

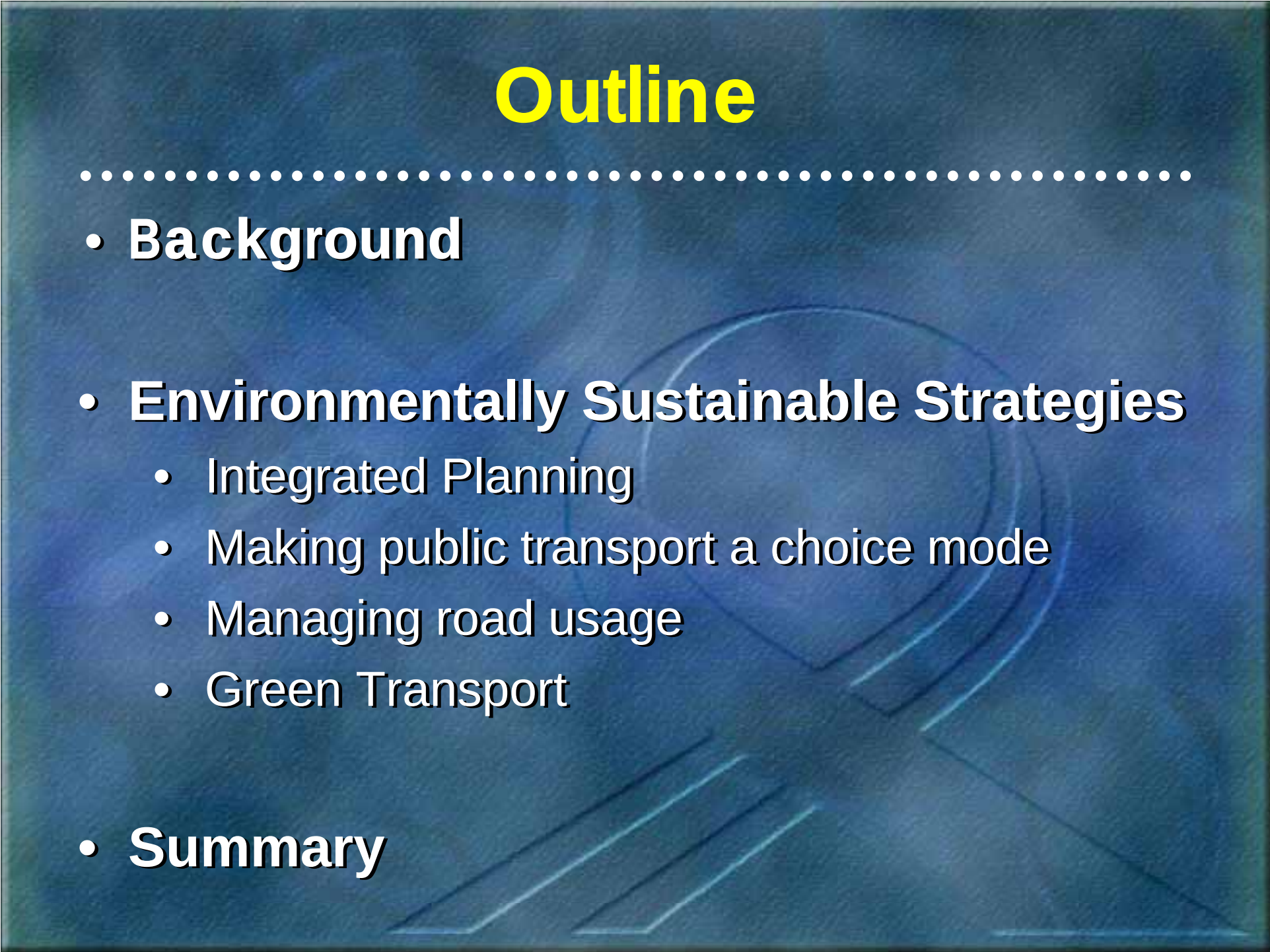
Environmentally Sustainable Transport – Singapore's Experience

