per use basis and rates vary according to vehicle type, time, and location, S\$0.5 - S\$2.5 per entry, less for small vehicles
- ❖ Starting from April 1999, a quarterly rate review system adjusts congestion prices based on the target speed ranges between 45 and 65 kph for expressways and between 20 and 30 kph on arterial roadways.
- ❖ 10 mph increase in average speed, 25 percent fewer traffic accidents, 45 percent reduction in traffic, 20 percent increase in use of public transportation, 176,400 fewer lbs of CO<sub>2</sub> emitted
- ❖ The annual operating cost of the system was about S\$16 million, annual gross revenue were S\$80 million

## Singapore ERP in 2005 [CBD priced zone (Inset) and Expressways (Red)]



# London Case: The Program

- ❖ On February 17, 2003, London implemented road pricing to combat congestion in central London. The system covers an eight square mile area.
- ❖ The scheme involves a standard per-day charge, 7:00AM to 6:30PM Monday - Friday.
- ❖ Video cameras optimal character recognition system at 174 entry points
- ❖ £5/day, £25/week, £110/month, or £1,250/year. 90 percent discount for area residents
- ❖ Taxi drivers, roadside help, disabled people, and two wheelers are exempted

# London Case: The Impacts

- ❖ Within the first few months of implementation, traffic was reduced by 20 percent
- ❖ After the first year of operation, traffic was reduced by 15 percent during charging hours, traffic delays were cut by 25 percent, travel speeds increased by 30 percent, bus use increased by 40 percent
- ❖ For the first two years of the program, traffic volume dropped 18 percent, average speed increased by 37 percent, from an average speed of 8 mph to 11 mph
- ❖ Between 2002 and 2003, the total NOX emissions in the charging zone reduced by 12.0 percent, PM10 emissions by 11.9 percent, and CO2 emissions by 19.5 percent.
- ❖ The initial capital costs of the congestion pricing were approximately £200 million at 2002 prices, most were provided by the central government.
- ❖ The total annual cost £130 million included £5 million for administration, £90 million for operation, £20 million for additional bus costs, and £15 million for charge-payer compliance costs.
- ❖ In the first year, the program generated net revenue of 68 million. £97 million in net revenues was collected in the 2004/05 budget year. Estimated surplus is around £122 million per year.

