
Urban Development and Transportation Energy Demand

Motorisation in Asian Cities

APERC Workshop at the EWG30

APEC Energy Future

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Outline

- **Study Objective**
- **Robust Oil Demand Growth in Asia**
 - **Outlook of Oil Demand**
 - **Outlook of Net Oil Import**
- **Trend of Urbanisation**
 - **Rapid Growth of the Asian Cities**
- **Factors Affecting Passenger Vehicle Ownership in the Asian Cities**
- **Projection**
 - **Vehicle Ownership and Energy Demand**
- **Implications**

Study Objectives

- **Analysis of trend for urban development in Asia**
 - **Income trend**
 - **Population trend**
- **Analysis of relation between urbanisation and transportation energy demand in the Asian cities**
- **Estimation of factors affecting vehicle ownership in the Asian cities**
- **Projection of vehicle ownership and vehicle energy demand in the Asian cities**
 - **To draw policy implications for sustainable development**

Robust Oil Demand Growth in Asia

Outlook of Oil Demand by Region

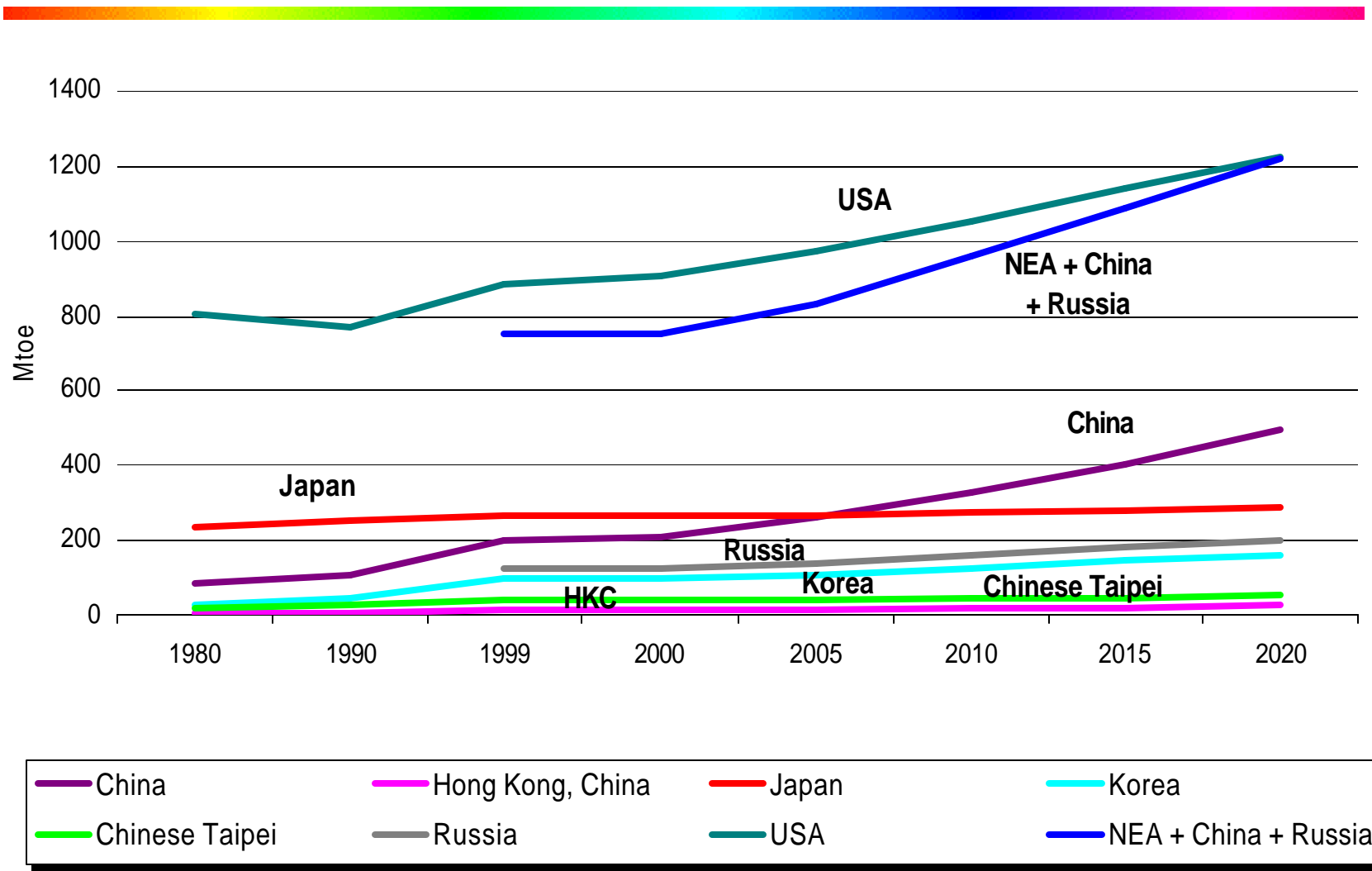
	Absolute Level (Mtoe)			Annual Growth Rate		
	1999	2010	2020	1999-2010	2010-2020	1999-2020
North America	882	1073	1265	1.8%	1.7%	1.7%
Latin America	76	100	129	2.6%	2.5%	2.6%
Northeast Asia	340	403	466	1.6%	1.5%	1.5%
Southeast Asia	117	187	287	4.3%	4.4%	4.4%
Oceania	42	53	65	2.1%	2.0%	2.1%
China	160	283	440	5.3%	4.5%	4.9%
Russia	85	116	153	2.9%	2.8%	2.8%
APEC	1703	2215	2805	2.4%	2.4%	2.4%

(Source) APERC (2002)



Oil Demand Outlook (1999-2020)

Selected Economies of Asia and USA



Net Oil Import in Asia (2002 and 2020)

	2002	2020
China	32%	69%
Indonesia	-11%	58%
Japan	100%	100%
Korea	100%	100%
Malaysia	-50%	37%
Philippines	98%	97%
Thailand	75%	95%
Viet Nam	-74%	6%

