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Integrated Land Use - Transport Planning & Transport Energy Use — Singapore's experience



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Outline

- **Introduction**
- **Singapore's experience**
 - **Facts and Figures on Land Transport in Singapore**
 - **Integrated Land Use and Transport Planning**
 - **Other Key Transport Strategies**
- **Summary**



Introduction

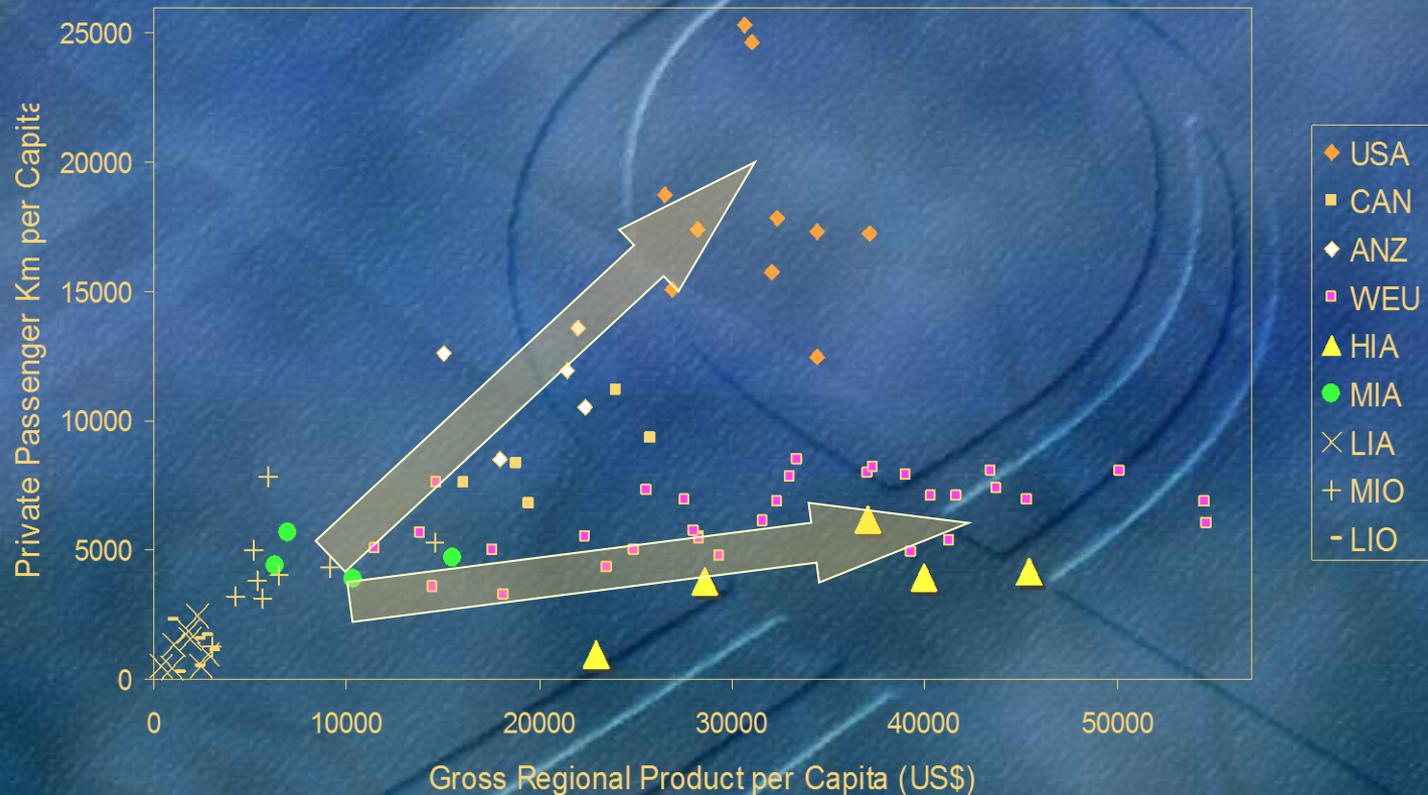
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Cities and Transport



Cities and Transport

- Automobile dependent cities
- Cities with “balanced” transport



Source:
Barter et al. (2003)

Automobile Dependent Cities

Adjust cities to cars:

- Extensive construction of freeways → fast travel by car
- Transit services neglected → auto dependency:
traffic congestion and energy use ↑
- Retail and many other activities relocated from central cities to suburban malls



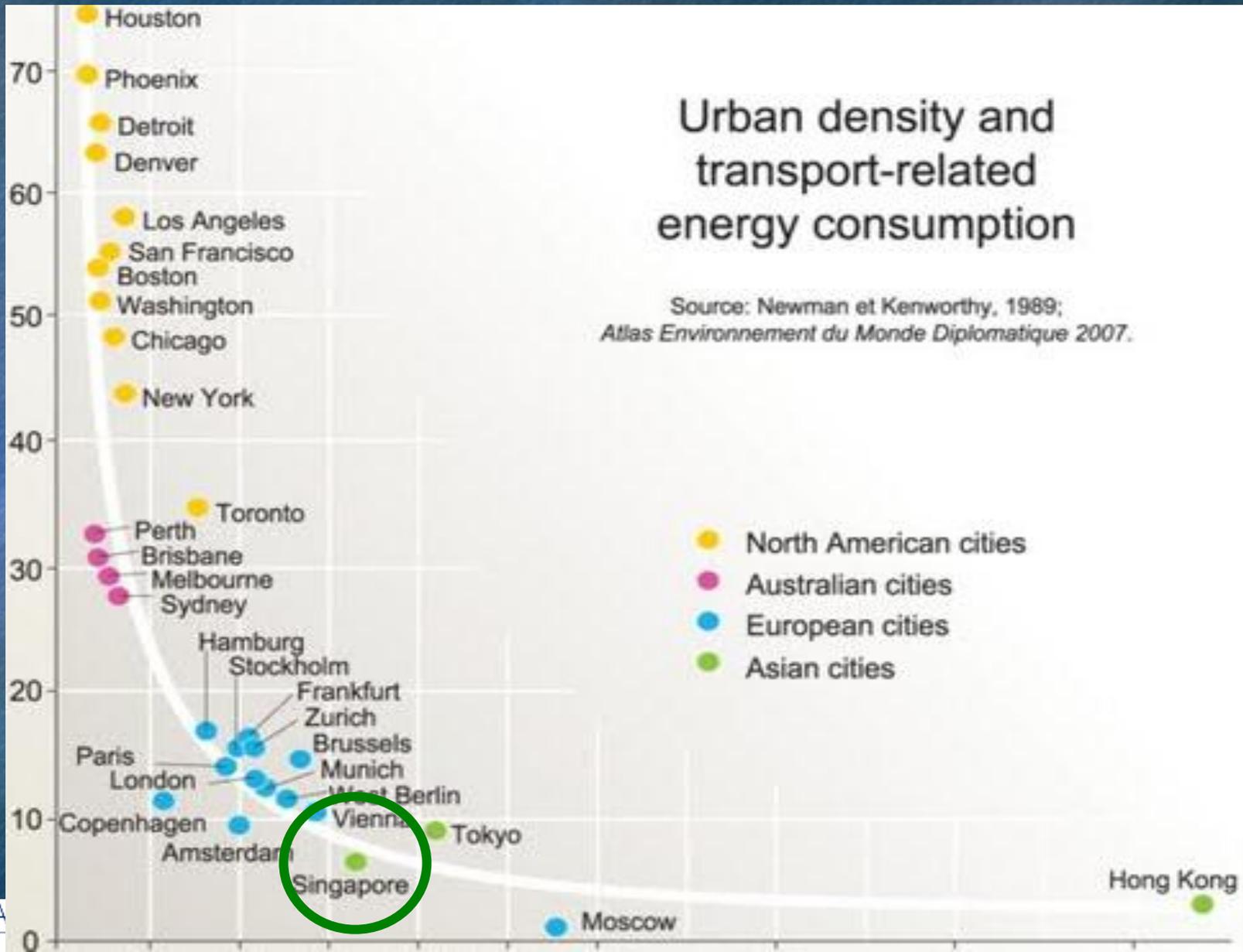
Cities with “Balanced” Transport

Develop integrated transport systems:

- Improve public transport services parallel with highway/ street growth
- Develop coordinated modes → more efficient use of energy
- Enhance cities’ liveability → ***sustainability***



Transport Energy Consumption



Singapore's Experience

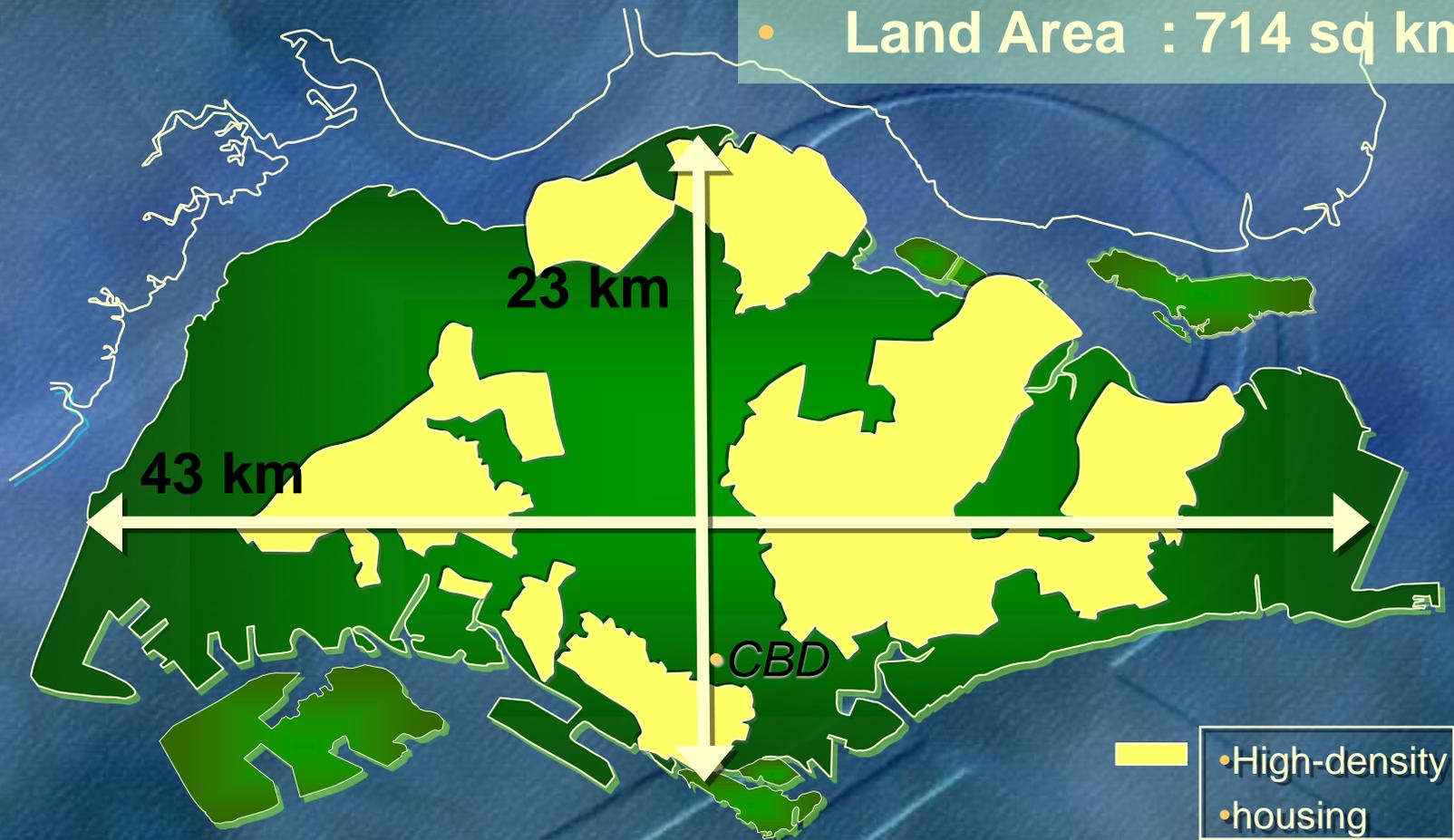
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Facts and Figures on Land Transport Challenges Ahead



Singapore

- Population : 5.31 million
- Land Area : 714 sq km



• Note: Population for year 2012; Land Area for year 2011

Travel Statistics

• Daily MRT/LRT trips : 2.7 million



• Daily Bus trips : 3.5 million



• Daily Taxi trips : 1.0 million



Public Transport

- MRT : 149 km, 99 stations



- Bus : 340 routes, 4100 buses



- Taxi : 27,000



- LRT : 29 km, 33 stations

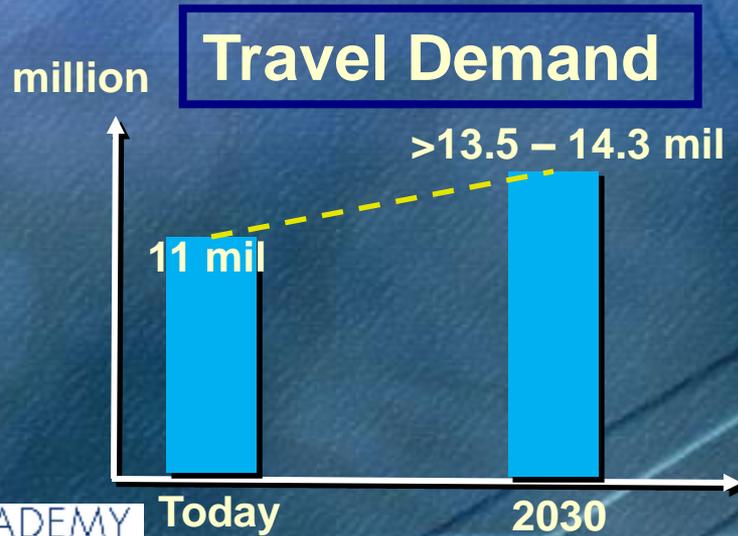
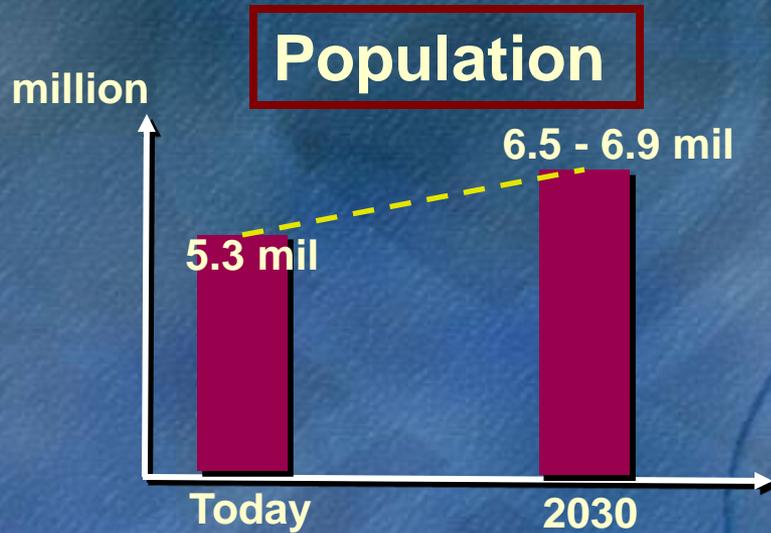
Road Transport