# The Central London Congestion Charging Zone



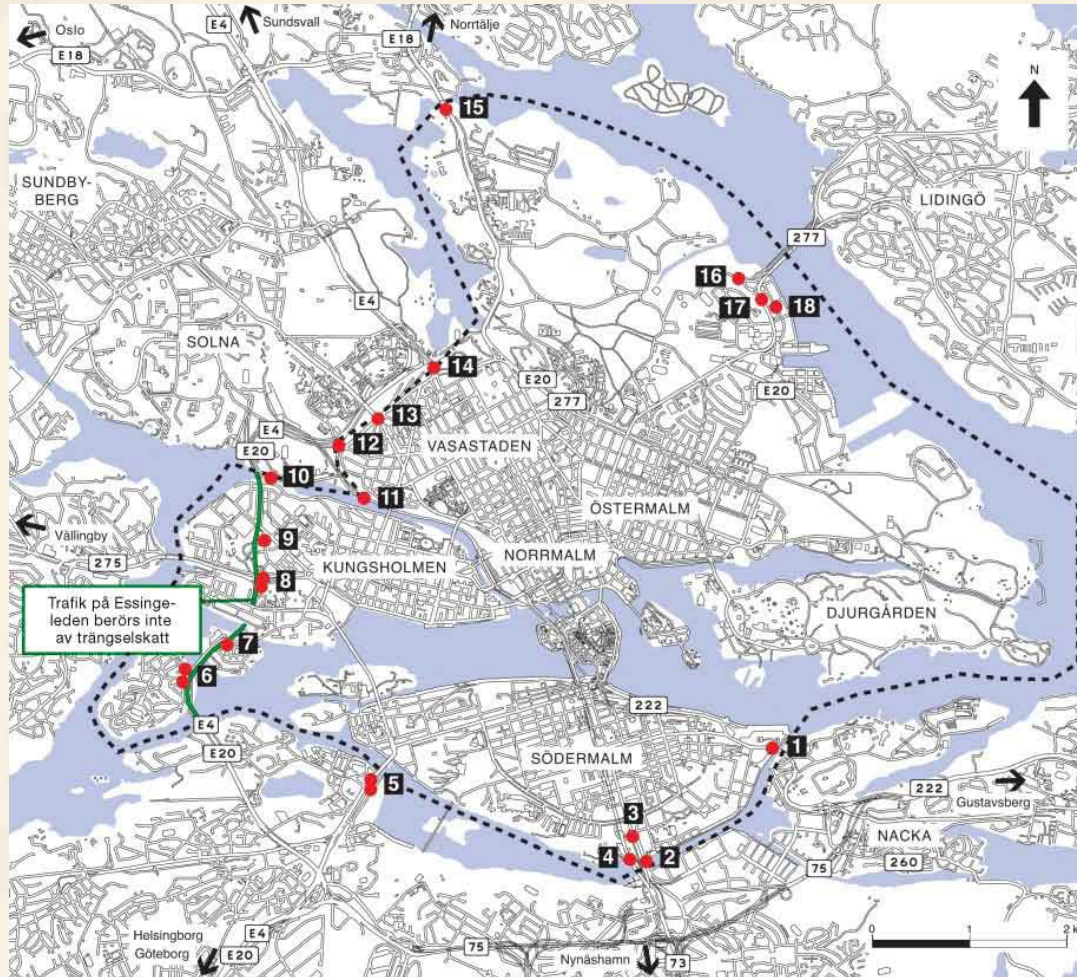
# Stockholm Case: The Program

- ❖ Stockholm initiated a trial period of cordon pricing for its central city, January 3-July 31, 2006, covering about 20 square miles, with 18 control points
- ❖ The project was preceded by transportation improvements including 197 new buses, 16 new bus lines and more trains at peak hours
- ❖ Weekdays 6:30AM - 6:30PM, with the price at 10, 15 and 20 SEK (Swedish krona, about US\$1.33, 2.00 and 2.67 at 2006 rates) for off-peak, shoulder (7:00-7:30AM, 8:30-9:00AM, 3:30-4:00PM, 5:30-6:00PM) and peak period (7:30-8:30AM, 4:00-5:30PM), respectively
- ❖ The daily maximum charge, for multiple crossings was set at 60 SEK
- ❖ About 30 percent of vehicles entering the priced zone were exempted from charges, including taxis, hybrid cars, buses, foreign cars, handicap tagged cars, diplomats and police and emergency vehicles
- ❖ Electronically identified the passing vehicle with On-Board Transponder Unit (OBU) and allowed automatic charge deductions from pre-set accounts
- ❖ Fines for non-payment were set at 70 SEK (US\$10) for the first reminder and went up to 500 SEK (US\$70) for the second reminder

# Stockholm Case: The Impacts

- ❖ Traffic across the charging zone decreased by around 30 percent during the first week, then at a stable decrease of around 22 percent less traffic than corresponding periods of 2005
- ❖ Overall traffic to and from the inner city declined by 10 to 15 percent and vehicle miles traveled in the charged zone decreased by 14 percent. Public transportation use increased by 6 to 9 percent.
- ❖ A 15 percent reduction in traffic, a 10-14 percent drop in CO<sub>2</sub> emissions, and preventing 30 premature deaths by reducing NO<sub>x</sub>
- ❖ The total start-up cost of the system was 2900 million SEK ( about \$400 million)
- ❖ The yearly operational cost of the system is about 220 million SEK
- ❖ Annual social surplus is estimated about SEK 650 million
- ❖ In fall 2005, about 55 percent of all county citizens believed that it was a “rather/very bad decision” to conduct the congestion-tax trial
- ❖ Two months after the trial, on September 17, 2006, 51.7 percent of voters passed a referendum to reinstate the charge, effect in July 2007

