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# *Urban Transport Energy Use in the APEC Region*

**APERC Workshop at EWG34**  
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Asia Pacific Energy Research Centre



Asia-Pacific  
Economic Cooperation

# *Contents*

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- **Characterisation of transport energy use in the major cities of APEC**
- **Evaluation of urban transport system and energy efficiency levels**
- **Analysis of policy/economic instruments**
- **Drawing policy implications for enhancement of energy security and sustainable development**

## *Transport and Oil in APEC*

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### **Continued Dependence on Oil Products**

- The transport sector will continue to drive up oil demand barring a major technological breakthrough.
  - By 2030, the transport sector will lead about 70 percent of incremental oil demand growth.
  - By 2030, oil is expected to continue to be the major energy source for the transport sector.
  - By 2030, road transport is projected to account for about 80 percent of total transport energy demand.

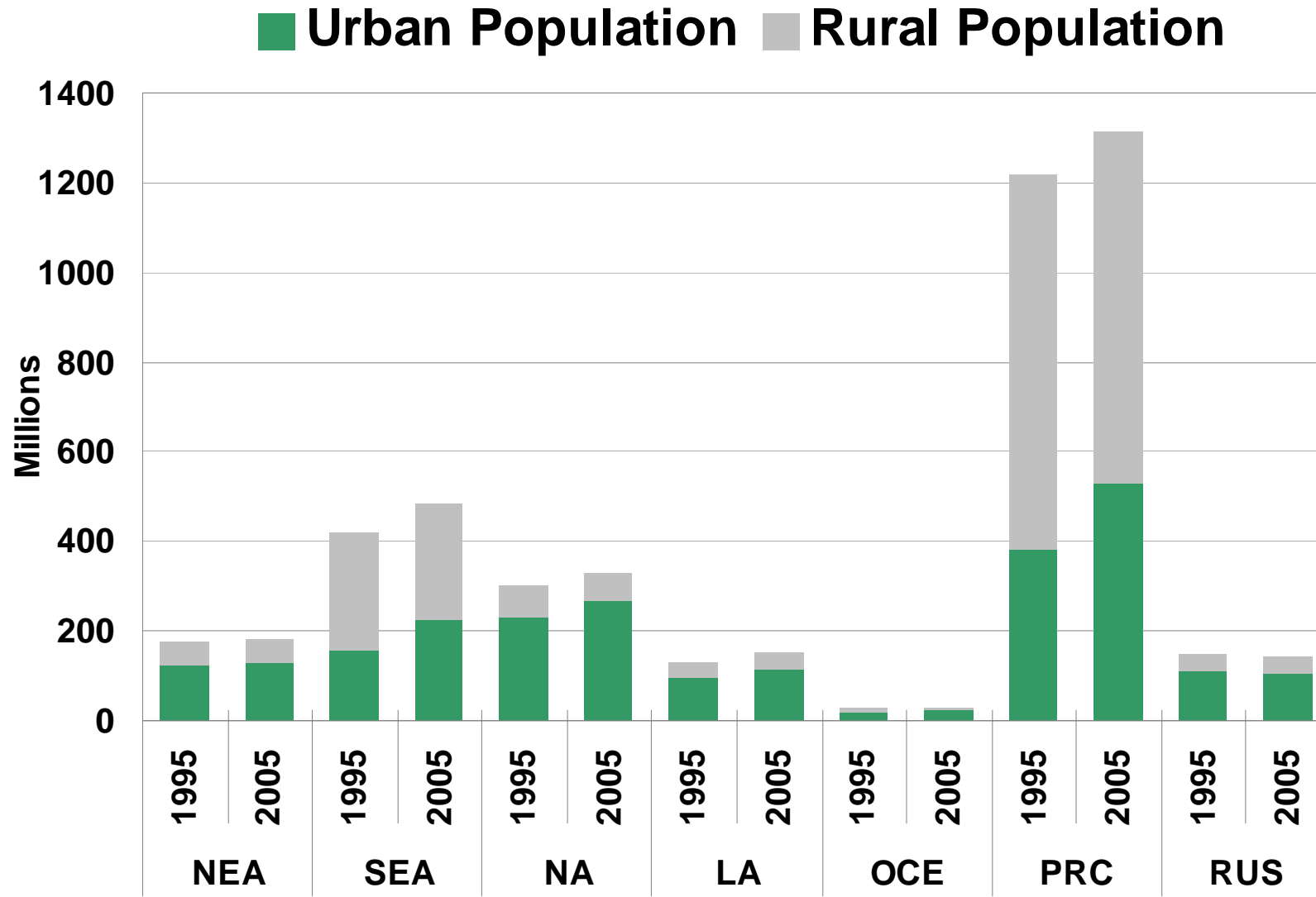
### **Continued Rapid Urbanisation**

- **By 2030, 26 million people per year will migrate from rural areas into urban areas.**
  - Urban population is likely to need more transport energy than rural population.

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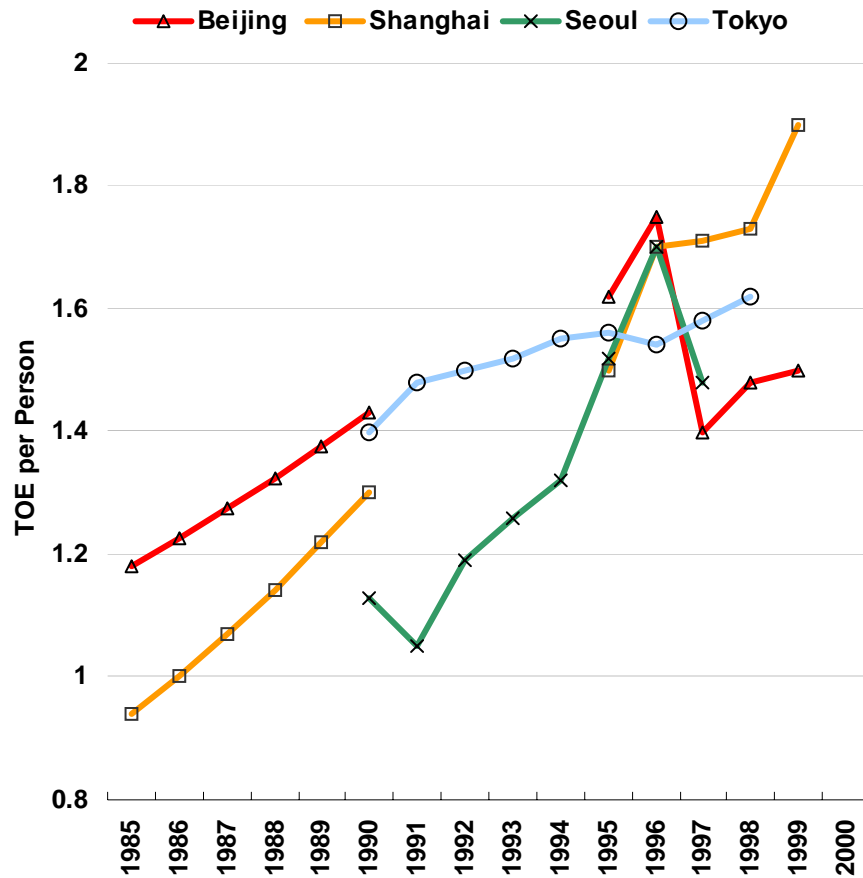
# Urbanisation in APEC