- **Road Network - 3,412 km**
- **Expressway Network - 161 km**
- **Vehicle Population – 967,000**
- **Car Population - 601,000**

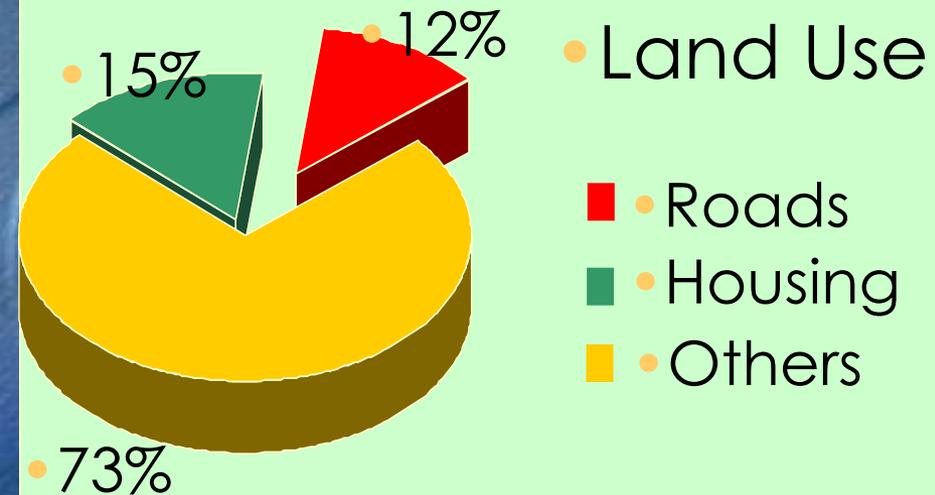
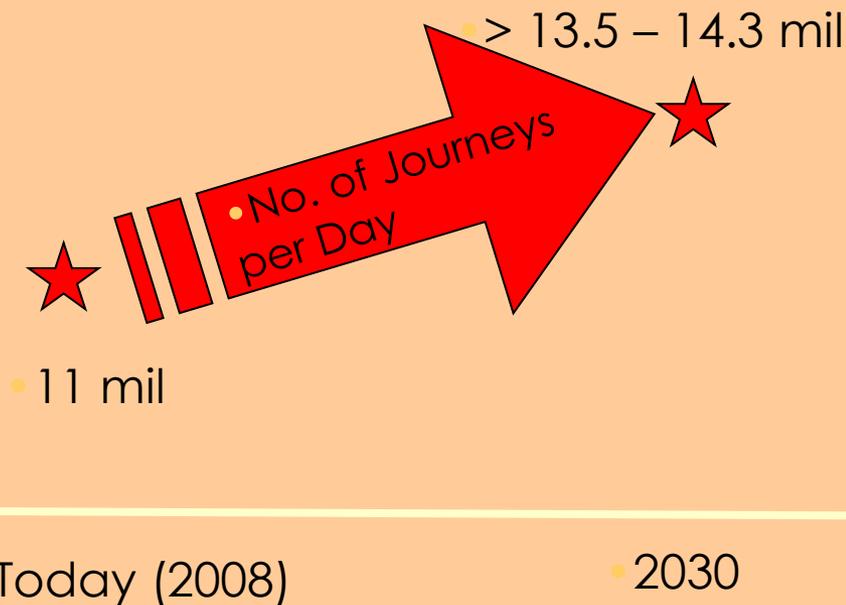


- Note:
- (a) Road Network for year 2011
- (b) Vehicle Population accurate as at Aug 2012

Population & Travel Demand Growth



Challenges: Increasing Travel Demand and Limited Land Space



- Increase in travel demand must be met largely by public transport

Singapore's Experience

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Integrated Land Use and Transport Planning



Reduce Demand & Energy Use in Transport

• AVOID/REDUCE

Reduce or avoid travel
or the need to travel

- Integration of transport and land-use planning
- Tele-work
- ...

• SHIFT

Shift to more environmentally
friendly modes

- Mode shift to Public Transport
- Transport demand management
- Mode shift to non-motorized transport
- ...

• IMPROVE

Improve the energy
efficiency of transport
modes and vehicle
technology

- Better fuel economy
- Green tyres
- Eco-Driving (raising awareness)
- Shift to alternative fuels
- ...

Integrated Land Use -Transport Planning

- Transport Planning is in an integral part of Land Use Planning
- Need an integrated and comprehensive transport network
 - A hierarchical rail network (the backbone)
 - Complemented by network of bus routes
- To safeguard corridors to support future economic growth and demands of urban travel



Close Interactions Amongst Government Agencies



Land Transport Authority (LTA)
land transport planning and development

Housing & Development Board (HDB)
provide public housing for the population

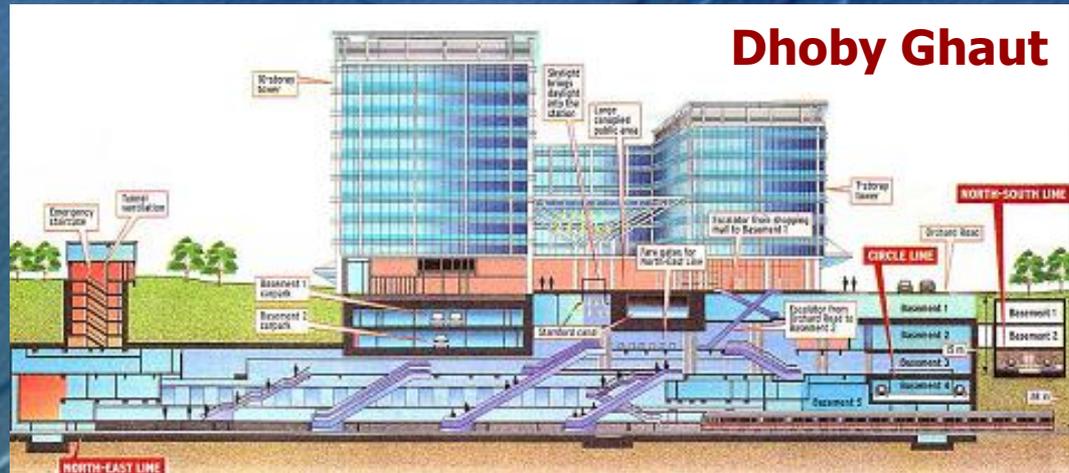
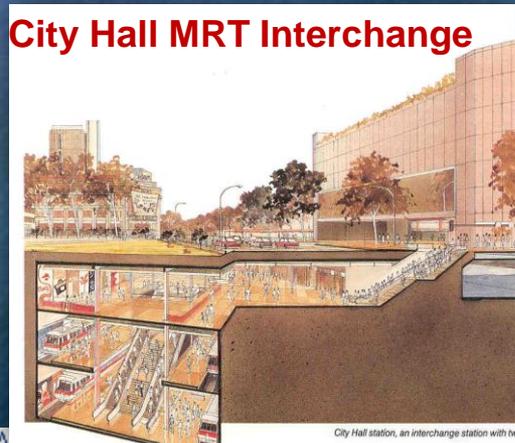
Urban Redevelopment Authority (URA)
overall urban planning

National Parks Board (NPB)
manage parks and greenery

Jurong Town Corporation (JTC)
industrial developer

Land Use and Transport Integration

- Integration: “speedy, convenient and economical connection of services to make up complete journeys for passengers from origin to final destination” (Simpsons, 1994)
- Tokyo, Hong Kong and Singapore often recognised as having successful transport and land use integration



Overall Planning Process

- Long term land use and transport plans (40-50 year horizon)

- Broad conceptual plans

- Medium term land use and transport plans (10-15 year horizon)