# Stockholm Priced Zone Cordon with Charging Locations



# The USA Case: Crisis of Congestion

- ❖ Commuting costs: Each motorist stuck in traffic wastes on average 47 hours and 30 gallons of fuel every year – at a cost of \$800 per person annually.
- ❖ Quality of life: Reduced air quality, less time with family and friends.
- ❖ Productivity: Delays to trucks and unreliability of delivery times increase costs for businesses and reduce economic competitiveness.
- ❖ In 2007, congestion caused urban Americans to travel 4.2 billion hours more and to purchase an extra 2.8 billion gallons of fuel for a congestion cost of \$87.2 billion – an increase of more than 50% over the previous decade.

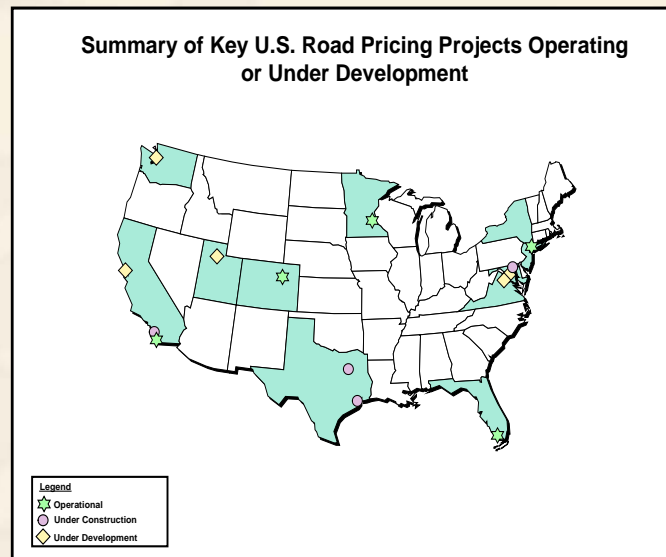


Congestion on I-95 in Northern Virginia

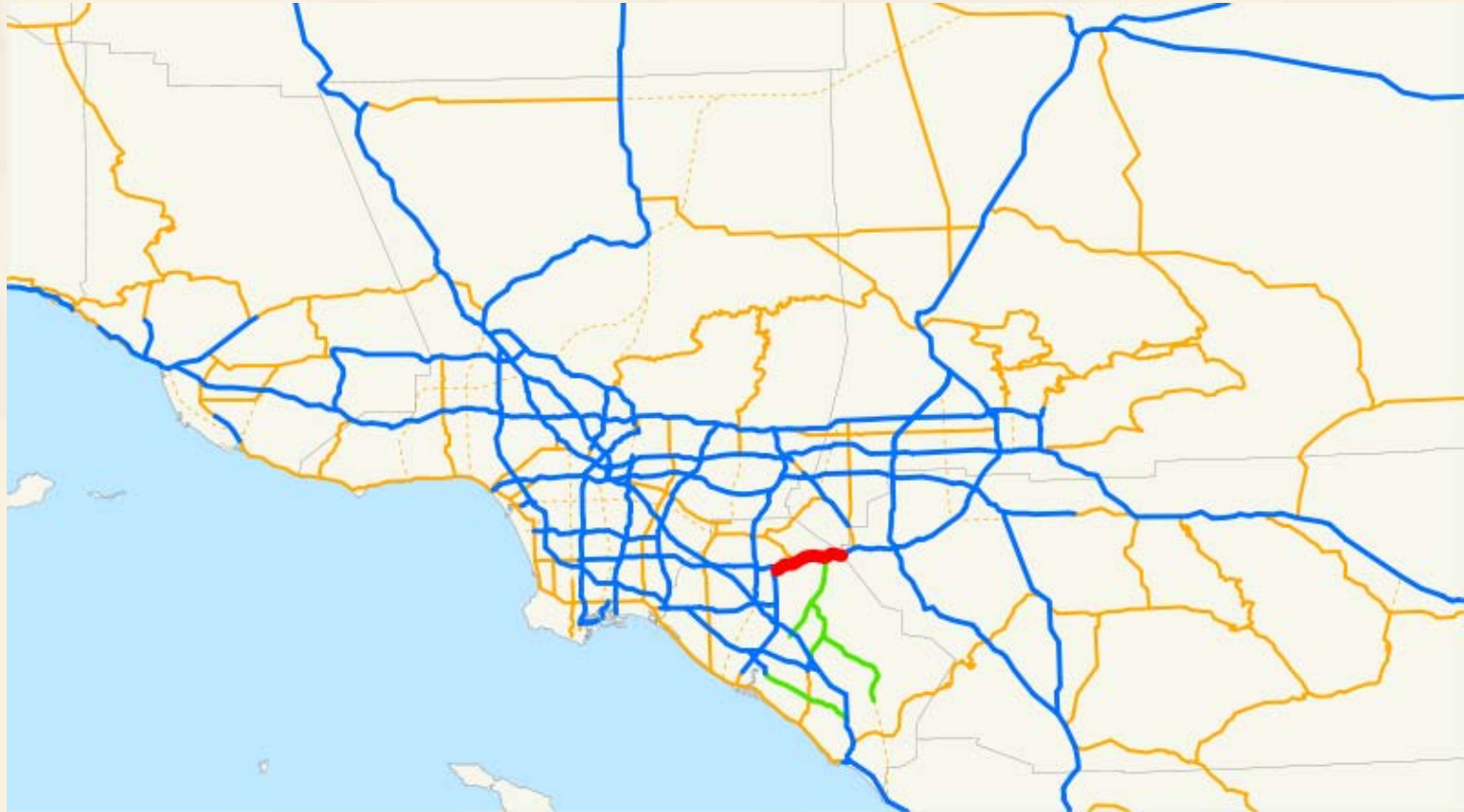
# The USA Case

A number of congestion pricing programs, including

1. HOT lanes on the I-495 corridor in Northern Virginia
2. A 2-lane-8-mile reversible facility in the median of I-15 in San Diego
3. The I-394 MnPASS Express Lanes (HOT Lanes) in Minneapolis
4. QuickRide 13-mile HOV lane on I-10 in Houston
5. The State Route (SR) 91 Freeway in Southern California



# California State Route 91 Express Lanes (in red)



# California State Route 91 Express Lanes

Photo: California Private Transportation Co.





# Faster Speed and Better Road Efficiency

## Express Toll Lanes Have Worked

SR 91:

- Toll-payers save 20-30 minutes.
- Trip time is reliable.



## Express Toll Lanes Have Worked

SR 91:

- HOT lanes carry more vehicles per lane.