**Kenneth Wong
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Land Transport Authority, Singapore

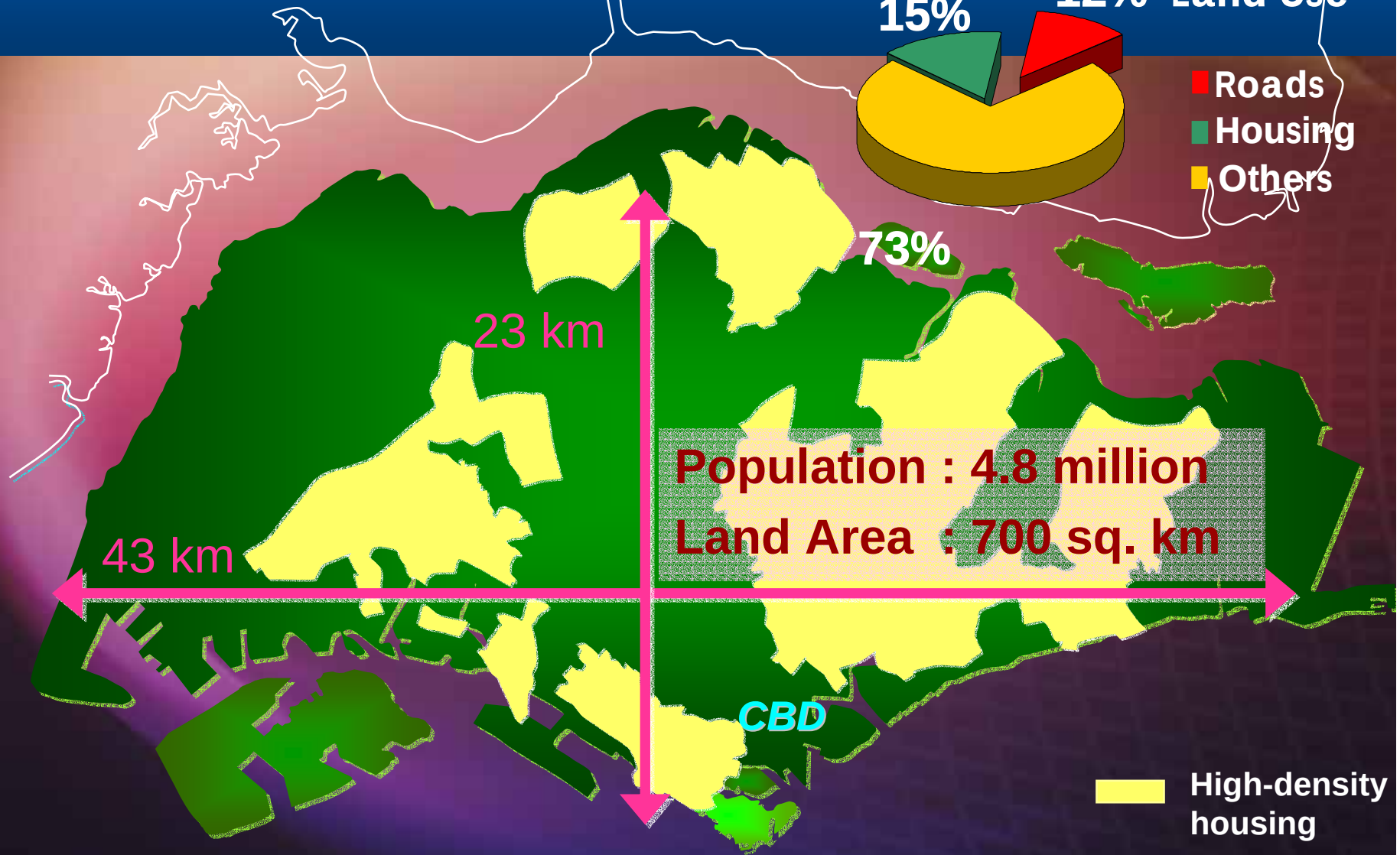
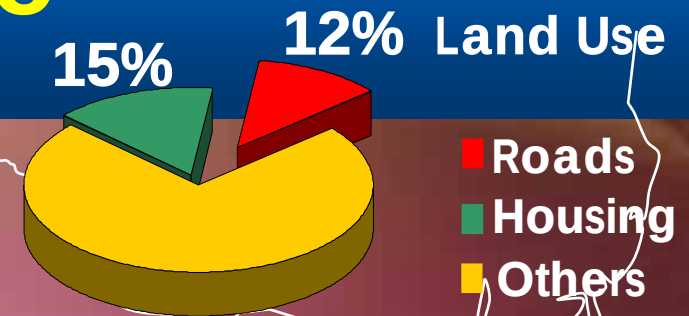
**Fourth Regional EST Forum
Seoul, Korea
24-26 February, 2009**

Outline



- **Background**
- **Environmentally Sustainable Strategies**
 - Integrated Planning
 - Making public transport a choice mode
 - Managing road usage
 - Green Transport
- **Summary**

Singapore



The background is a deep blue with a subtle, grainy texture. It features faint, glowing geometric shapes: a large circle in the upper right and several parallel lines in the lower left, suggesting a stylized landscape or architectural elements.

Background on Land Transport

Public Transport

MRT: 109 km, 67 stations



Buses: 325 routes, 3700 buses



Taxis: 24,000



LRT: 29 km, 43 stations

Figs as of end 2007

Road Transport

Road Network - 3,300 km

Expressway Network - 162 km

Vehicle Population - 851,000

Car Population - 517,000
(60% of veh pop)



Figs as of end 2007

Travel Statistics

.....
Daily MRT/LRT trips : 1.6 million



Daily Bus trips : 2.9 million



Daily Taxi trips : 0.94 million



Total Daily Trips: 8.9 mil (about 60% by public transport)