- Staging plans

- Safeguard land needed

- Road and rail feasibility studies (5-10 year horizon)

- Engineering studies

- Cost-benefit studies

Concept Plan

Master Plan

**Planning
Feasibility Studies**

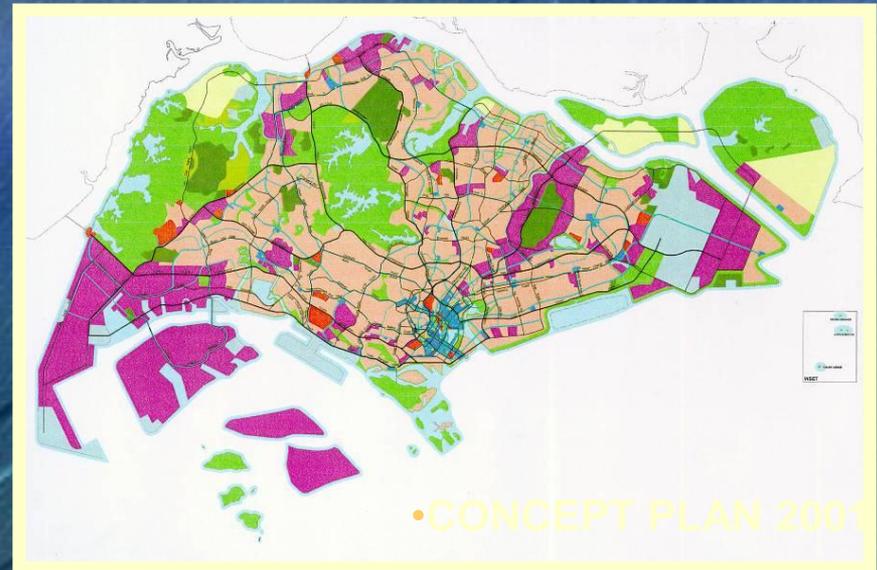
**5 Year Road Devt
Programme (5RDP)**

RTS Lines

Concept Plan (Long Term 40-50 years)

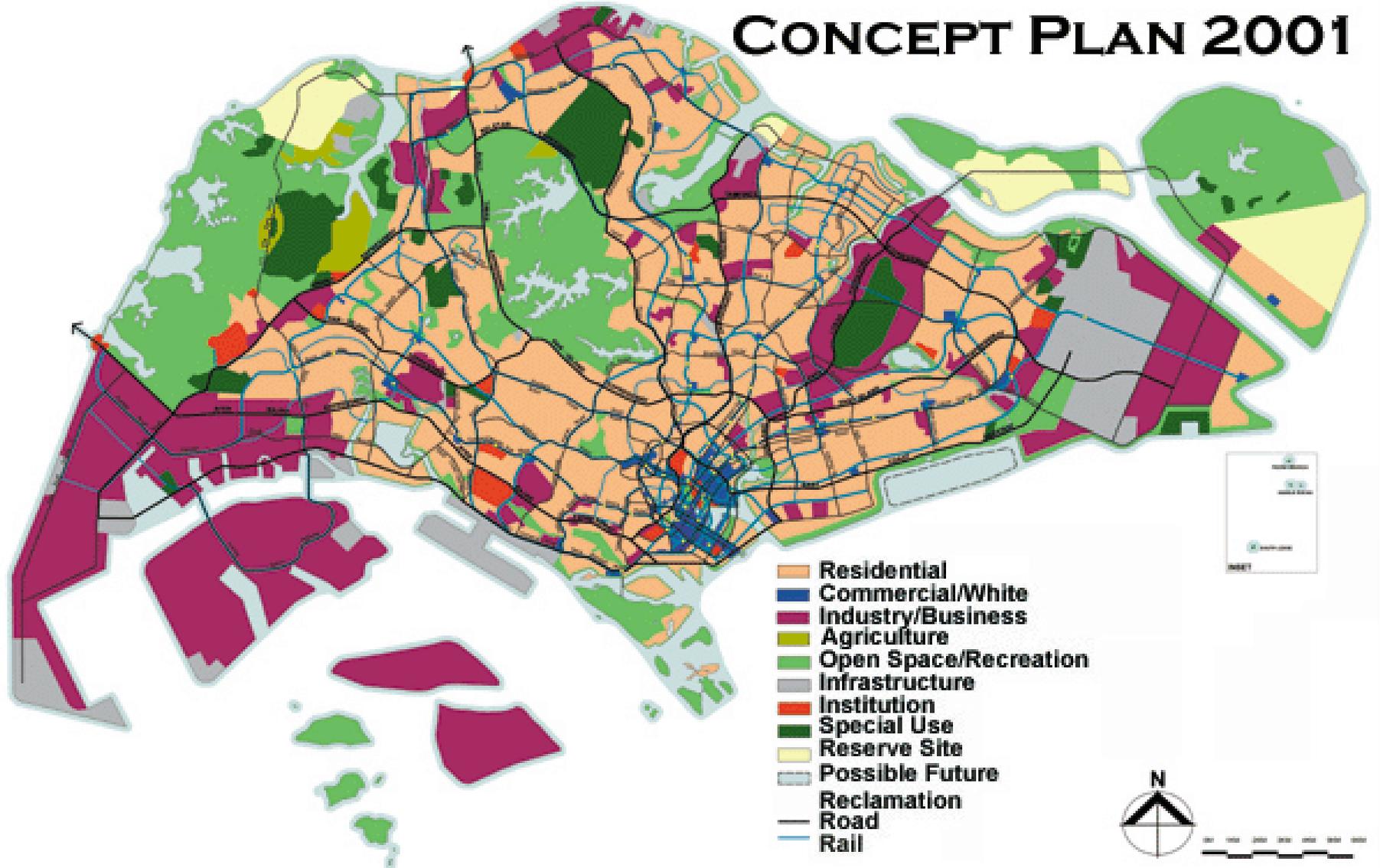
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- Long term strategic plan which guides the overall physical development of Singapore
- Reviewed every 10 years
- Prepared in collaboration with various land use agencies
- Transportation plan developed to meet anticipated population and economic growth