# Implications to China

- ❖ The above international experiences suggest that congestion pricing could be quite successful in reducing traffic levels, saving travel time, improving air quality, generating net revenues, enhance road efficiency, and even increasing public acceptability.
- ❖ China has strong incentive to experiment congestion pricing, facing the worsening traffic congestion in all major Chinese cities.
- ❖ Technology should not be an issue for congestion pricing implementation. However, initial capital investment could be a challenge and a barrier for some local cities and governments. For this, provincial authorities or the central government may provide support, like the cases in London, Stockholm, and most applications in the USA. It is also possible for a government-private partnership in financing the initial capital investment, like the case of SR91 in Southern California.

# Implications to China

- ❖ Public perception about congestion pricing could be more favorable in China than in other countries.
  1. Charging a fee for using transportation facility is not a new concept.
  2. Privacy could be less concerned in China.
  3. Congestion charges may be much less regressive in China.
  
- ❖ China could have a better political feasibility of implementing congestion pricing.
  1. Urge to find effective solutions to mitigate the worsening urban congestion.
  2. Fewer institutional barriers to overcome.
  3. Most of Chinese urban workers still commute via public transit.
  4. The Chinese government seems to have more financial resources.
  5. China has many more government-oriented projects.
  
- ❖ Congestion pricing, which used to be a Western economists' dream but politician's nightmare, could be a dream of both Chinese economists and policy makers.



Thank you!