(Note) Net Oil Import = (Oil Import + Oil Export)/Total Primary Demand of Oil

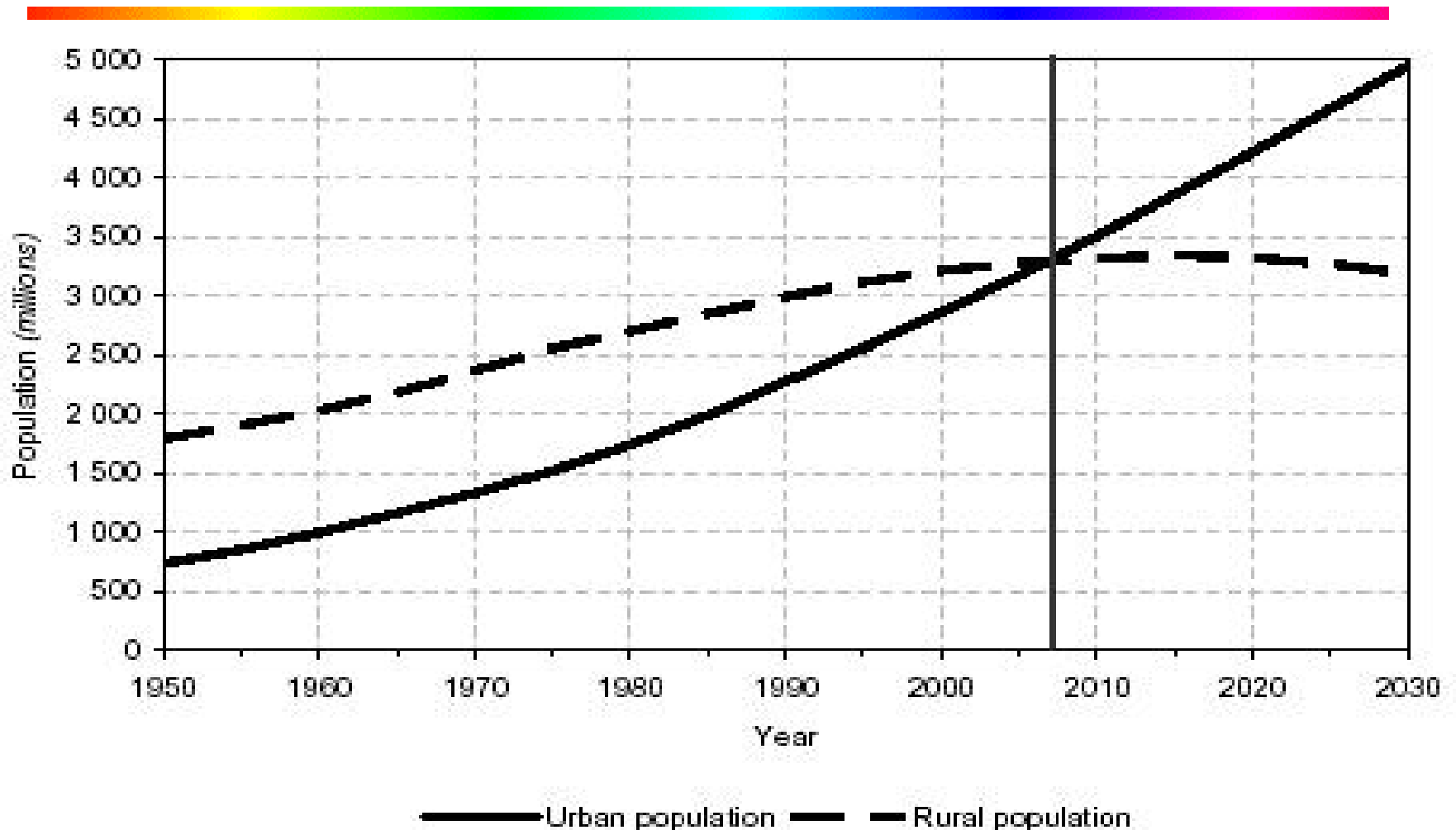
(Source) History: IEA (2004), "Energy Balances of OECD and Non-OECD Countries",

Projection: Asia Pacific Energy Research Centre (2002), "APEC Energy Demand and Supply Outlook 2002"



Trend of Urbanisation

World Urbanisation to reach 50% by 2007



Source: UN (2003)

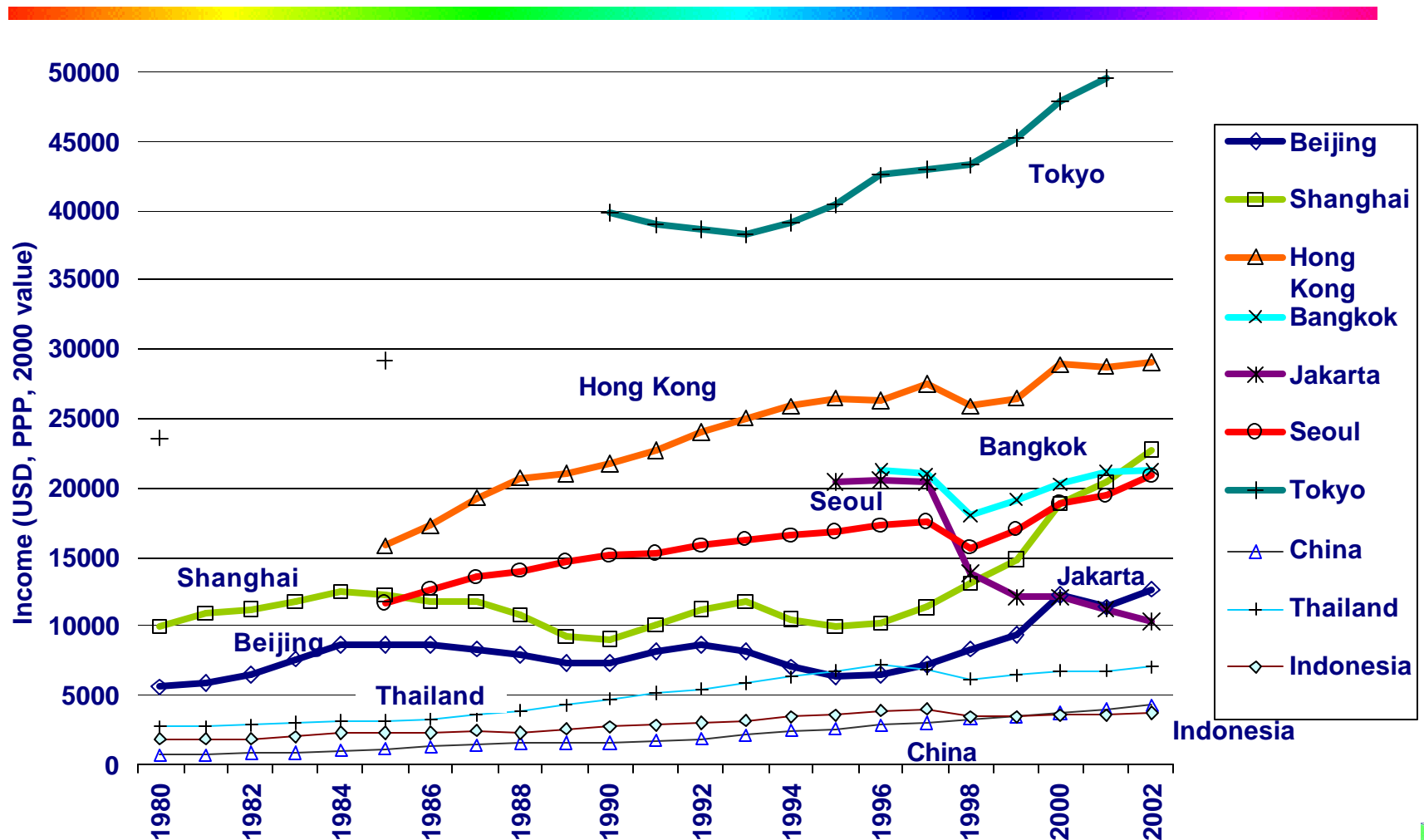
Urbanisation in Asia

- **Mega-cities in Asia (by 2015)**
 - **Cities with more than one million inhabitants**
 - 153 in Asia out of 358 in the world
 - **Megacities with more than 10 million inhabitants**
 - 15 in Asia out of 27 in the world