# Urban-Rural Population in APEC

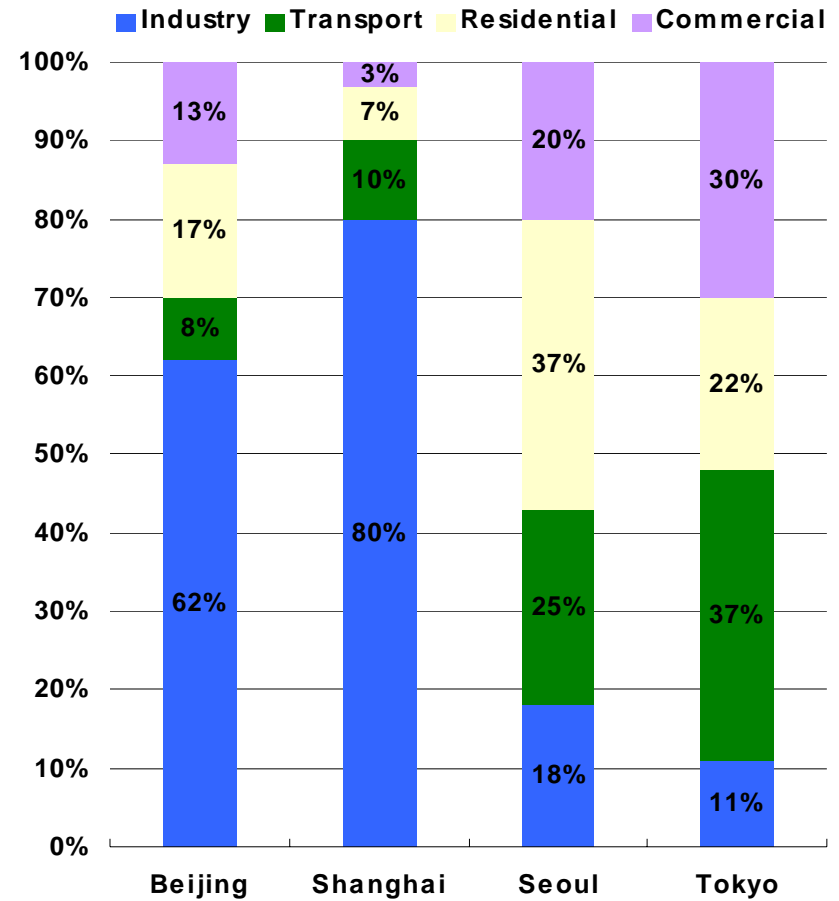


# Energy Consumption in Beijing, Shanghai, Seoul and Tokyo

## Per capita Energy Consumption (1985-2000)



## Sectoral Share in Energy Consumption (1998)

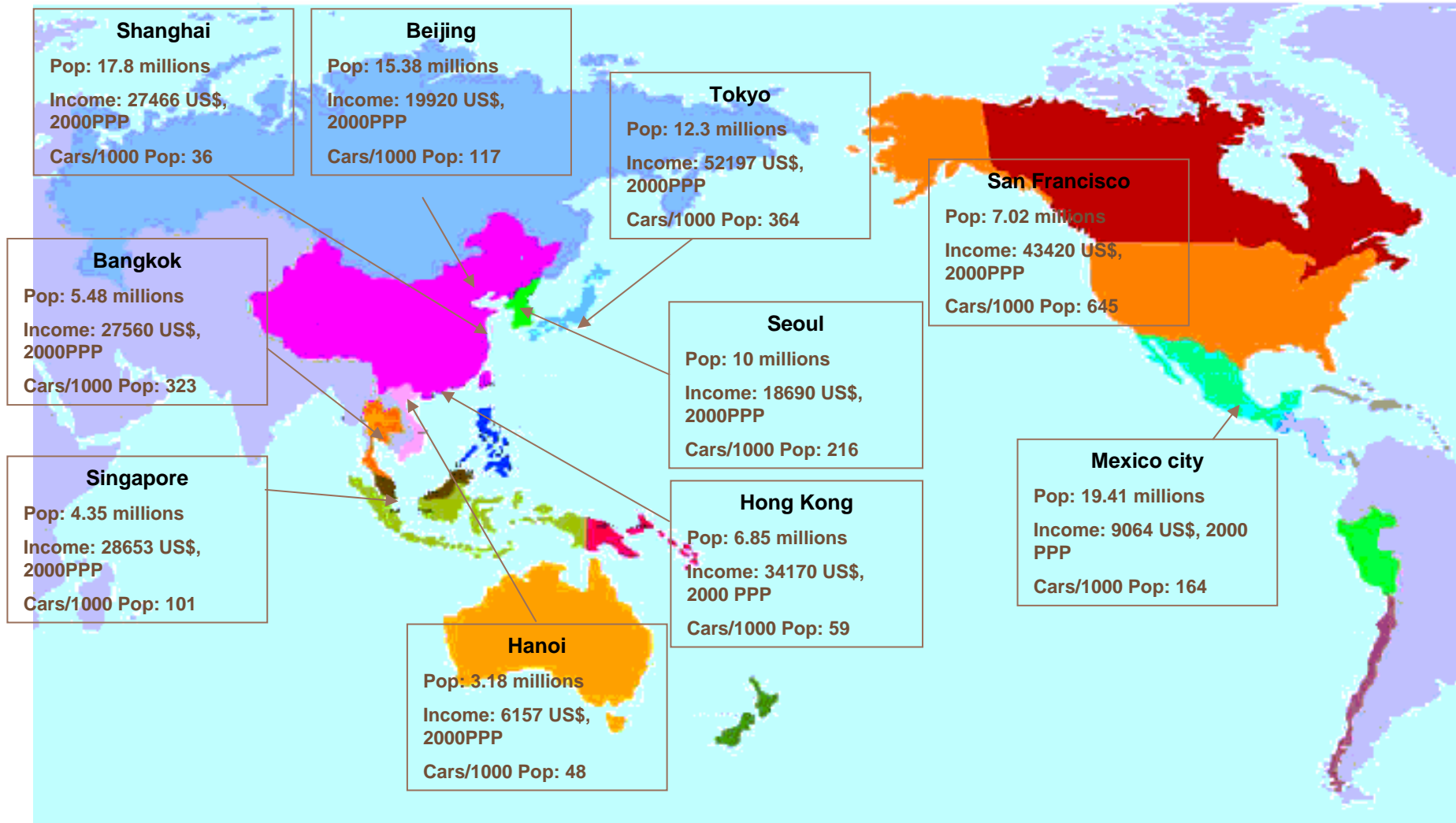


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# Characterisation



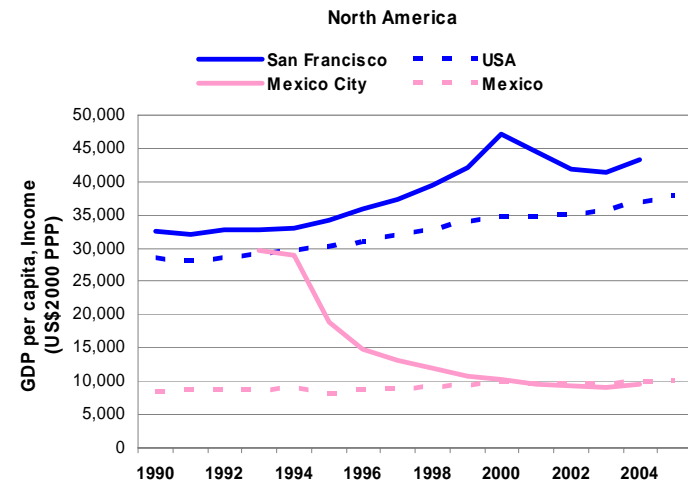
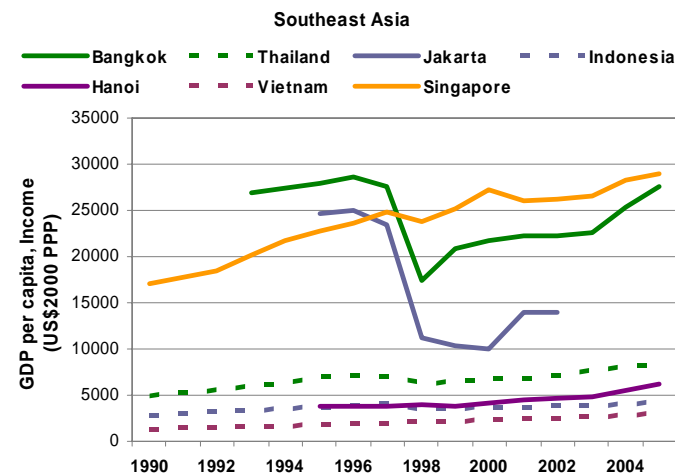