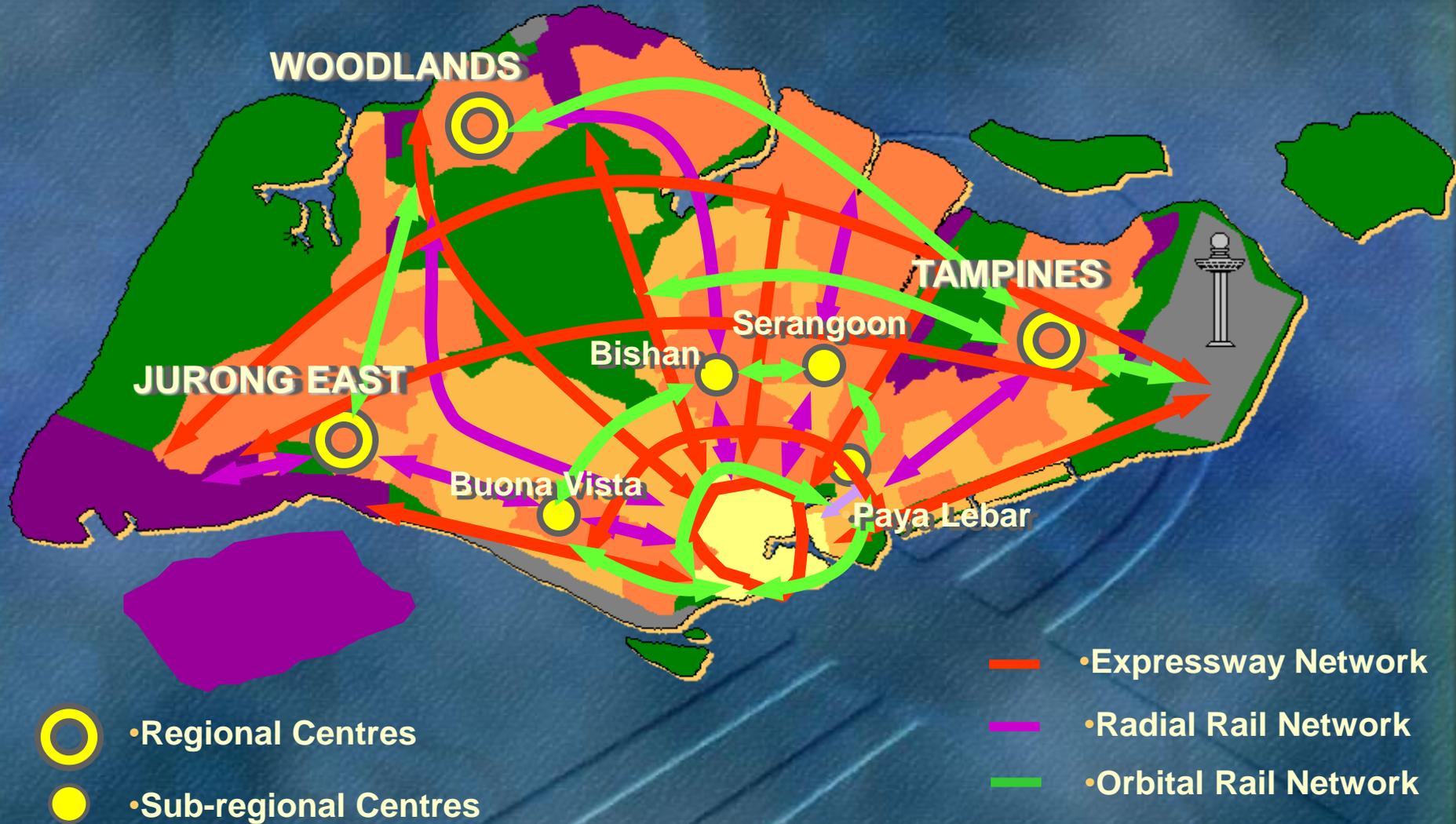


Concept Plan 2001

CONCEPT PLAN 2001



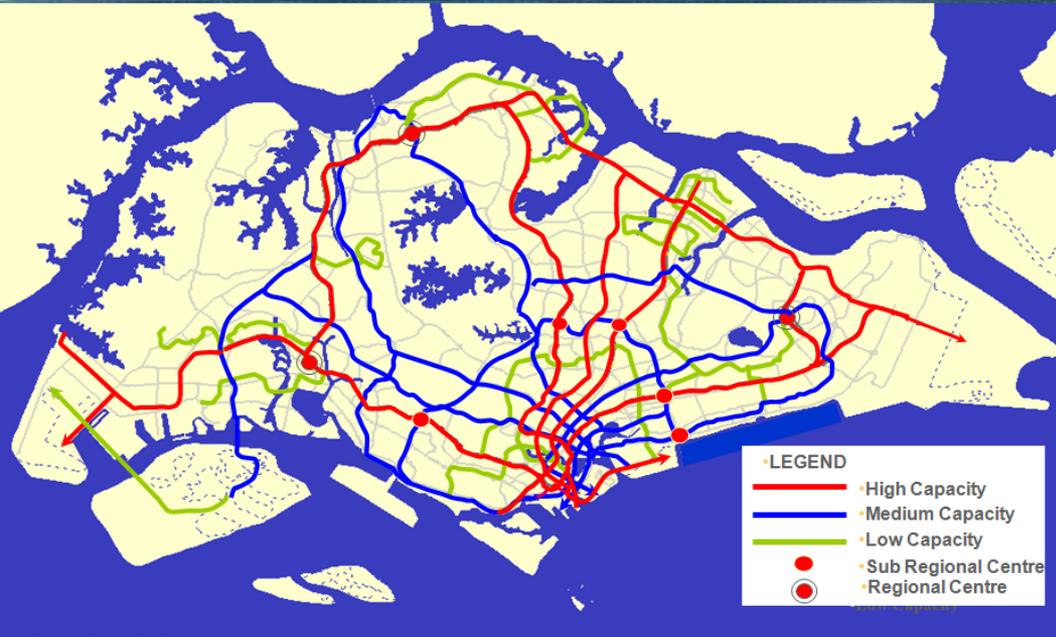
Conceptual Road and Rail Planning



- Expressway Network
- Radial Rail Network
- Orbital Rail Network

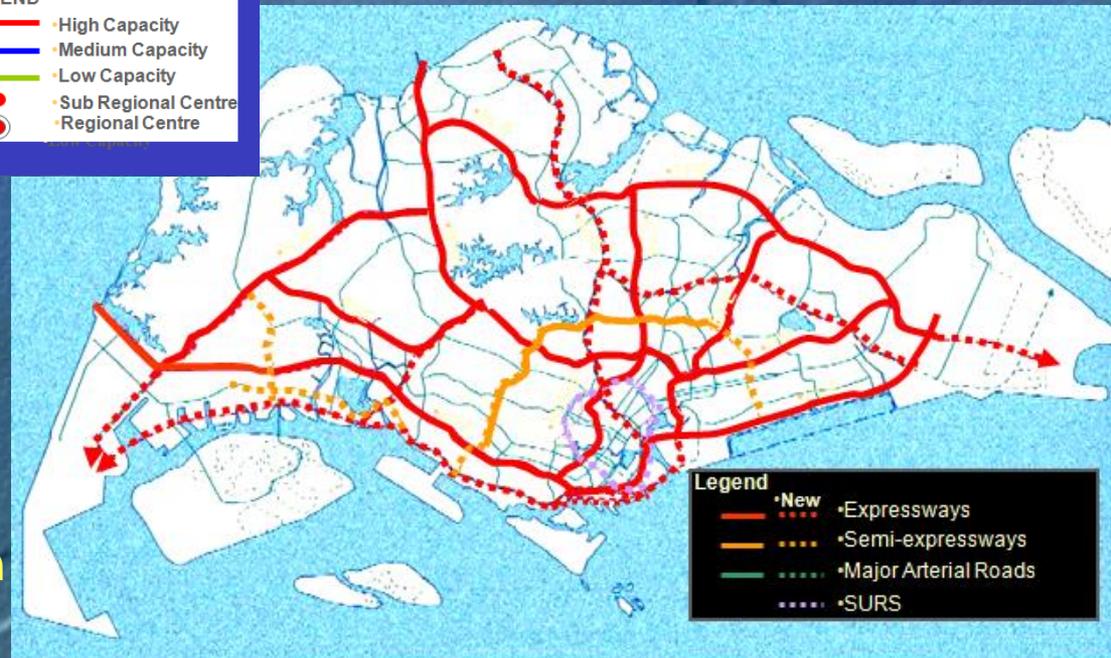
- Regional Centres
- Sub-regional Centres