Coverage of the Countries and Cities in Asia

- **China**
 - **Beijing**
 - **Shanghai**
- **Hong Kong, China**
- **Japan**
 - **Tokyo**
- **Korea**
 - **Seoul**
- **Indonesia**
 - **Jakarta**
- **Thailand**
 - **Bangkok**

Income Trends of the Major Asian Cities



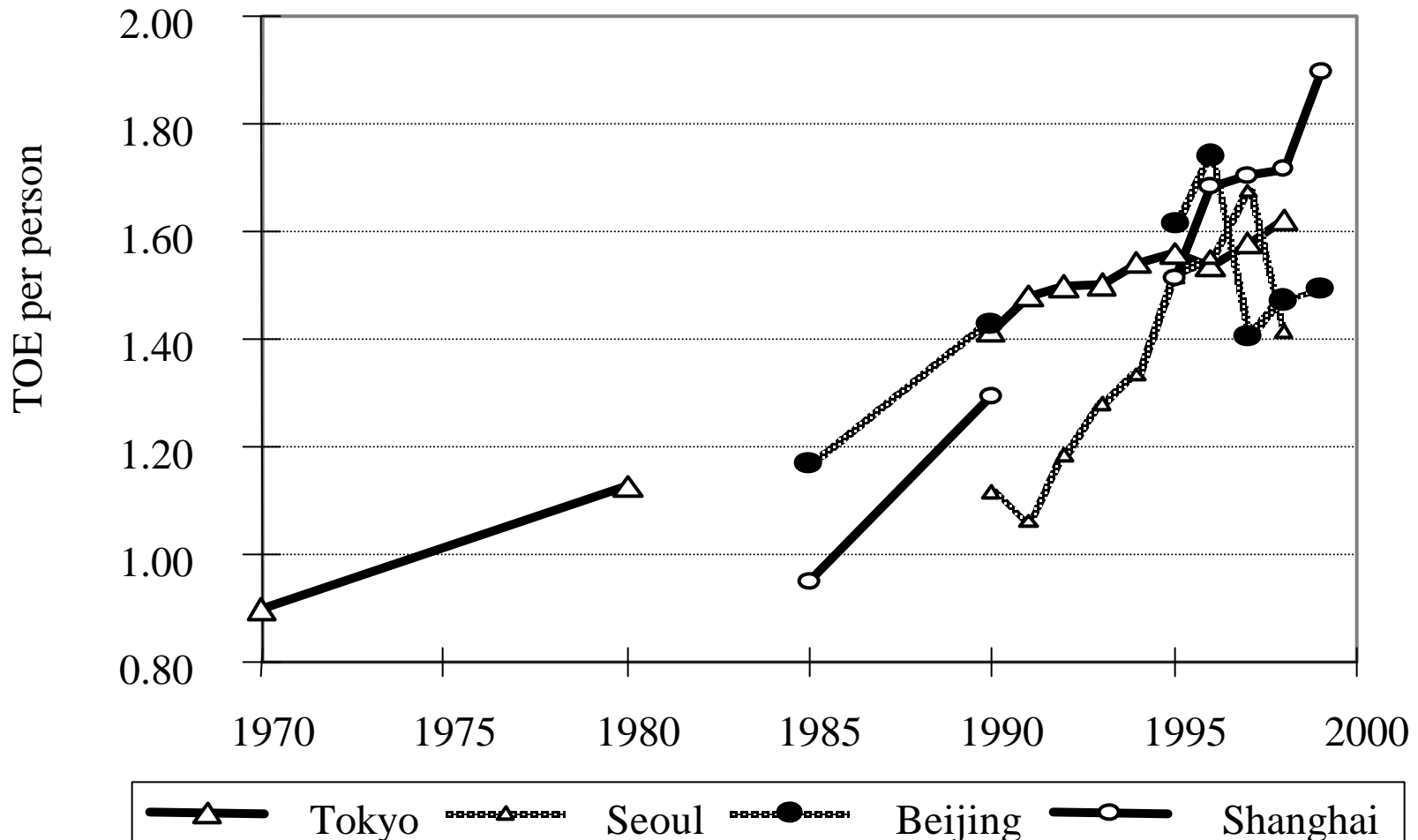
(Source) APERC Database (2005)



Urbanisation and Transportation Energy Demand

Urban Energy Use

Comparison among Beijing, Shanghai, Seoul and Tokyo

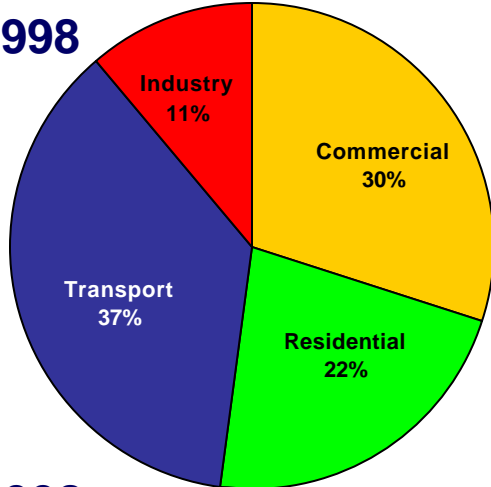


(Source) Dhakal (2004), "Urban Energy Use and Greenhouse Gas Emissions in East Asian Mega-cities" a paper presented at the APERC's Energy Outlook Workshop

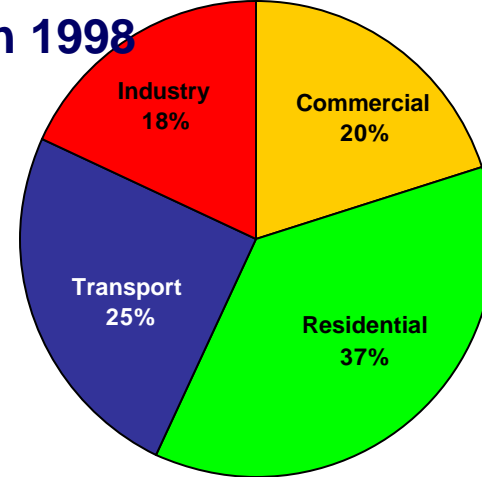
Energy Demand in the Cities: Sectoral Share