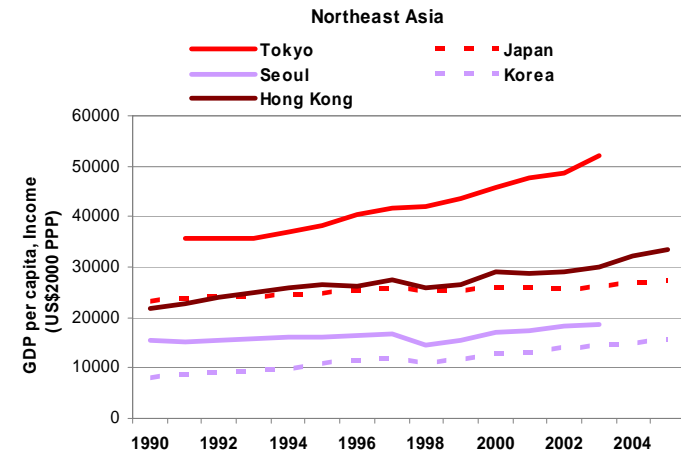
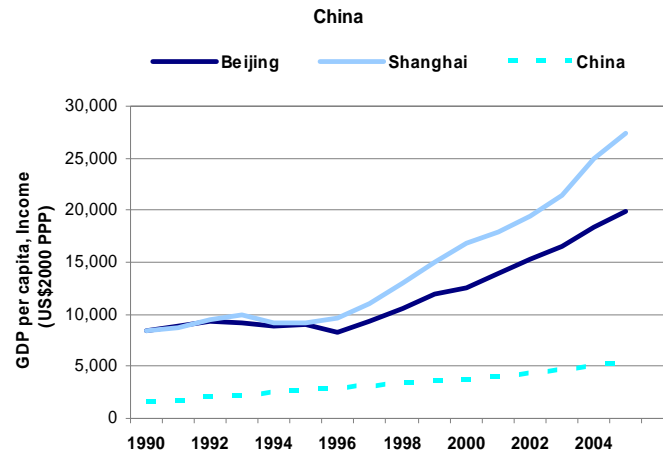
# Coverage of the Cities in APEC





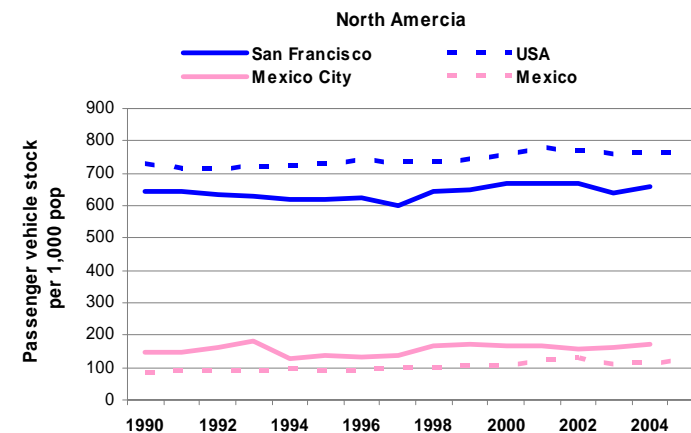
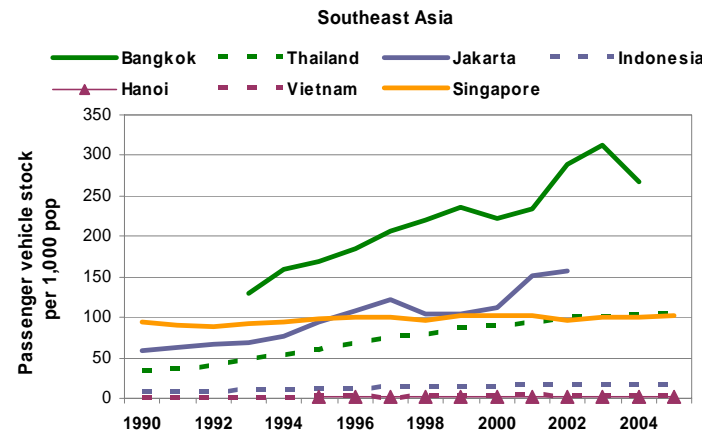
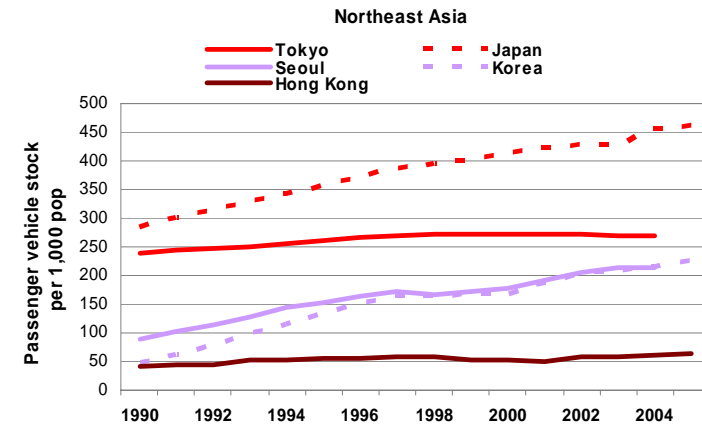
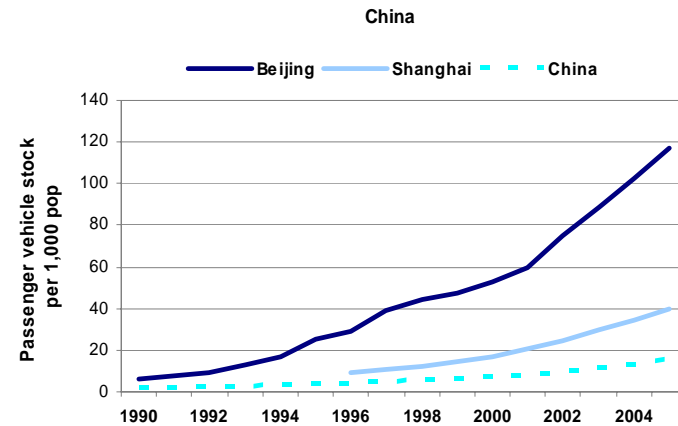
# Historical Trends in Income (1990-2005)

Cities' income represent substantially higher level than that of national average.