Figs as of end 2007

**Make Public
Transport a
Choice Mode**

**Green
Transport**

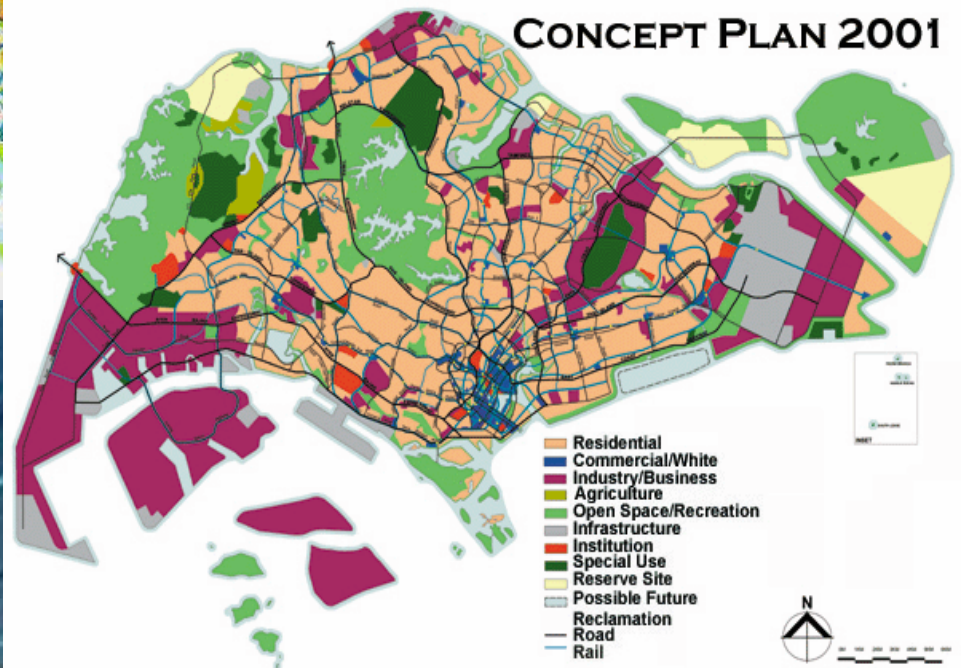
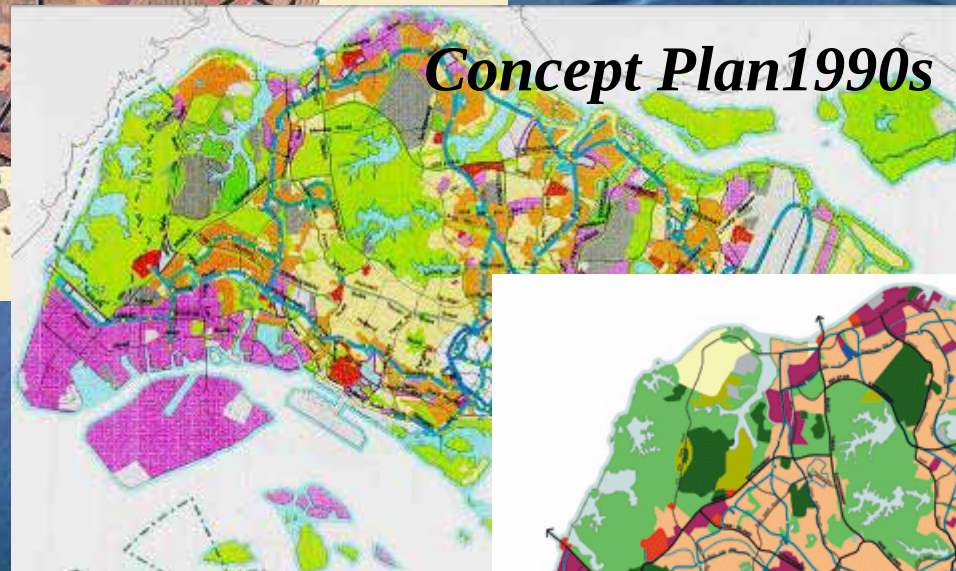
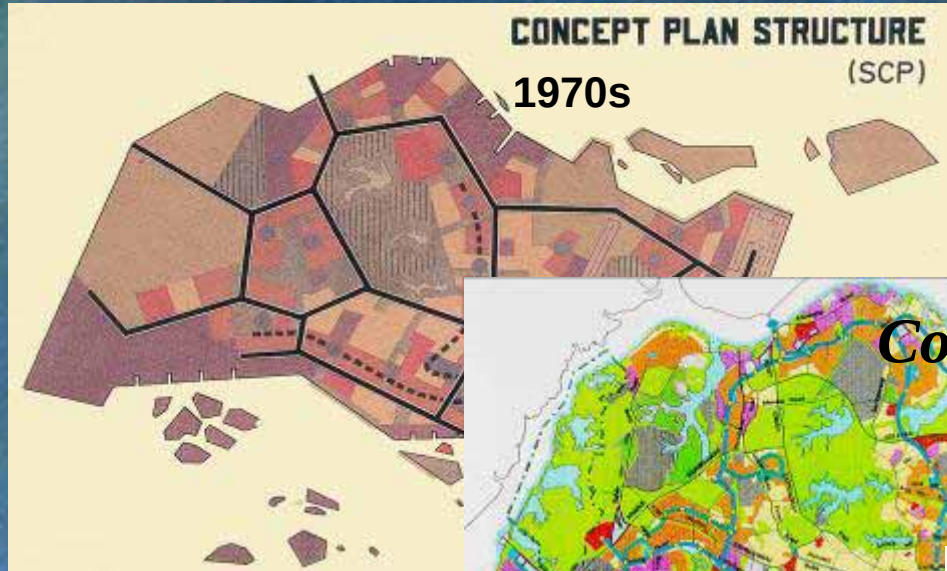
***Environmentally
Sustainable
Strategies***