CP2001 Rail & Road Master Plan



Rail Master Plan

Road Master Plan



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Concept Plan

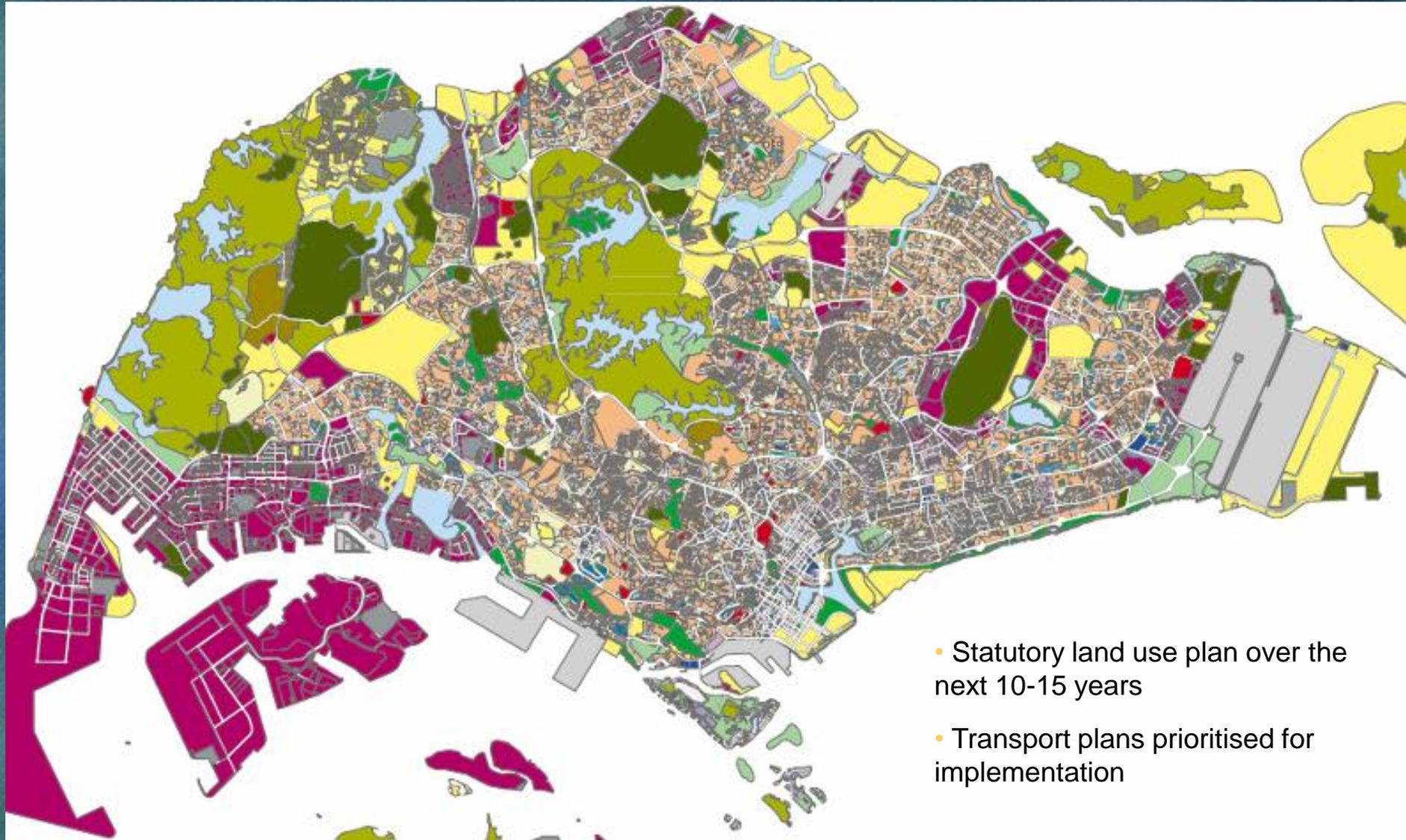
Master Plan

Planning
Feasibility Studies

5 Year Road Devt
Programme (5RDP)

RTS Lines

Master Plan 2008 (Medium Term 10-15 Yrs)



Land Use and Transport Integration

- Early planning for all developments to consider transport and land use integration.
- Integration of transport and land use adopted globally
- Over the years, more integrated approach to design developments around transport nodes to support more intimate connections



Land Use and Transport Integration

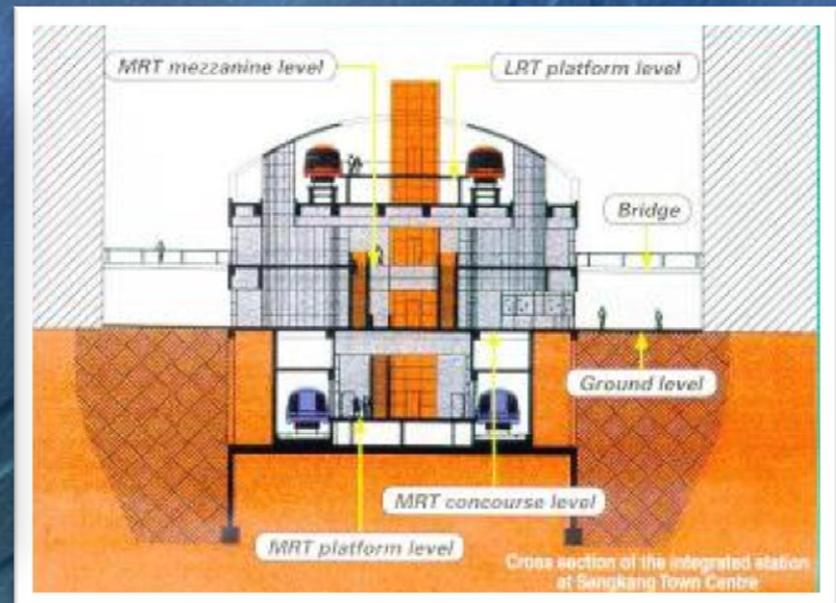
Physical Integration

- Enhancing physical connectivity between transport modes/nodes, as well as transport nodes and development
- Various forms of horizontal / vertical integration depending on:
 - Land Use
 - Site Constraints
 - Construction Costs

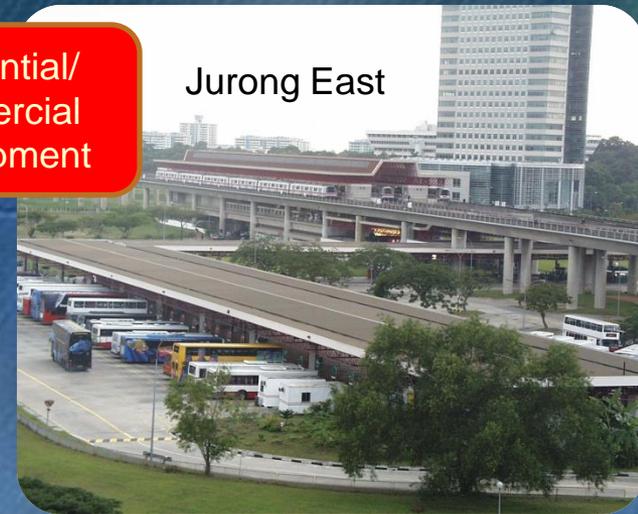
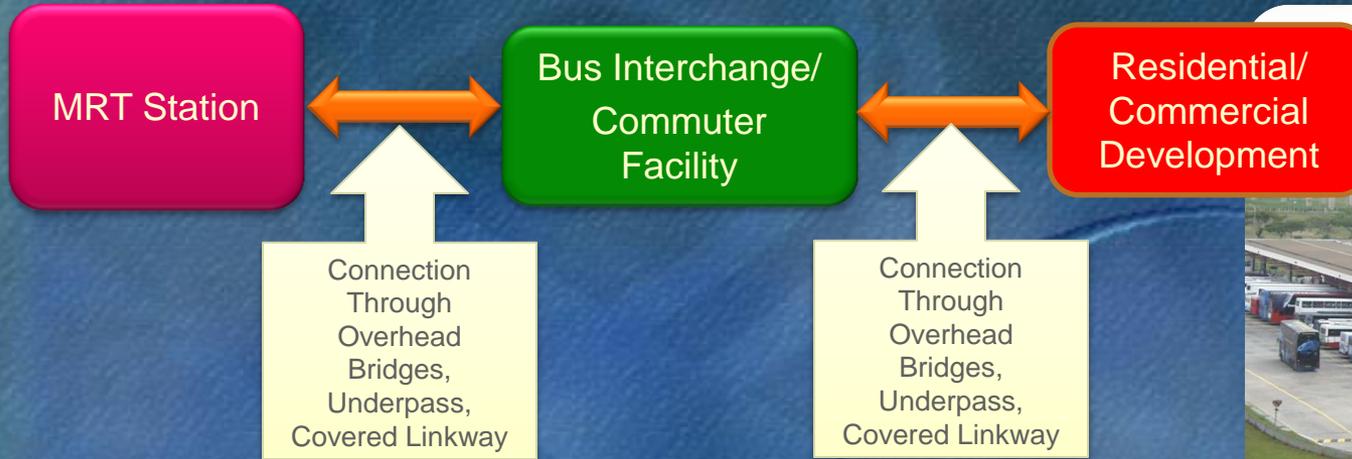