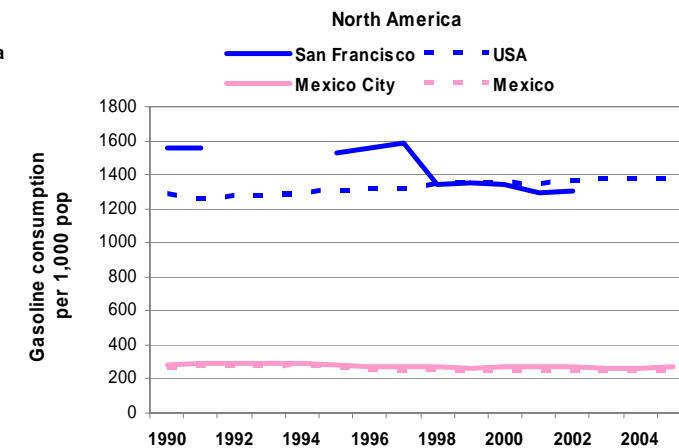
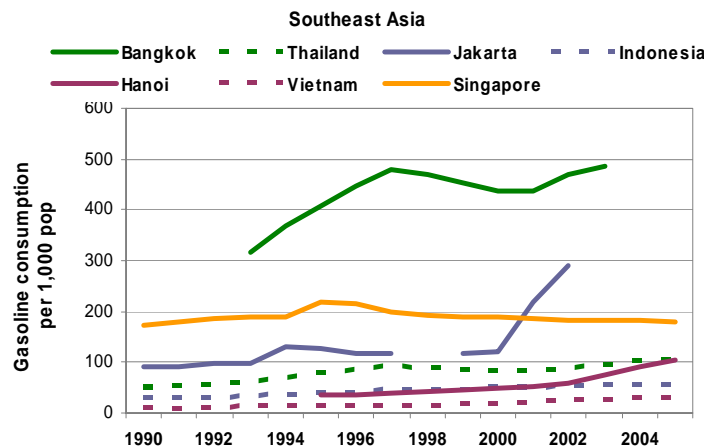
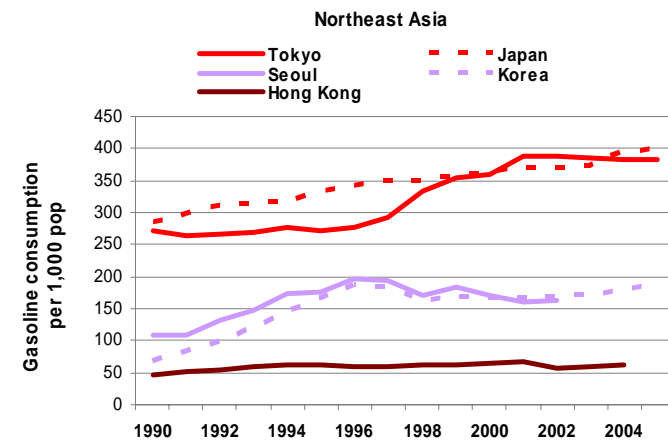
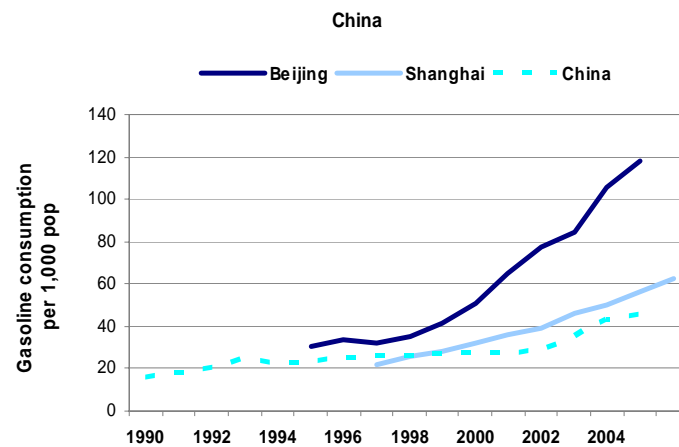
# Historical Trends in Passenger Vehicle Stocks (1990-2005)

Cities represent higher level of passenger vehicle stocks per 1,000 population than that of national average.



# Historical Trends in per capita Gasoline Consumption (1990-2005)

China and SEA to represent higher per capita gasoline consumption than economy average.