**Integrated
Planning**

**Managing
Road Usage**

(1) Integrated Planning

- Long Term Landuse and Transport Plans



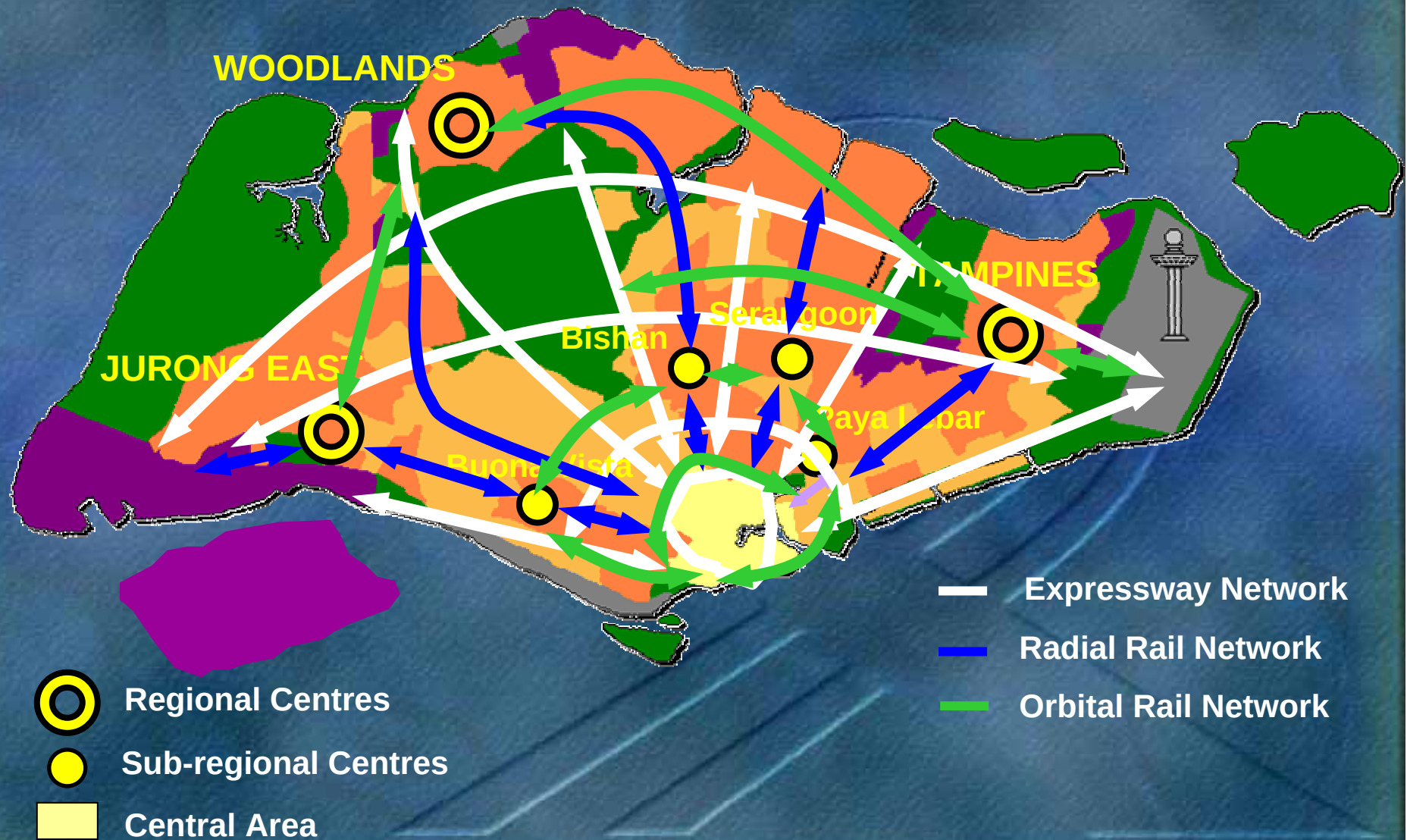
(1) Integrated Planning

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- Integrate land use
 - Reduce demand for road space
 - ‘access’: the ability to reach goods service, activities & destination
 - => Reduce distance travelled
- Integrate inter-modal transport facilities with building developments for seamless connectivity
- Coordinated between government agencies to integrate transport with land use planning