Vertical Integration

- The LRT is stacked above the MRT station.
- Residential development integrated on top of the bus interchange and with the shopping development.
- The concourses allow commuters to make transfers or proceed to the shopping development



Horizontal Integration



Transport nodes can also be vertically integrated but integration with developments remain as horizontal.

Other Key Transport Strategies

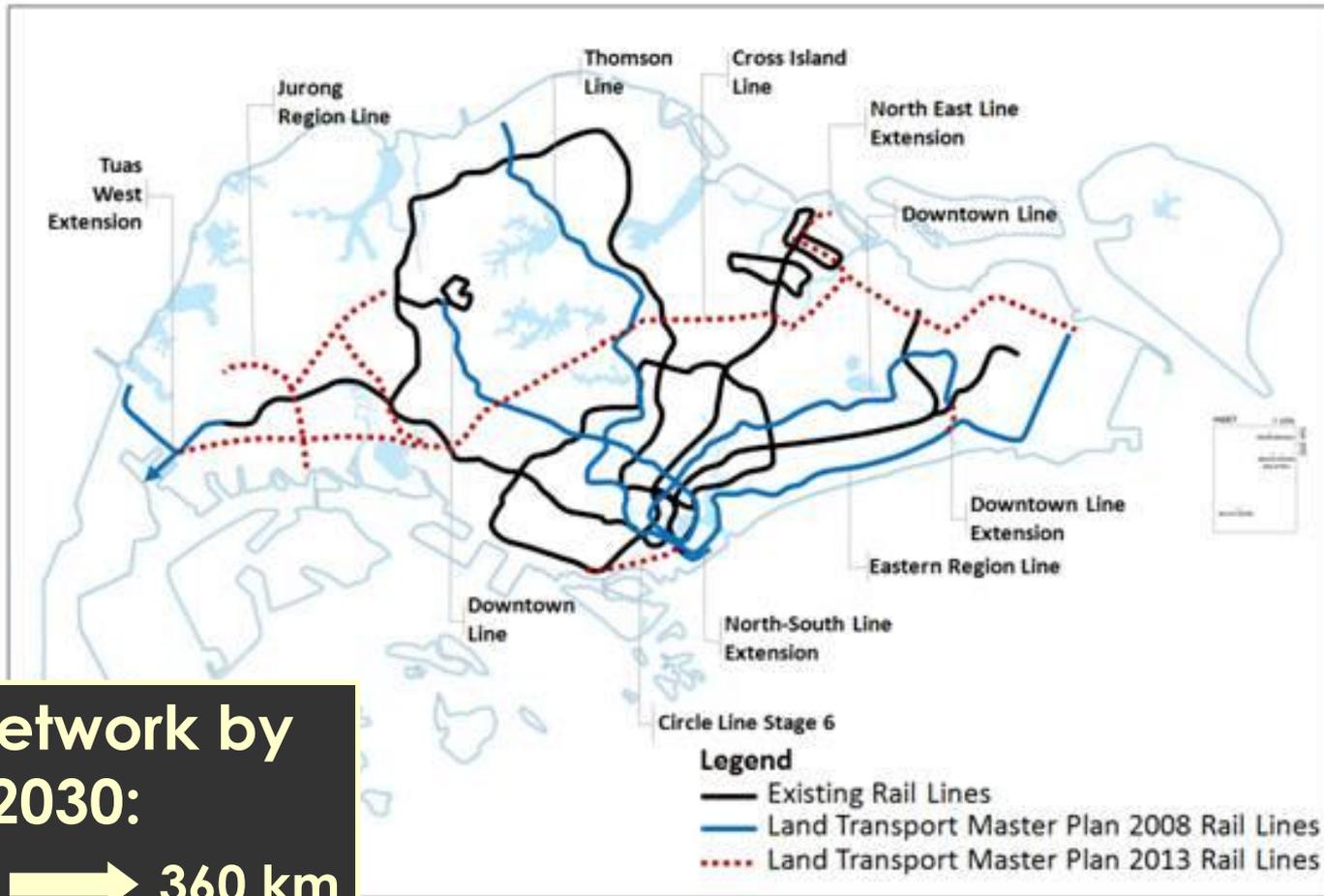
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Continual Investment in PT
Demand Management



Expand Rail Network

Rail Network Expansions under Land Transport Master Plan 2013



Rail network by
2030:

178 km \longrightarrow 360 km

Better Bus Services

- Centralised bus network planning
- Increase bus fleet - 550 buses funded with Govt's assistance (\$1.1bn) over next 5 years
- More extensive bus priority measures

Mandatory give-way at bus bays



Full day bus lanes



Bus priority at junctions

Other Forms of Transport-related Integrations

Fare Integration

- Single integrated ticketing system
- Example: Distance-based Fares



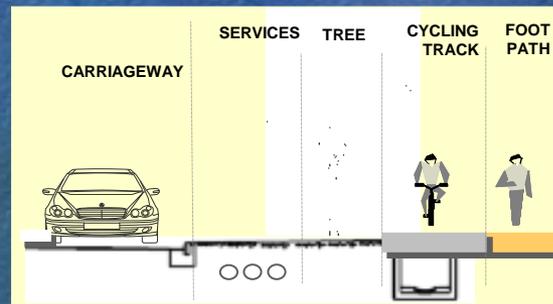
Information Integration

- Integration of information on various transport modes
- Example: MyTransport.sg



Enhance Commuter Experience

- Walking
 - Pedestrian/ commuter facilities
- Cycling
 - Easy access to public transport, parking facility, foldable bicycles on board train/buses



Demand Management

Ownership Control

- Vehicle Quota System (i.e. COE)

FINAL RESULTS FOR FEBRUARY 2013 1ST OPEN BIDDING EXERCISE

Category		Quota	QP(\$)
A	CAR (1600CC & BELOW)	335	87,109
B	CAR (ABOVE 1600CC)	302	92,901
C	GOODS VEHICLE & BUS	230	54,989
D	MOTORCYCLE	506	1,782
E	OPEN	238	94,890