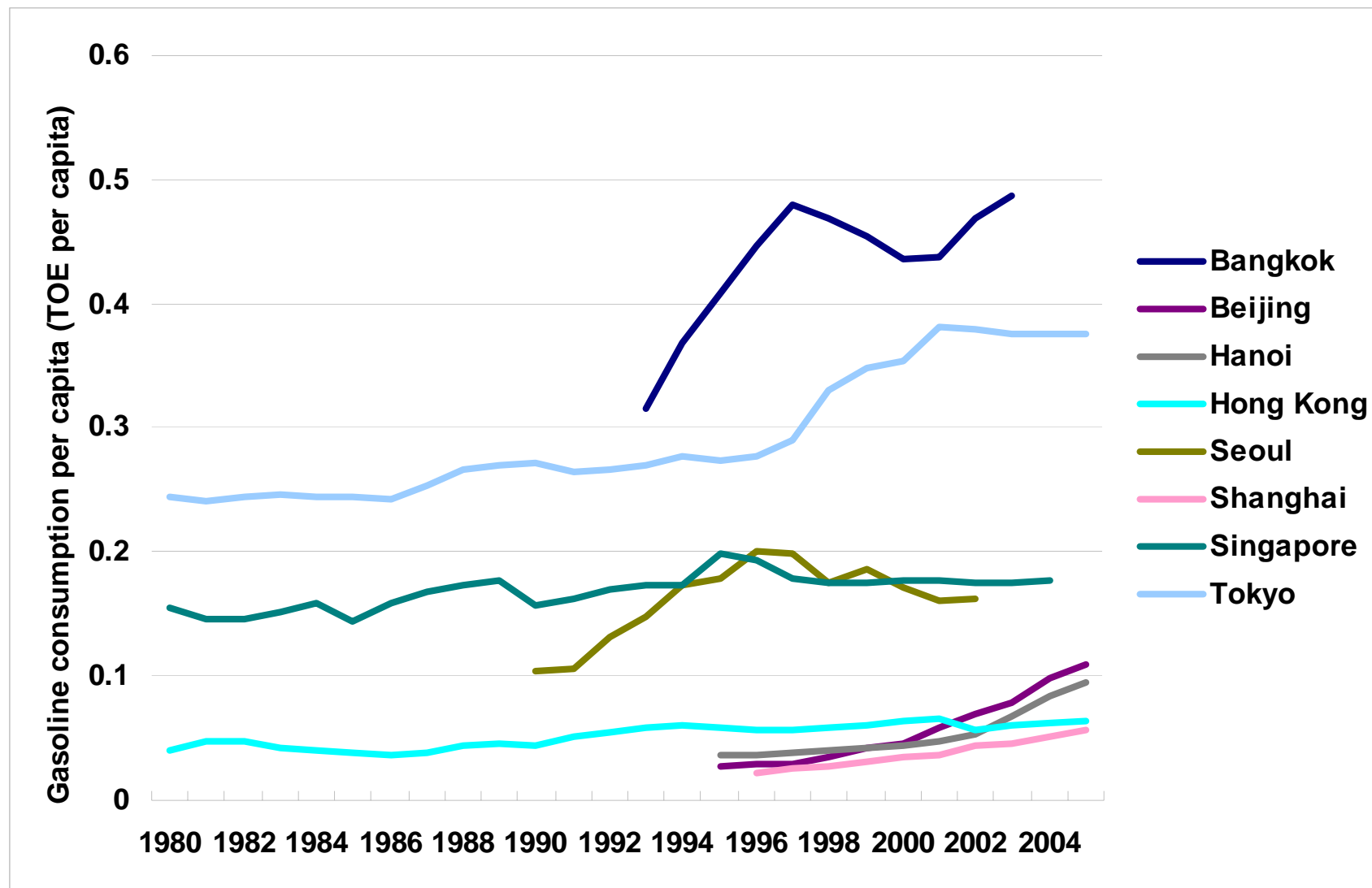


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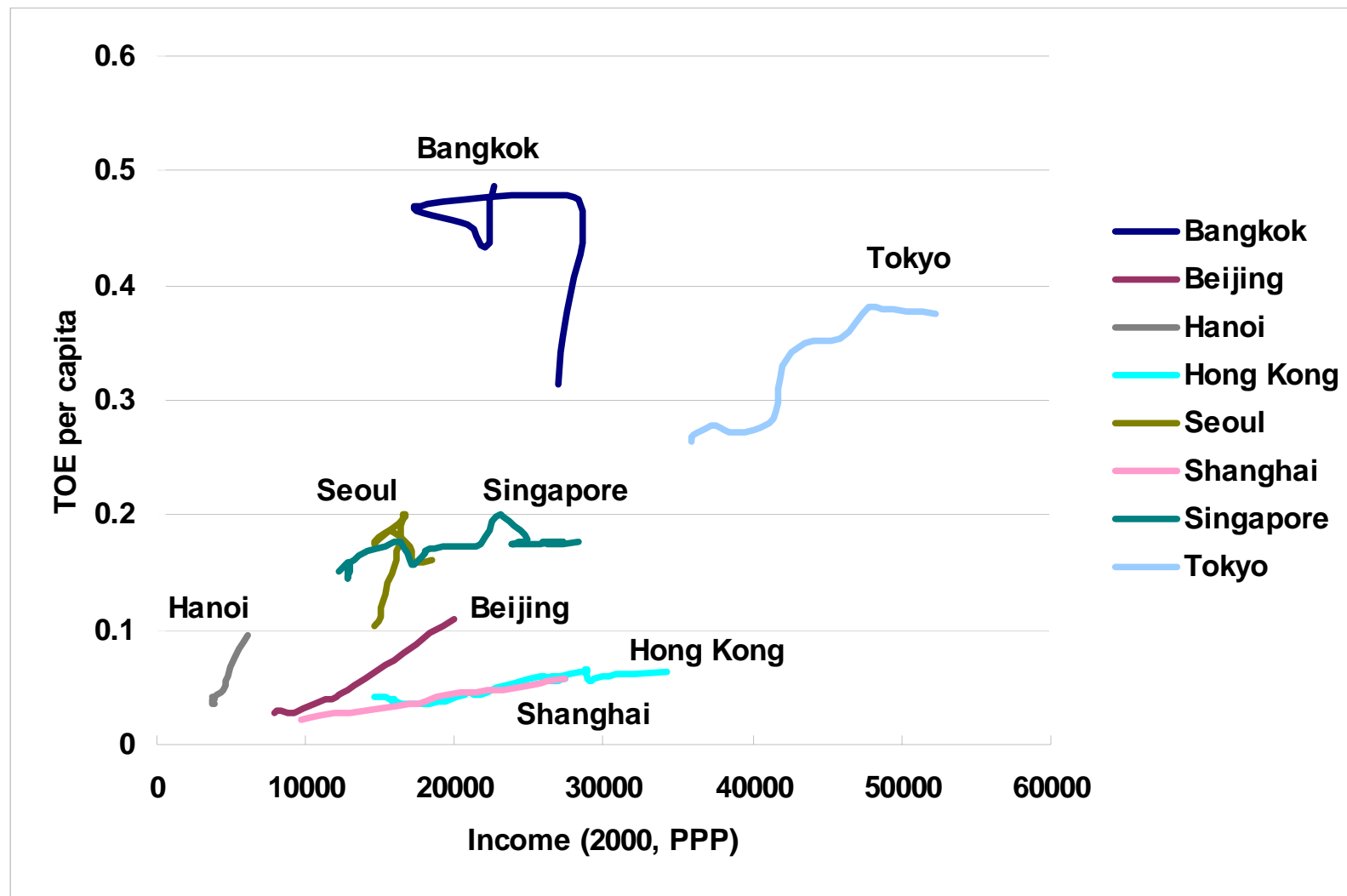
# Evaluation of Urban Transport System in Asia



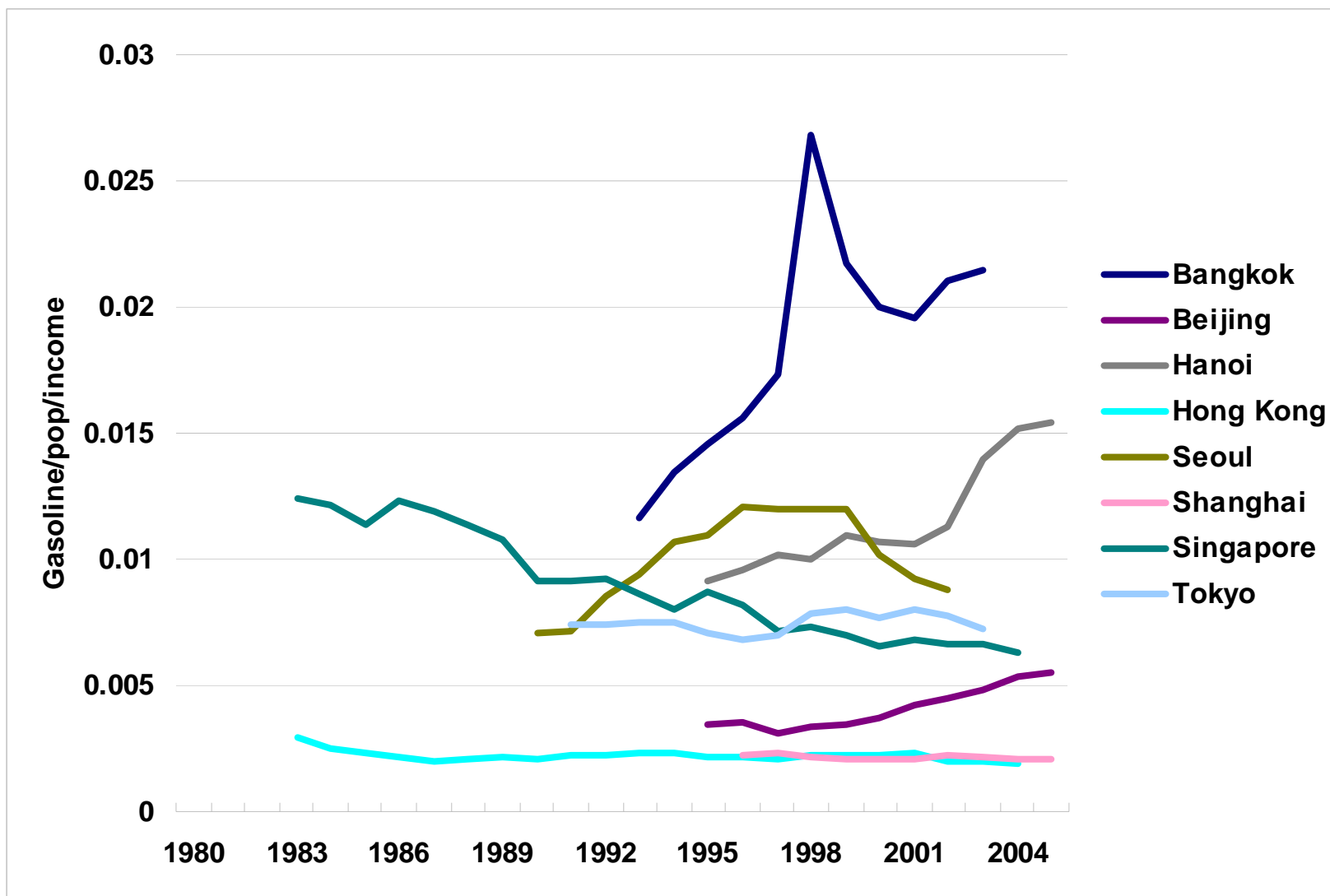
## Gasoline Consumption per Capita in the Cities of Asia (1980-2004)