Integrate Planning of Road & Rail Network

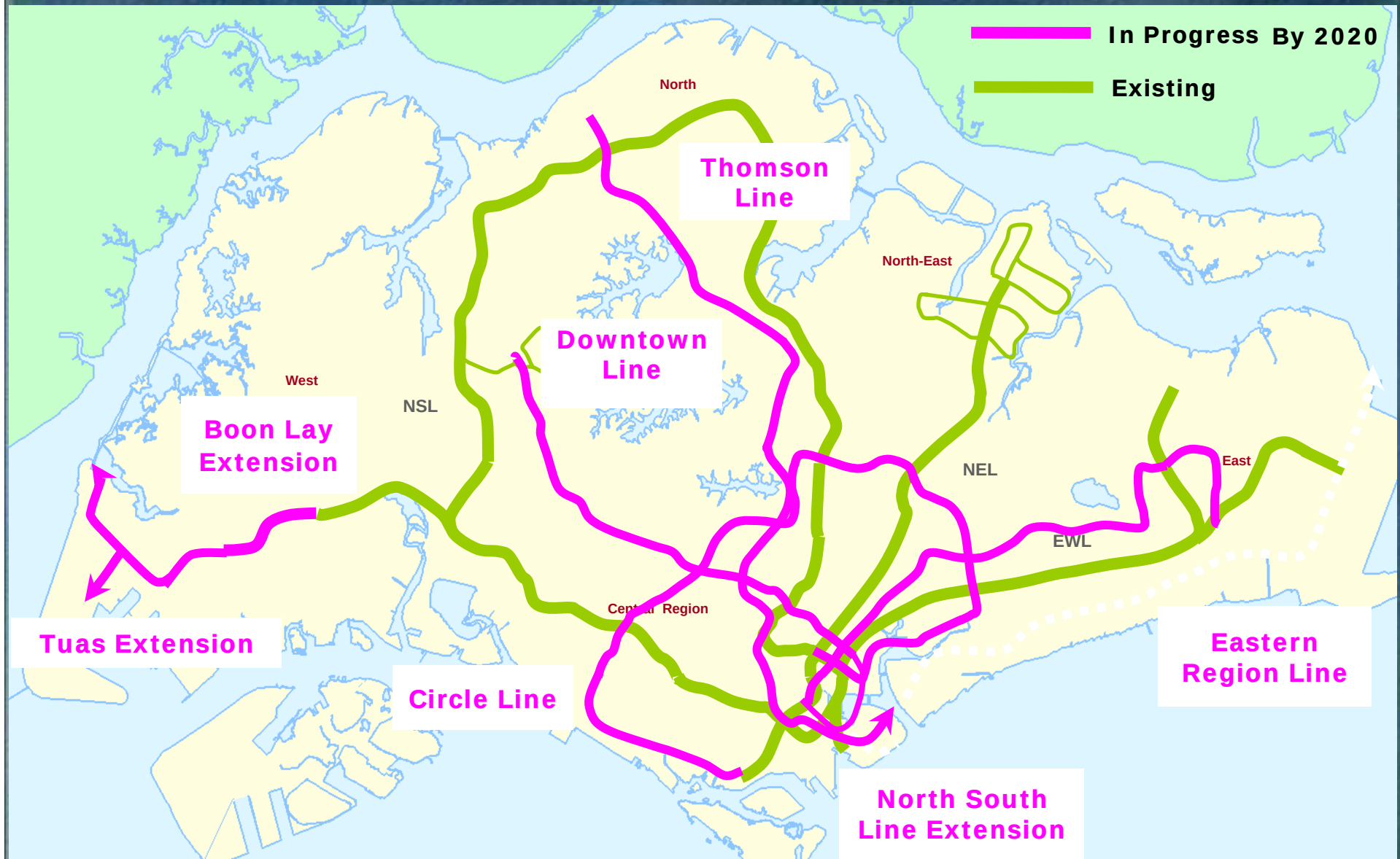


(2) Make Public Transport a Choice Mode

- Expand rail network
- Extend bus priority
- Provide travel information
- Enhance Physical Accessibility



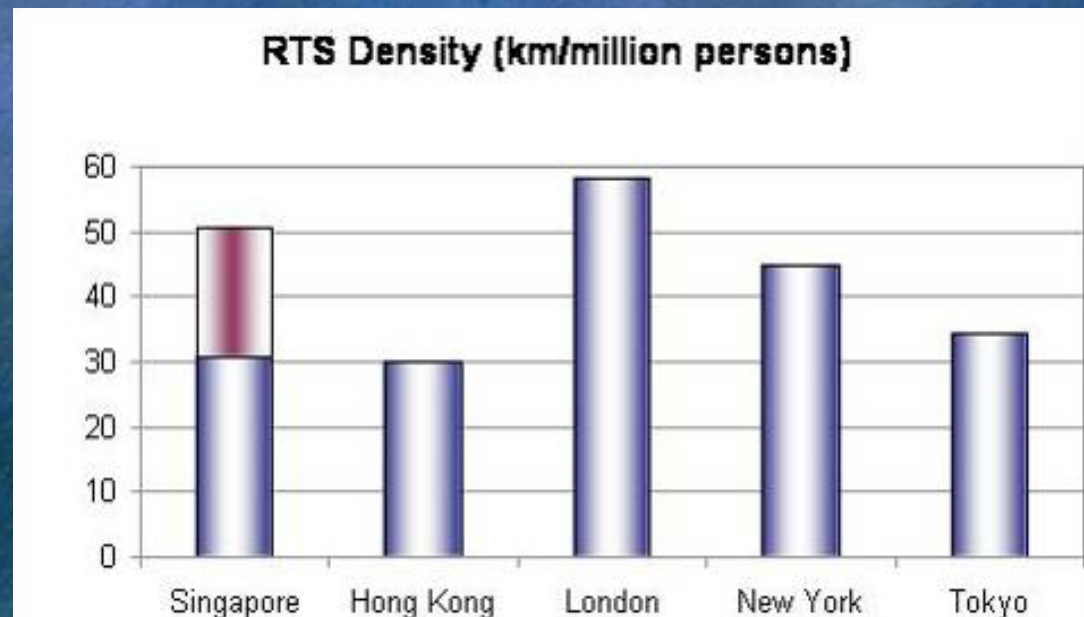
Expand Rail Network



Doubling of Rail Network by 2020

By 2020

- RTS network will double from 138 km today to 278 km
- RTS density will increase from 31 km per million persons today to 51 km per million persons
 - Short 5-minute walk (400 m) to an MRT station in the city
 - Comparable to cities like New York, London