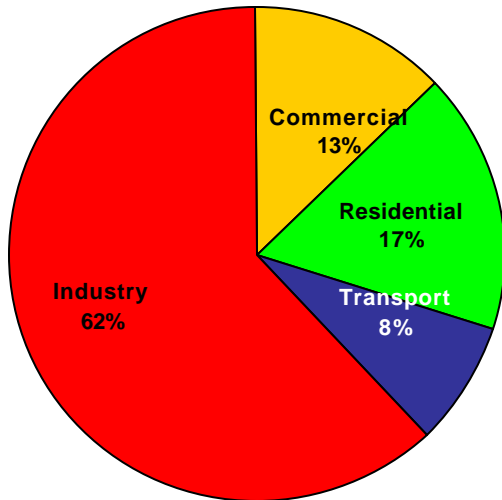
Tokyo in 1998



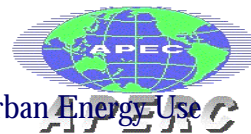
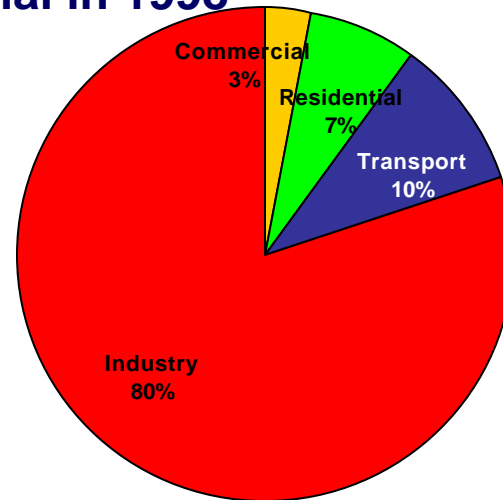
Seoul in 1998



Beijing in 1998



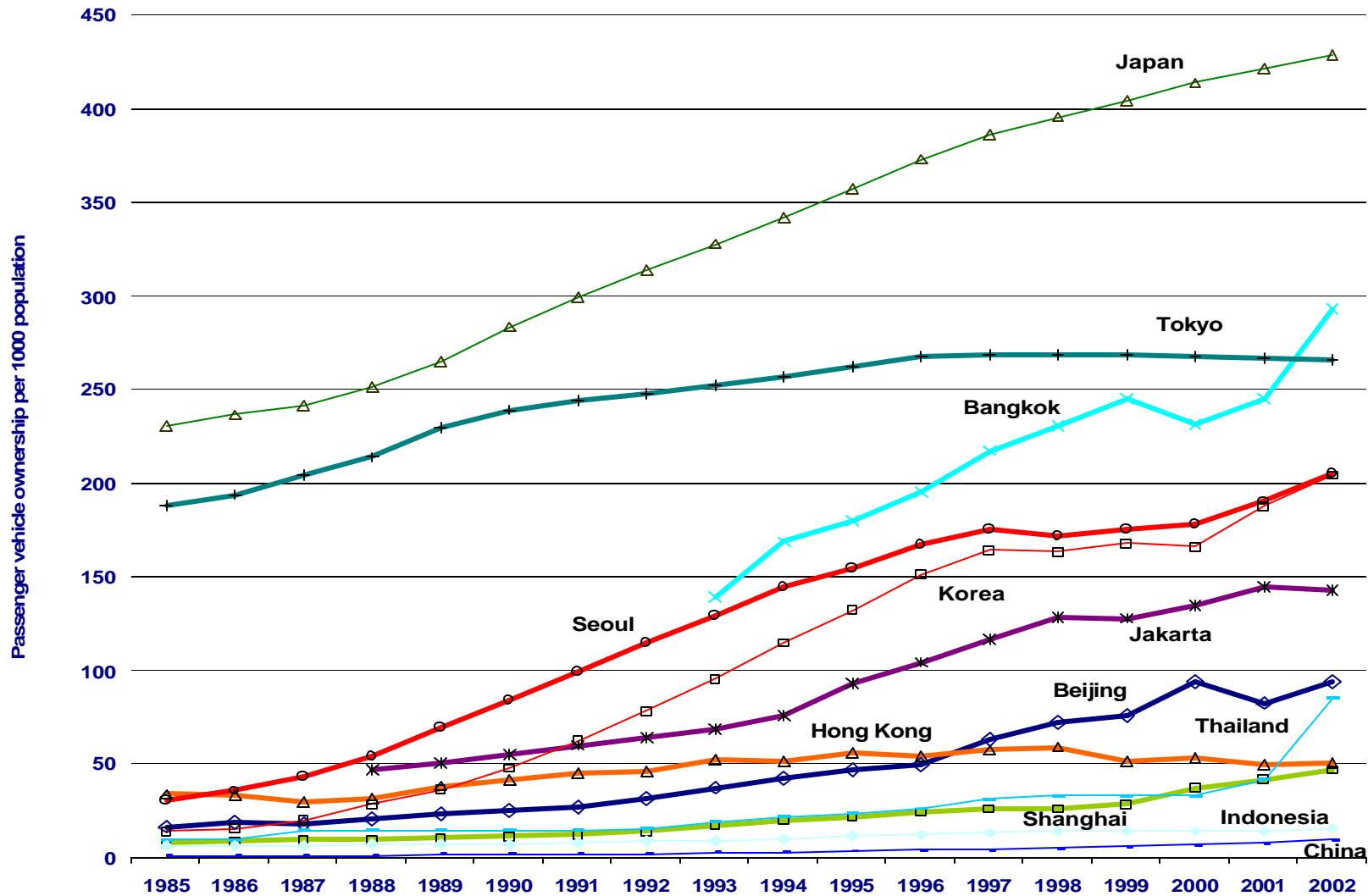
Shanghai in 1998



Source: China Statistical Bureau, "Statistical Year Book of Beijing" and "Statistical Year Book of Shanghai", and Dhakal (2004), "Urban Energy Use and Greenhouse Gas Emissions in East Asian Mega-cities" a paper presented at the APERC's Energy Outlook Workshop

Fast Pace of Motorization in the Asian Cities:

Trend of Passenger Vehicle Ownership per 1,000 Population

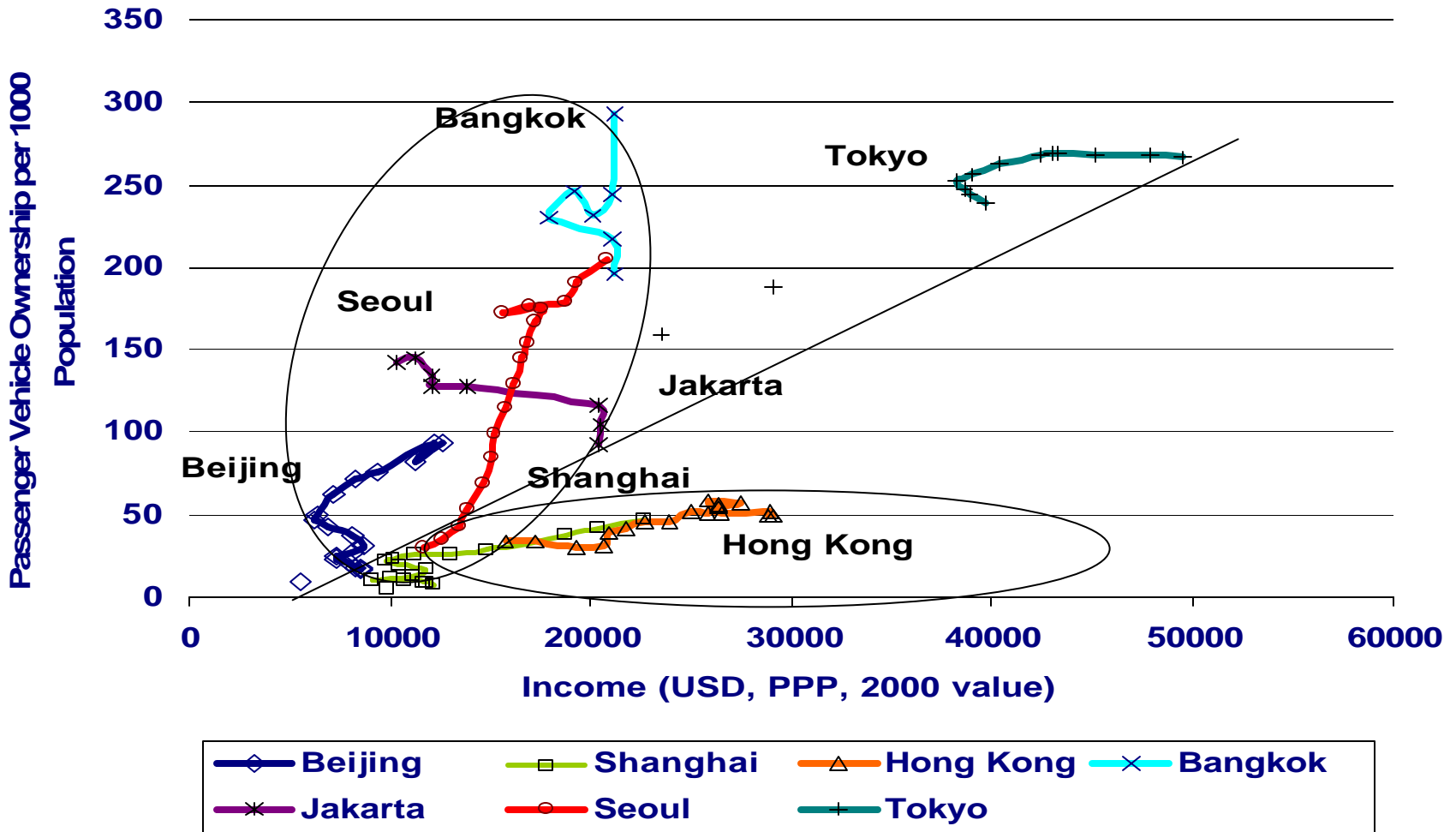


(Source) APERC Database (2005)



Factors affecting Vehicle Ownership

Income and the Number of Passenger Vehicle Ownership (1980-2002)



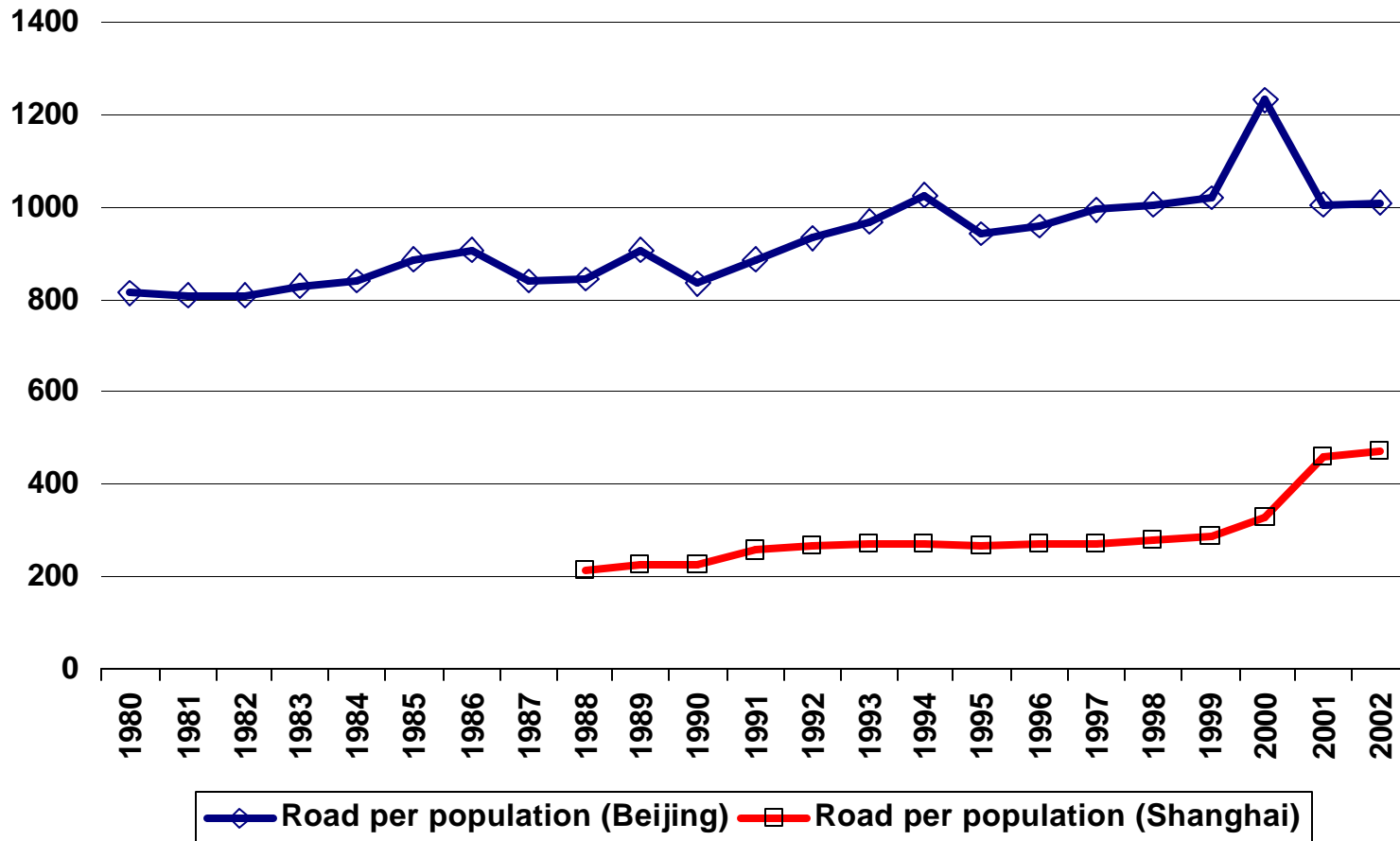
(Source) APERC Database (2005)

Drivers for Passenger Vehicle Ownership

- **Factors affecting the level of passenger vehicle ownership.**
 - **Income growth**
 - **Length of road**
 - **Availability of public transport**
 - **Availability of parking**
 - **Oil products prices**
 - **Cost of vehicle ownership**

Length of Road per Population:

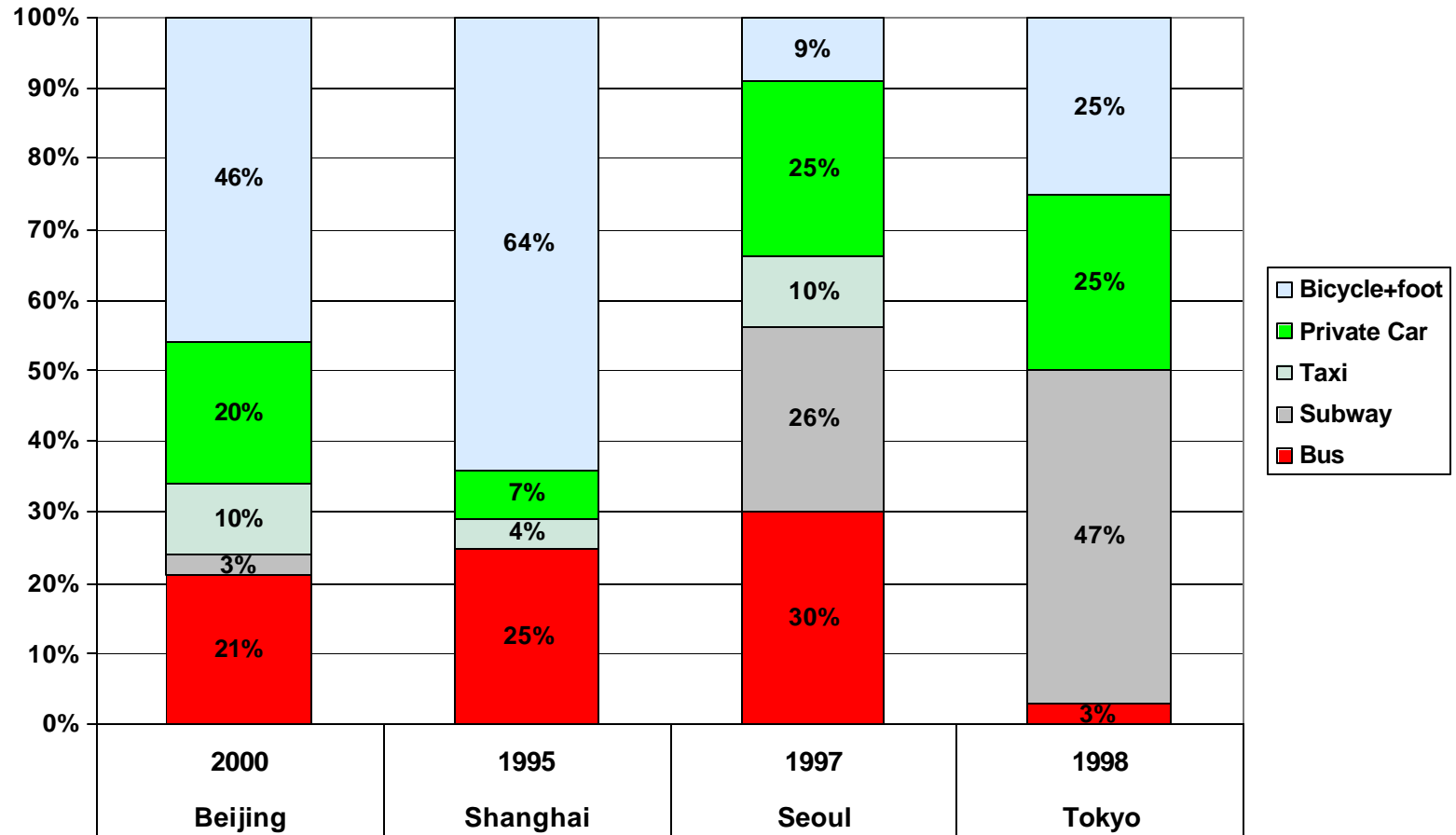
Factors affecting different trend in vehicle ownership between Beijing and Shanghai



(Source) Yearbook House of China Transportation and Communication (Various Years), "Yearbook of China Transportation and Communication"



Modal Split in Asian Cities

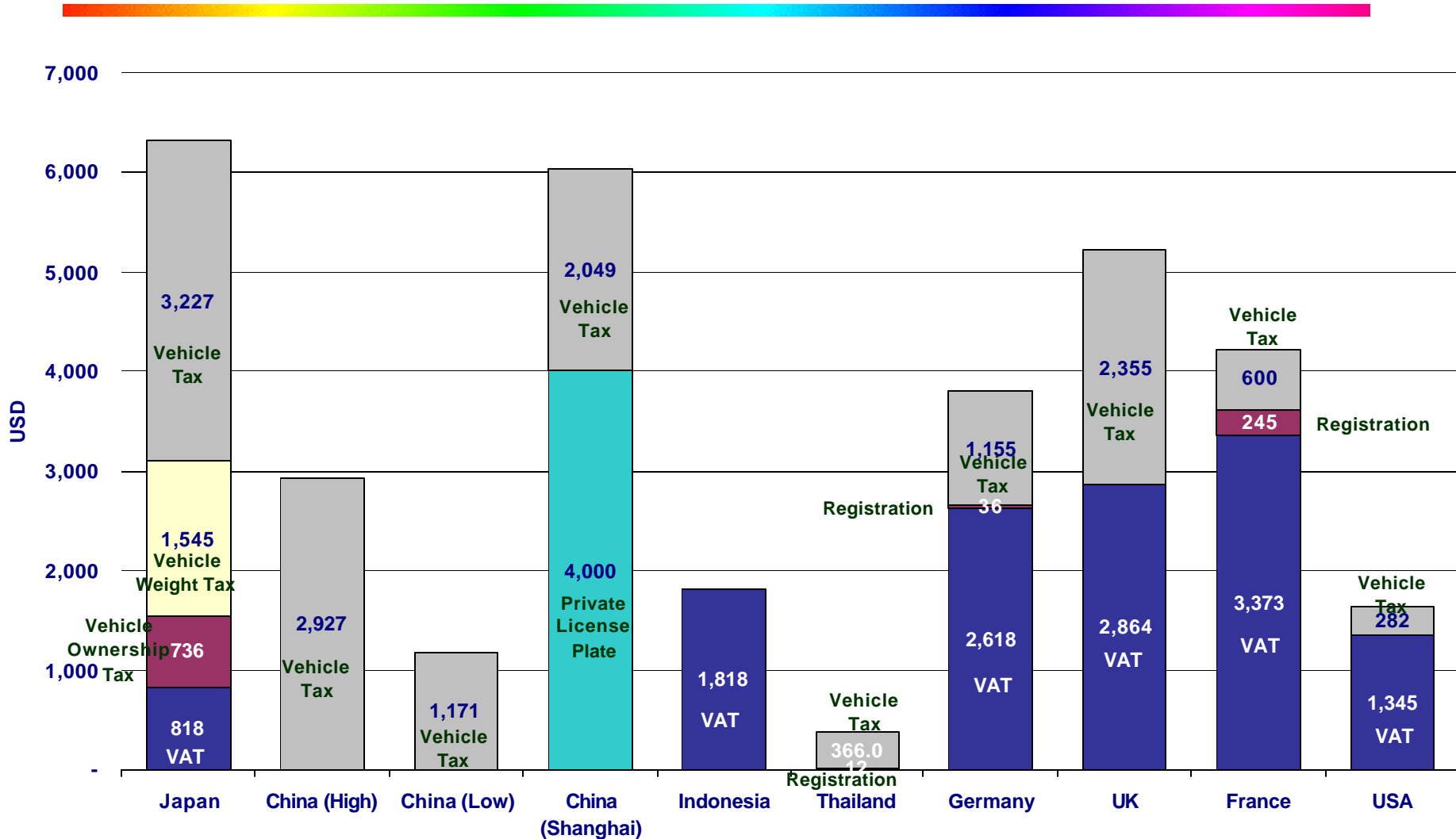


(Source) Dahkal (2004)