# Income and Gasoline Consumption per Capita in the Cities of Asia (1980-2004)



## Income Normalised per Capita Gasoline Consumption in the Cities of Asia



# Urban Transport Indicator: Asia

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## ■ Creation of two indicators

### ■ Road indicator

- Weighted average of the below indicators
  - Vehicle ownership
    - Passenger vehicles/1,000 population/Income
  - Length of road
    - Length of road/Population/Income
  - Distance Traveled

### ■ Offset indicator

- Weighted average of the below indicators
  - Energy efficiency improvement
    - Annual growth rate of gasoline consumption/vehicle between 1995 and 2005
  - Accessibility to rail and subway
    - the number of subway and rail stations/urban land area)
  - Governance
    - World Bank's Worldwide Governance Indicators



# Urban Transport Indicator – Ranking

## Road Indicator

Road Indicator					
	City	Vehicle Stocks (Tokyo = 10)	Road	Vehicle Mileage	Road Indicator
1	<b>Jakarta</b>	22.0	95.4	59.4	47.9
2	<b>Bangkok</b>	23.2	33.1	74.0	40.4
3	<b>Seoul</b>	22.1	41.7	41.9	31.9
4	<b>Beijing</b>	10.8	62.1	45.0	31.3
5	<b>Hanoi</b>	15.4	72.6	12.3	25.9
6	<b>Singapore</b>	6.6	24.4	56.4	25.1
7	<b>Taipei</b>	15.2	32.9	26.1	22.0
8	<b>Tokyo</b>	10.0	37.7	31.2	21.9
9	<b>Hong Kong</b>	3.0	8.3	57.1	20.3
10	<b>Shanghai</b>	2.7	25.0	40.0	18.4

## Offset Indicator

Offset Indicator					
	City	Vehicle Efficiency	Access to Rail and Subway	Governance	Offset Indicator
1	<b>Hong Kong</b>	0.0	45.4	94.7	46.6
2	<b>Tokyo</b>	-6.1	42.8	86.6	41.3
3	<b>Seoul</b>	4.6	43.4	74.4	41.1
4	<b>Taipei</b>	1.1	36.6	80.7	39.2
5	<b>Singapore</b>	1.4	13.7	98.2	35.4
6	<b>Bangkok</b>	5.0	5.9	61.1	22.5
7	<b>Shanghai</b>	3.7	14.4	45.8	20.6
8	<b>Beijing</b>	1.9	5.1	45.8	16.4
9	<b>Hanoi</b>	-2.4	0.0	37.6	10.6
10	<b>Jakarta</b>	-6.3	5.1	31.4	9.6

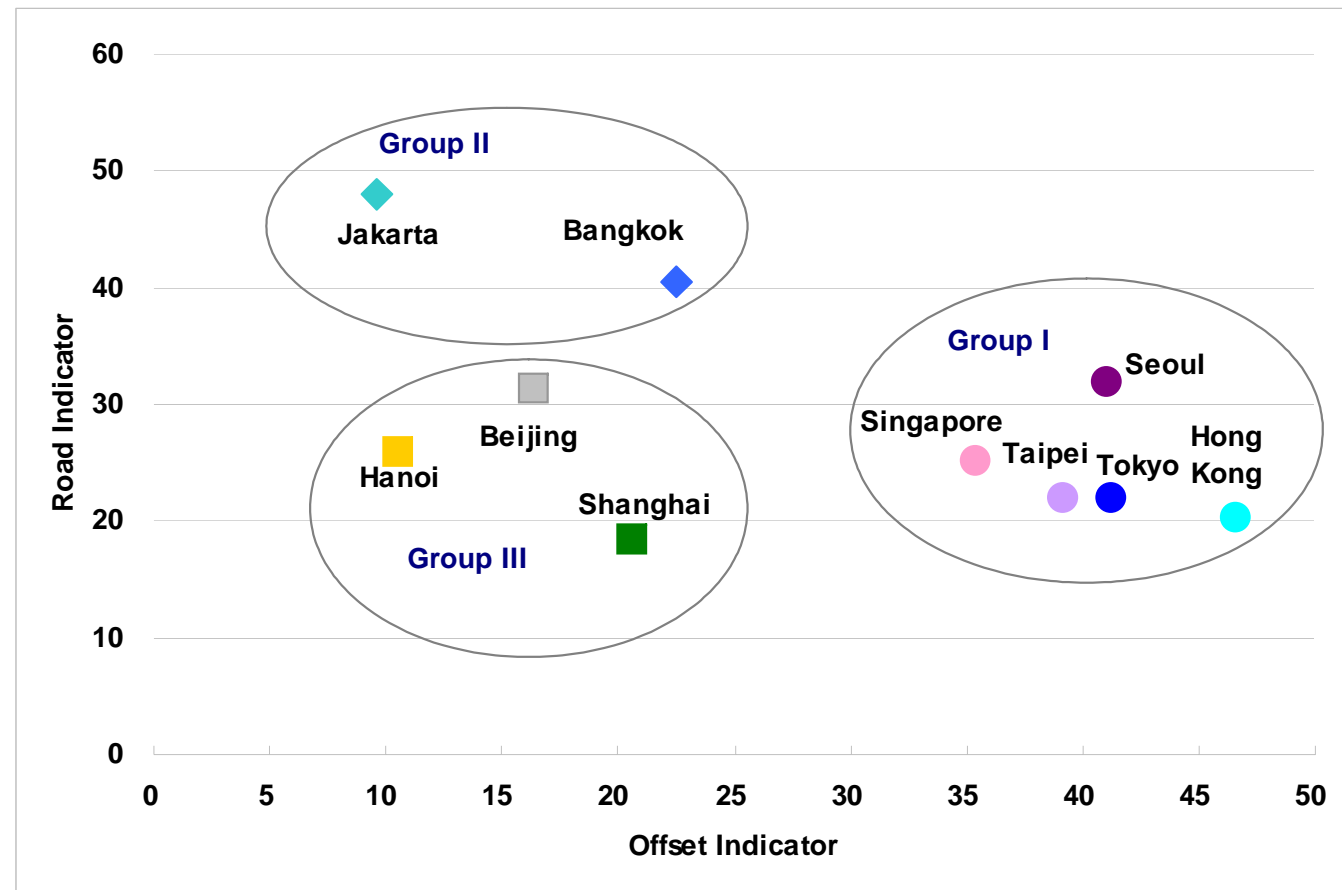


# Road Indicator and Offset Indicator (2005)

Cities in Group I represent relatively high accessibility to subway/rail stations – key to offset growth in road energy consumption.