Extend bus priority

Full Day Bus lanes



Mandatory Give-Way at Bus Bays

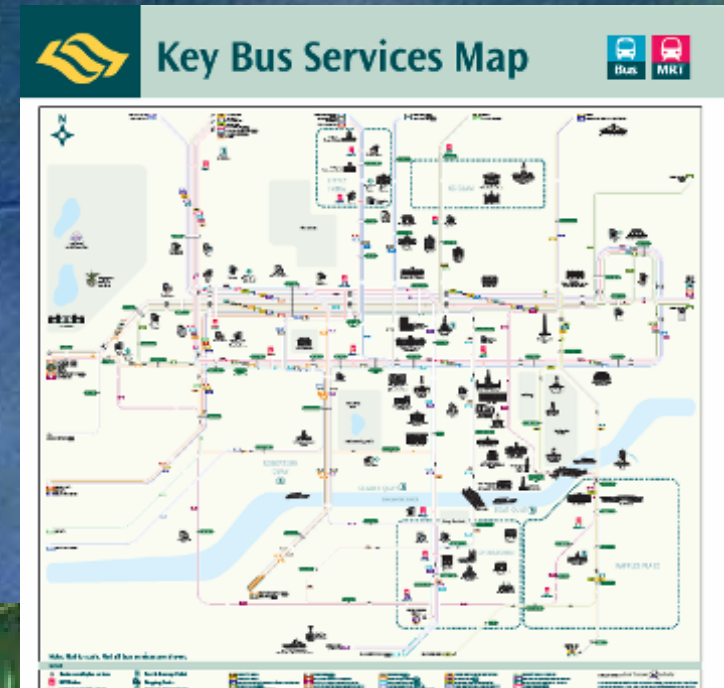


Bus Priority at junctions



Provide Travel Information

- Bus service information posters
- Key Bus Services Map
- Real-time bus arrival information panels
- SMS for bus arrival info



Enhancing Physical Accessibility

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- Barrier-free access routes at MRT stations
- Wheelchair accessible buses
- Barrier-free road and related facilities



Managing Road Usage

- Manage demand for road use
- Leverage on technology
- Develop road network

Manage Demand for Road Use

Ownership Control

Vehicle Quota System
(i.e. COE)

Other Ownership Costs

- Additional Registration Fee
- Excise Duty
- Road Tax

Usage Restraint

Petrol Duty

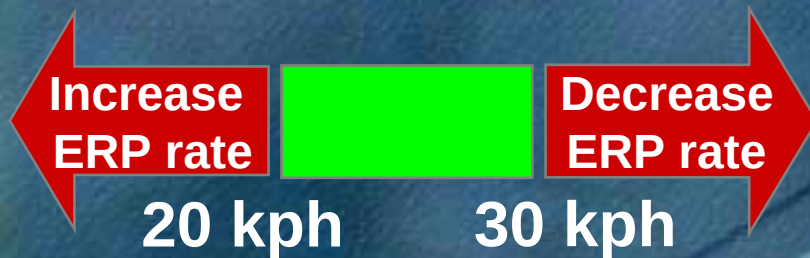
Electronic Road Pricing
(ERP)

Electronic Road Pricing (ERP)

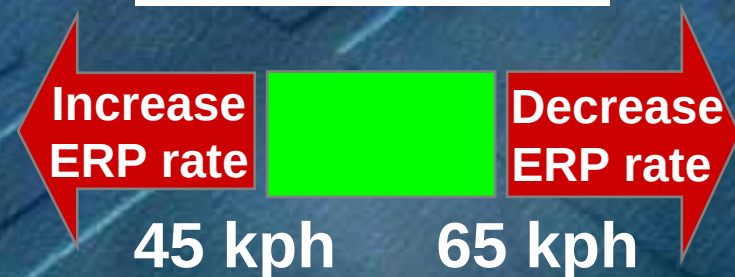
- ERP is a congestion management tool
- Pay-as-you-use principle
- Review speed range at 3-month interval, adjust ERP rates