Cost of Vehicle Ownership

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



(Source) APERC Database (2005)

Liberalization of Automobile Industry

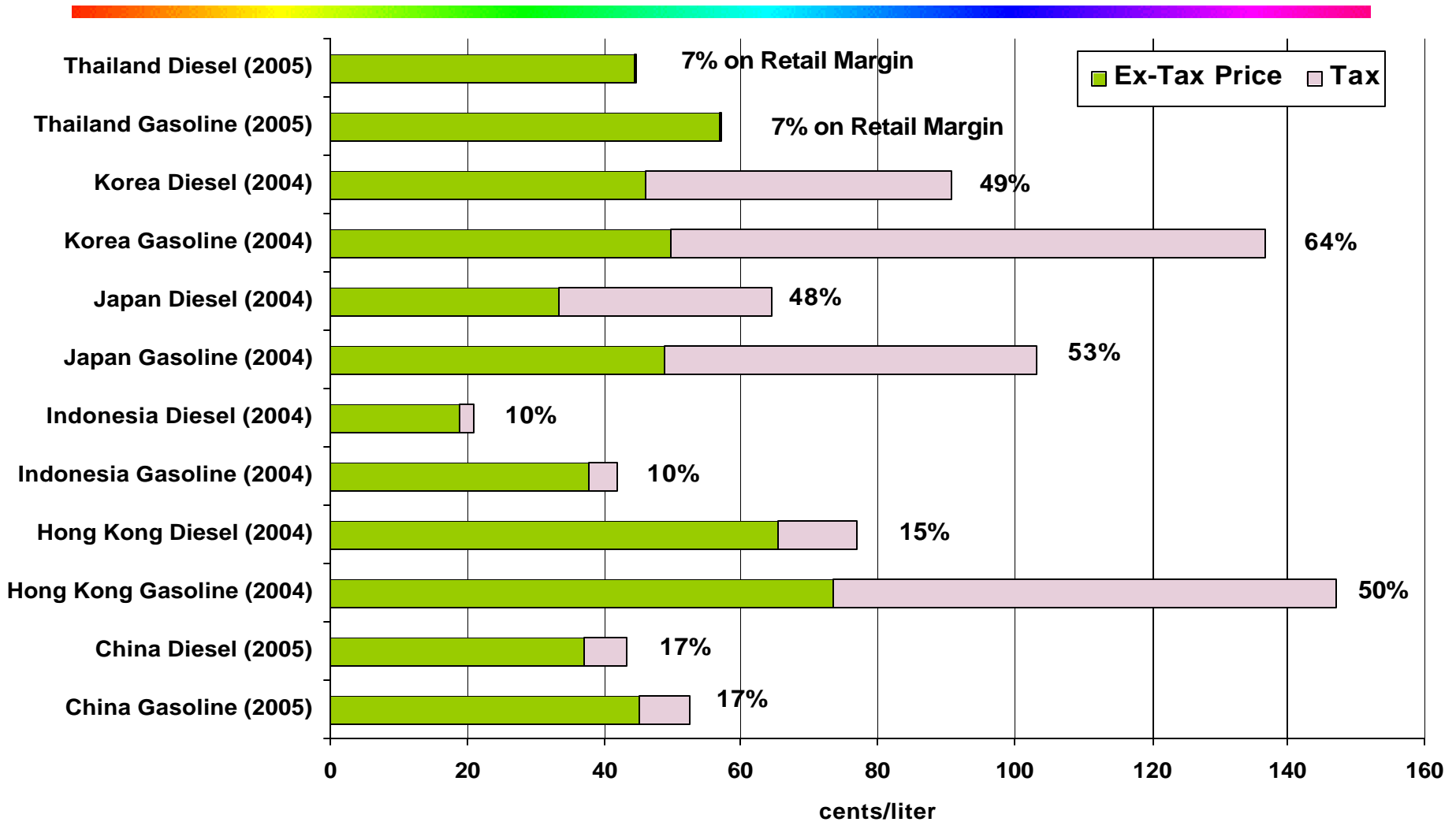
China	Korea	Indonesia	Thailand
<p>Tariffs on imported automobiles to be lowered from 70% in 2001 to 43.8% in 2002 and further down to 25% in 2006</p>	<p>Removal of registration tax and vehicle tax for those less than 800 cc.</p>	<p>Tariffs on imported automobiles are maintained at 45-80%, while that of ASEAN made automobiles (including CKD), has been lowered to less than 5% since 2002.</p>	<p>Tariffs on imported automobiles are maintained at 80%, while that of ASEAN made automobiles, (including CKD) has been lowered to less than 5%.</p>
<p>Share of foreign ownership for the JV to produce automobile would have to be less than 50%.</p>			<p>FTA has been signed with India. By 2010, tariffs would be gradually removed.</p>
<p>Removal of automobile import quota by 2005.</p>			<p>FTA has been signed with Australia. Tariffs would be gradually removed by 2010.</p>
<p>Lifting a ban on establishing a company for automobile loan.</p>			
<p>Removal of the 50% limit on the foreign ownership for automobile retail stores.</p>			

(Source) APERC Analysis (2005) from various sources.



Prices and Taxes of Oil Products in Asia

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



(Source) APERC Analysis (2005) from various sources.

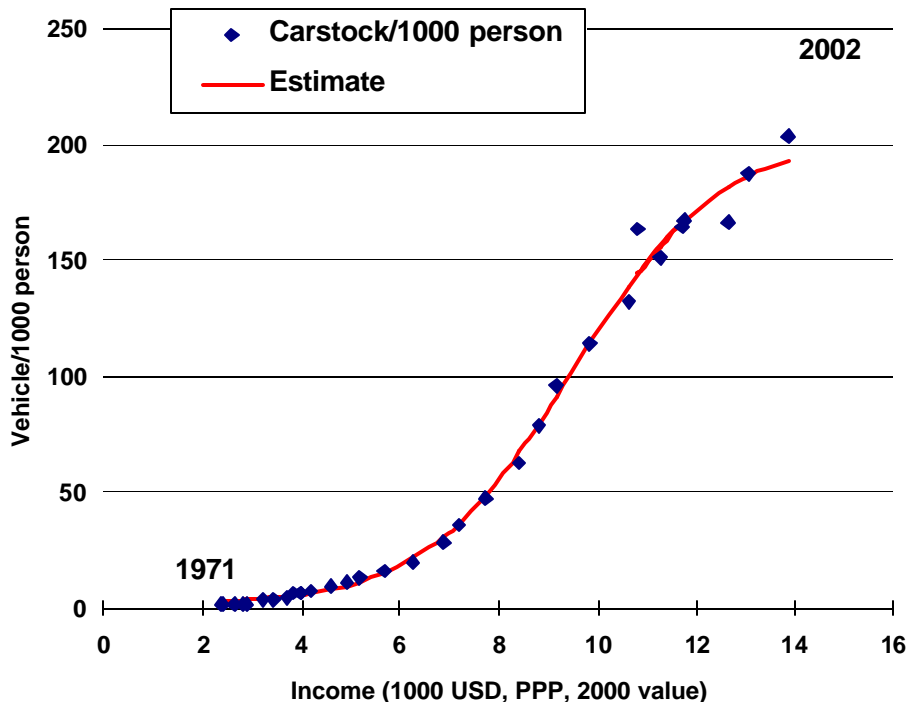
Projection of Passenger Vehicle Ownership in Asia

Model Framework for Projecting Vehicle Ownership

- **National Level**

- Vehicle ownership per 1000 population was projected using logistic function.