Cities in Group II have relatively high vehicle stocks compared with income levels, while accessibility to subway/rail is low.

Cities in Group III are at the early stage of development.

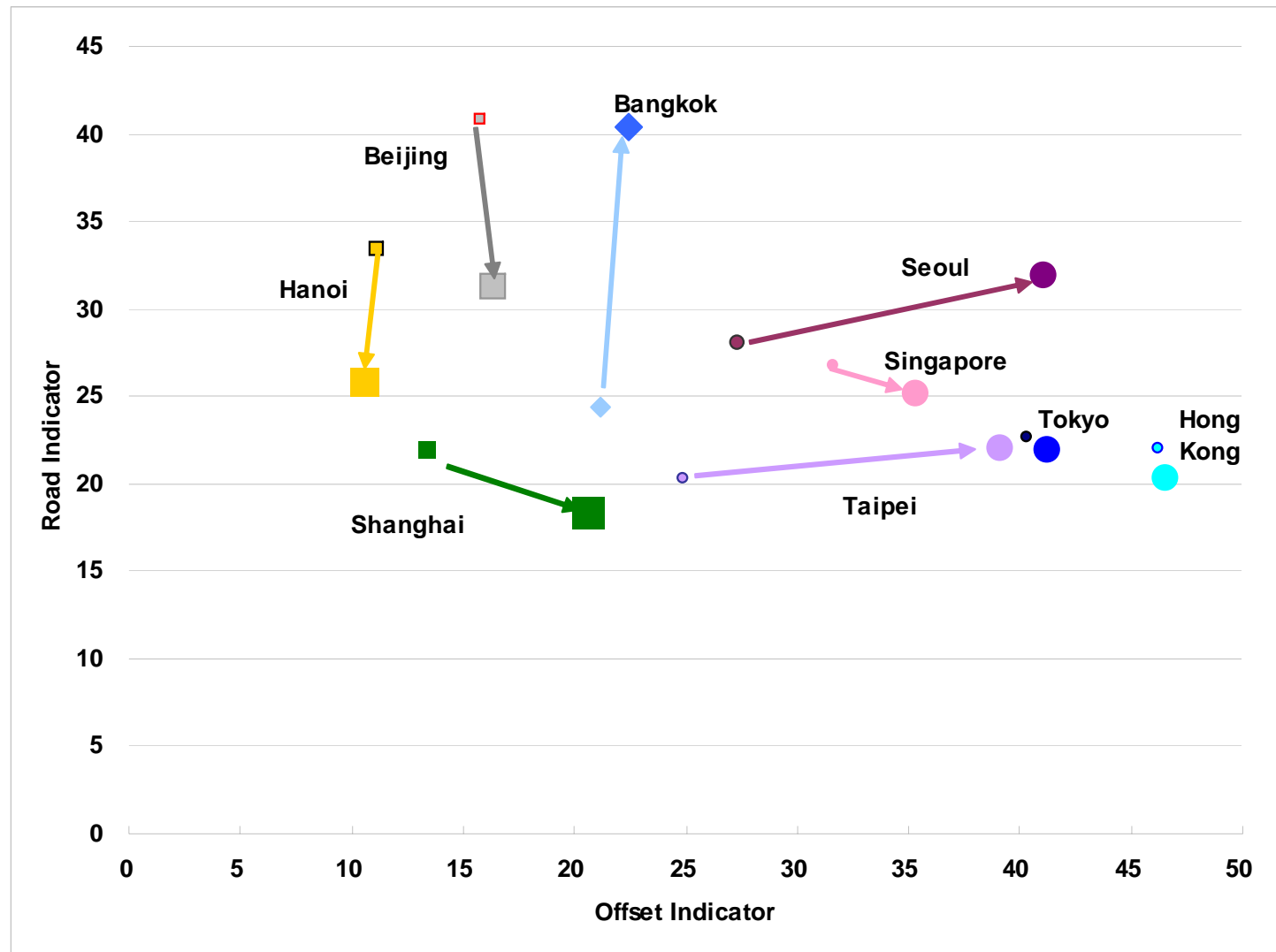


## Urban Transport Indicators (1995 and 2005)

Cities in Group I represent relatively high accessibility to subway/rail stations – key to offset growth in road energy consumption.

Cities in Group II have relatively high vehicle stocks compared with income levels, while accessibility to subway/rail is low.

Cities in Group III are at the early stage of development.



# Findings

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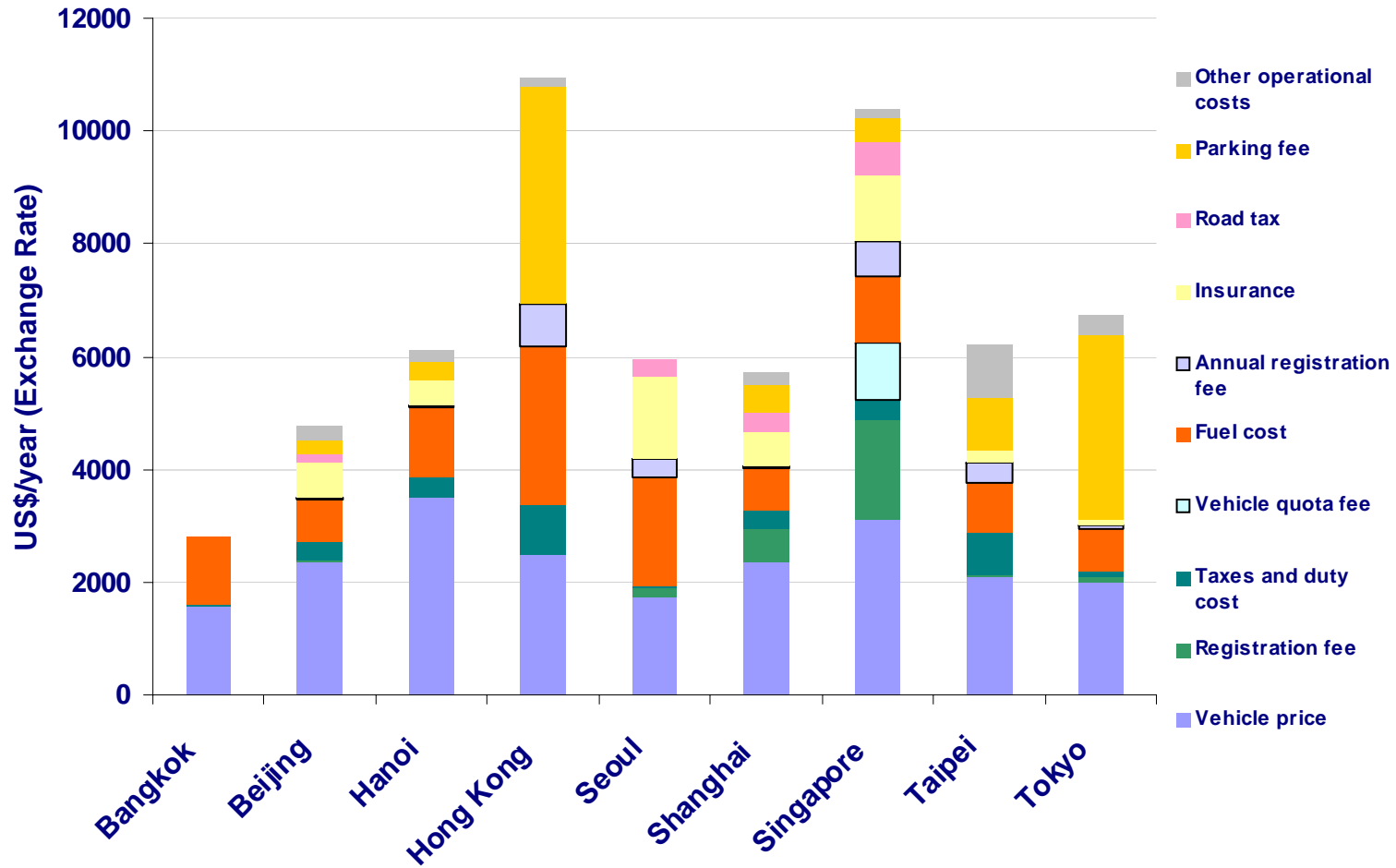
- Accessibility to rail/subway is the key.
  - Hong Kong, Tokyo, Seoul and Taipei
- Development of rail/subway infrastructure needs proper governance.
  - Hong Kong, Tokyo, Seoul and Singapore
- Urban dwellers depend heavily on vehicles unless accessibility to rail/subway is ensured.
  - Bangkok
- Increase in distance traveled offsets the impact of vehicle efficiency improvement.
  - Income growth (Bangkok and Beijing)
  - Road infrastructure development (Beijing and Hanoi)
  - Suburbanisation (Seoul)