Arterial Roads



Expressways





Green Transport

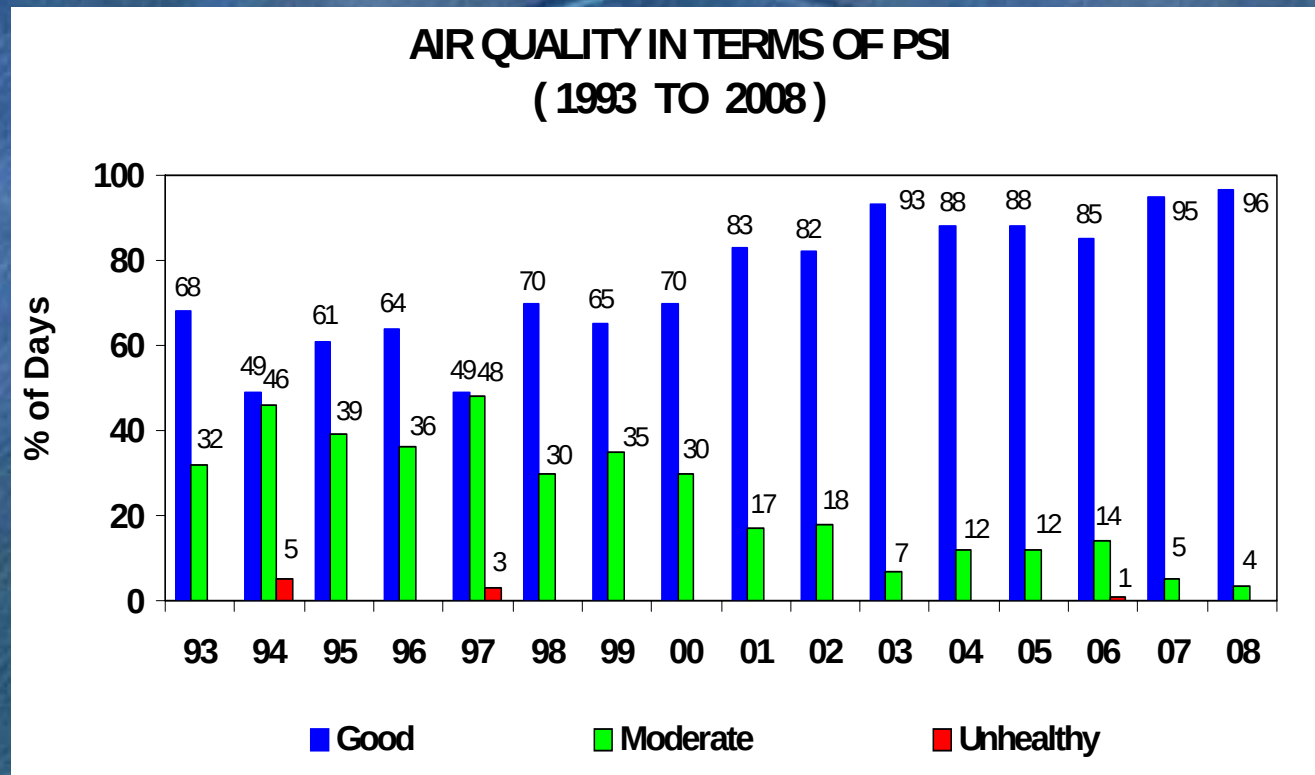
- Euro IV emission standard
- Green Vehicles Rebate Scheme
- Fuel Economy Labeling Scheme
- Non-motorised Transport

State of the Environment

- Ambient Air Quality**

Pollutant Standards Index (PSI), based on 5 key pollutants (SO₂, NO₂, CO, Ozone, PM₁₀) measured in accordance with USEPA guidelines.

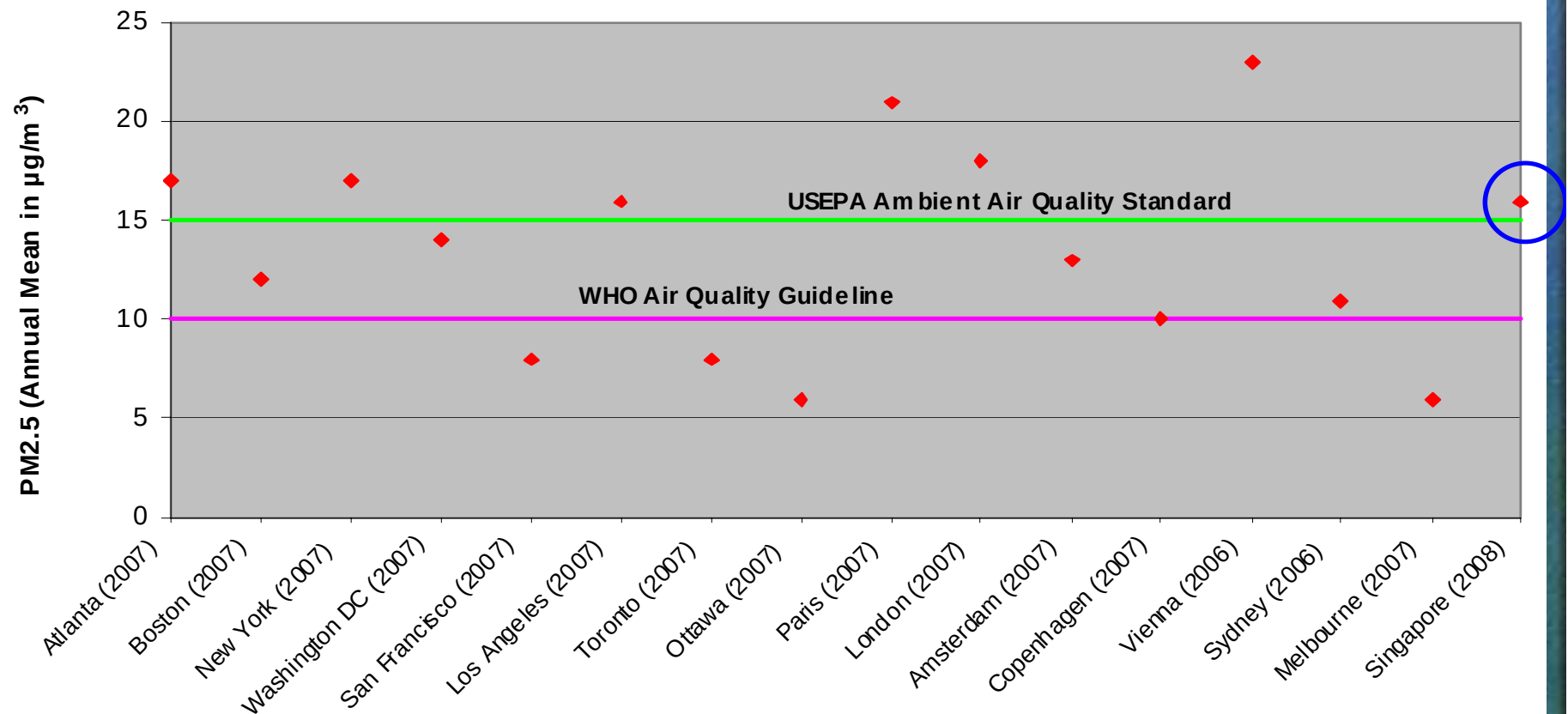
Air quality was affected by transboundary smoke haze in 1997 and 2006