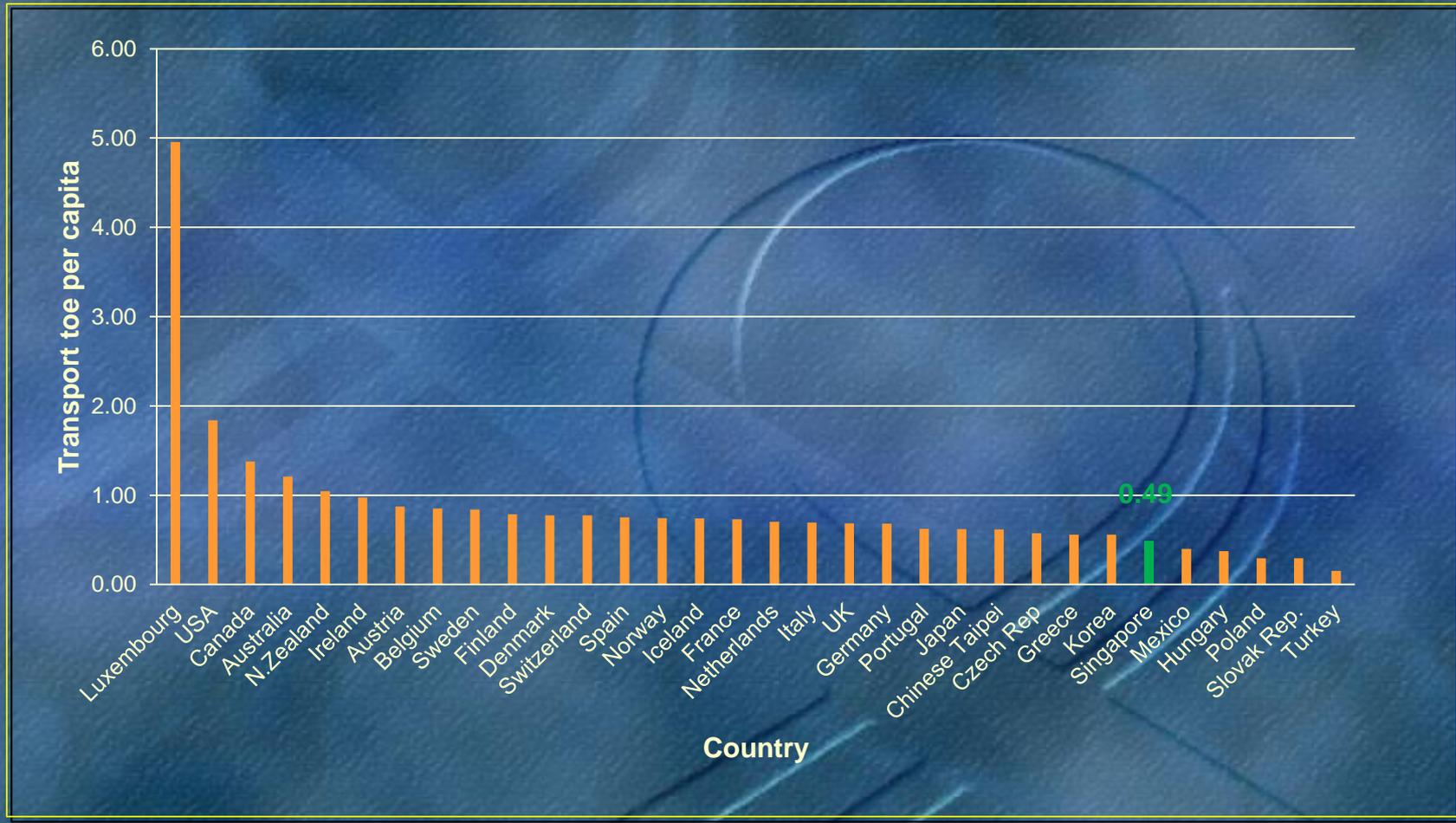
Category	Received	Successful	Unsuccessful
A CAR (1600CC & BELOW)	418	333	85
B CAR (ABOVE 1600CC)	431	278	153
C GOODS VEHICLE & BUS	316	230	86
D MOTORCYCLE	637	502	135
E OPEN	295	221	74

Usage Restraint

- Electronic Road Pricing (ERP)

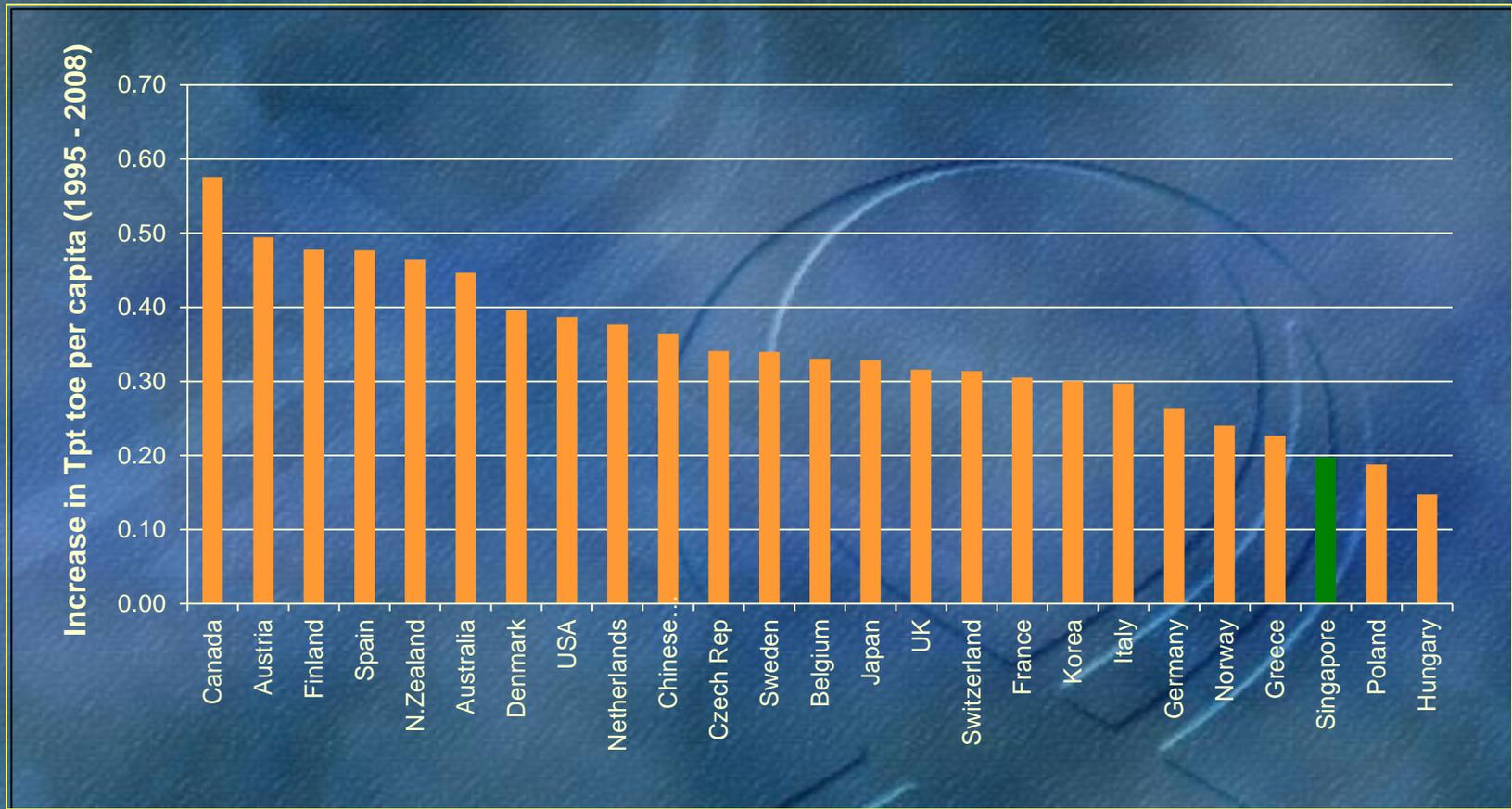


Transport Energy Consumption



Source : OECD Environmental Data Compendium 2008 (www.oecd.org)

Transport Energy Consumption



Source : Developed from OECD Environmental Data Compendium 2008 & UITP(2001) Millennium Cities Database

Summary

- ✓ PT dependent cities have more efficient transport energy use
- ✓ PT dominance can be achieved through integrated land use - transport planning and development
- ✓ Continual investment in PT and automobile restraint policies are needed



Thank You

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