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# Measures to Curb Road Energy Consumption

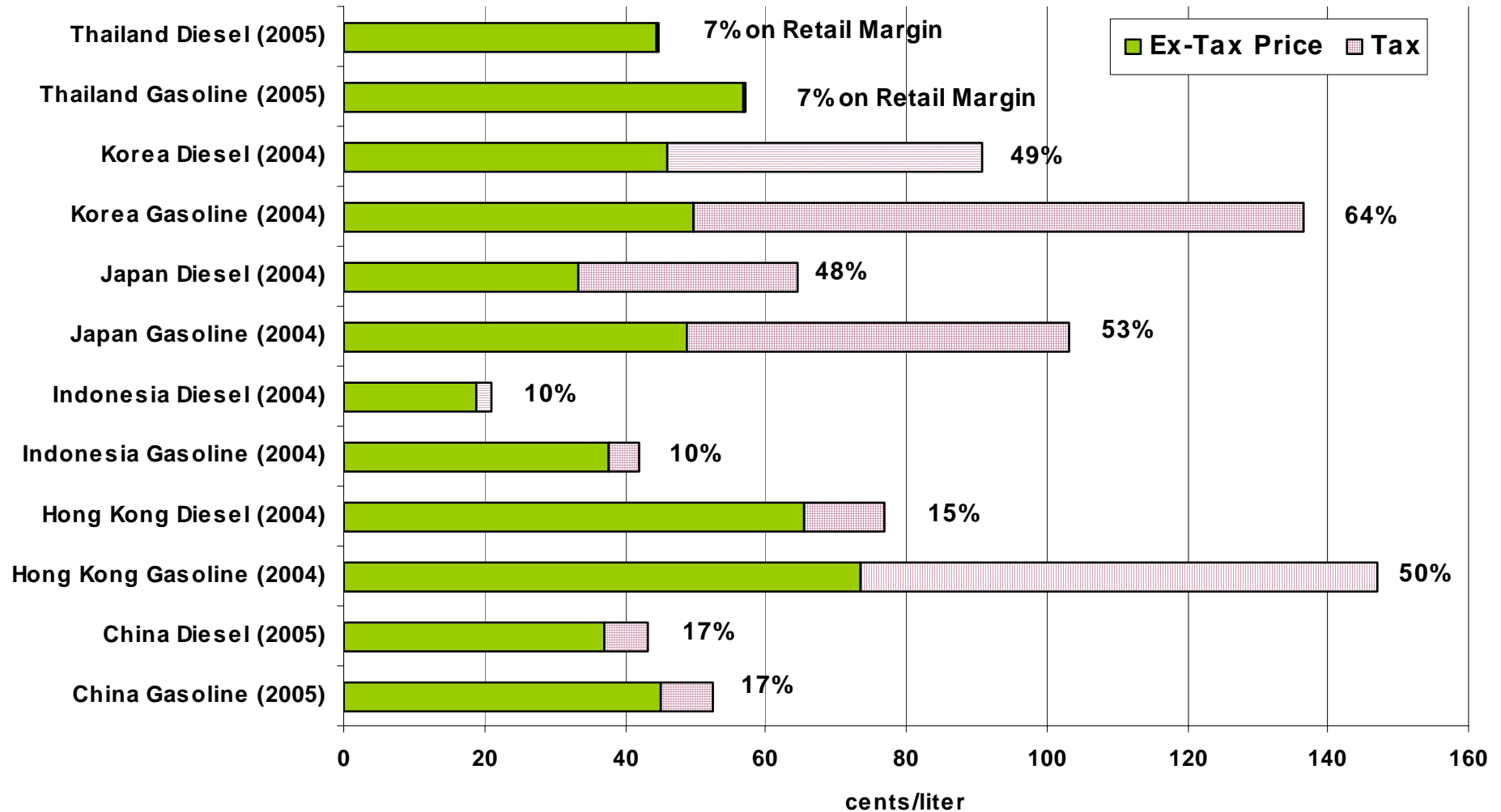
# Annual Cost of Vehicle Ownership

Assuming 9 years' ownership of 1800 cc car, we obtained substantial difference in the cost of vehicle ownership across the cities.



# Prices and Taxes of Oil Products in Asia

Gasoline and diesel prices show substantial difference across the countries, reflecting different pricing and tax.



# *Transport Policy Issues*

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## ■ Bangkok

- More than 10 organisations under different ministries/agencies are responsible for transport planning.
- No mechanism is in place to realign different policy goals.
  - Promotion of automobile industry
  - Mitigation of traffic congestion

## ■ Shanghai

- Central government plans to ban “license plate auctioning” to foster automobile industry.



# *Implications*

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- Passenger transport energy consumption results from diverse socioeconomic factors.
  - Income, Length of road
  - Accessibility to alternative transport modes
  - Urban form, population density
- Accessibility to rail/subway is the key component that can reduce passenger vehicle dependence and improve energy intensity of the urban passenger transport sector in Asia.
- Proper governance is needed to support rail infrastructure development
- City planners, especially at the early stage of development, need to appropriately assess their future transport requirements and plan appropriate timing in investment towards rail/subway infrastructure.

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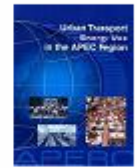
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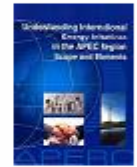
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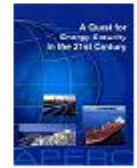
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