Many developed cities,
including Singapore, have yet
to meet the recommended
standard for PM_{2.5}



The USEPA set the standard for PM_{2.5} after studies showed that particulate matter air pollution is linked to 95,000 cases of chronic and acute bronchitis, 10,000 hospital admissions for respiratory and cardiovascular diseases, and hundreds of thousands of aggravated asthma cases in the US each year.



Vehicular Emission Control

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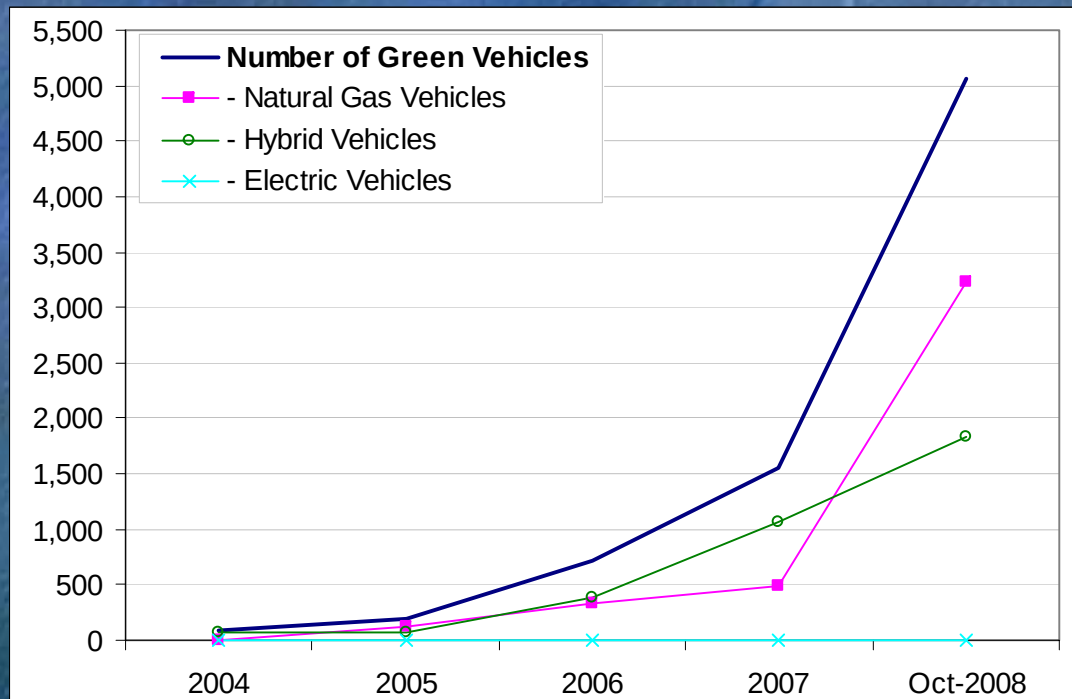
- Set stringent emission standards for registration of vehicles e.g. diesel vehicles must comply with Euro IV emission standards
- Cleaner fuel quality: Unleaded petrol, ULSD
- Mandatory periodic inspection of in-use vehicles : chassis dynamometer smoke test
- Enforcement against smoky vehicles



Green Vehicles Rebate

Hybrid, Electric cars & Natural Gas powered vehicles

- Rebate of 40% of upfront tax on cars



A hybrid vehicle

Fuel Economy Labelling Scheme

- Launched as a voluntary programme in 2003, aim is to provide buyers of passenger cars with fuel economy information at the point of sale.
- From Apr 2009, it will be mandatory for car retailers to display fuel economy labels on cars in their showrooms.

Fuel Economy Labeling Scheme

Make	XYZ
Model	XYZ12345
FUEL ECONOMY	
8.0	
km per litre	
For city driving when tested to UN ECE R 101	
Comparison	
Vehicles with engine capacities 1601 to 2000 cc achieve 6.0 to 11.1 km per litre	
Actual fuel economy will vary according to factors such as vehicle condition, traffic conditions and driving habits.	
NOTE: Test was performed without air conditioning	
 A joint SEC-NEA-NEEC initiative SINGAPORE GREEN LABELLING SCHEME	
Details available at www.neec.gov.sg	

Non-Motorised Transport

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Walking - Pedestrian and Commuter Facilities

Pedestrian overhead Bridge, pedestrian crossings, covered linkways, Pedestrianisation of streets



Cycling

Parking facilities at MRT stations / bus interchanges

Cycling via park connectors and access public transport

Foldable bicycles on board trains and buses



Summary

Improvement in energy consumption per capita

- Integrated Planning
- Make Public Transport a Choice Mode
- Manage Road Usage
- Green Transport



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Thank you