Korea: Vehicle Ownership/1000

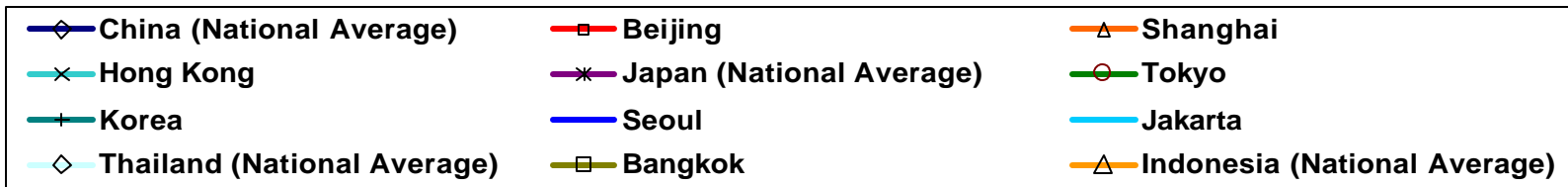
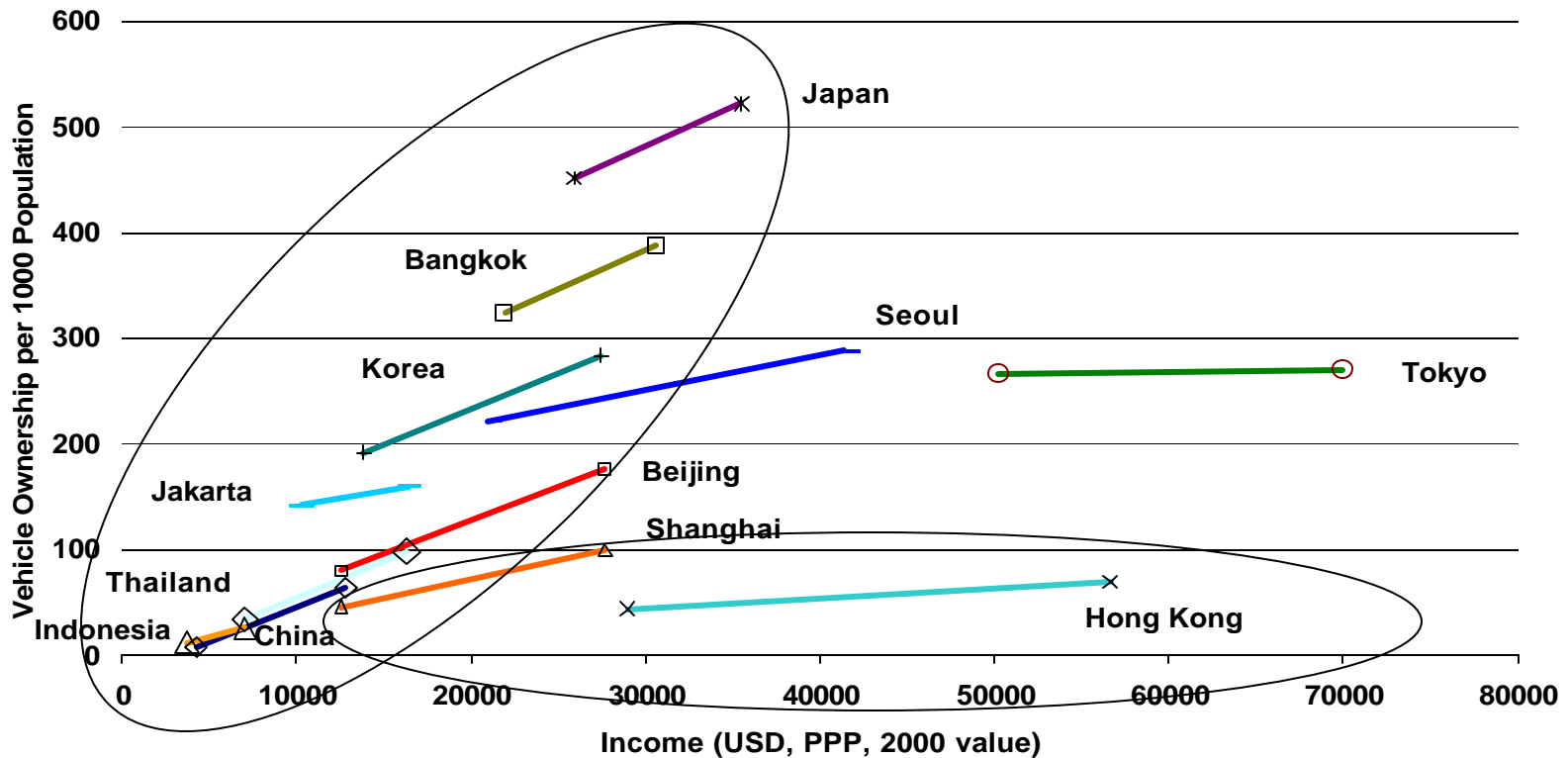


- **City Level**

- Vehicle ownership per 1000 population was projected using various variables.

- Income
- Length of road
- Population density
- Fuel price
- Cost of vehicle ownership

Projection of Passenger Vehicle Ownership per 1,000 Population: 2002-2020



(Source) APERC Analysis (2005)

Projection of Energy Demand from Passenger Vehicle (ktoe)



	2002	2020	Growth Rate (2002-2020)
Beijing	2,800	6,859	5.1%
Shanghai	1,661	3,872	4.8%
Hong Kong	1,438	2,435	3.0%
Tokyo	3,185	3,489	0.5%
Seoul	4,017	5,170	1.4%
Jakarta	4,192	5,741	1.8%
Bangkok	4,314	5,425	1.3%

(Source) APERC Analysis (2005)



Implications

- The pace of urbanisation in Asia is expected to be faster than the world average.
- Greater share of urban energy demand would come from transportation sector.
 - Relocation of industrial plant would advance along with urbanisation.
- Asian urban dwellers would seek for greater use of vehicle for their mobility.
 - Pace of passenger vehicle ownership would be faster in urban than in rural.
 - Excessive use of vehicle would deteriorate air quality in urban area.
- How to manage passenger vehicle energy demand would become a critical element for the energy security and sustainable development.
 - Coordination among different policy areas would be enhanced.
 - Infrastructure development, oil products pricing, industrial promotion, and tax on vehicle ownership

