Public Symposium on
Environmentally Sustainable Transport (EST) in Asia
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Beyond Bangkok 2020 Declaration

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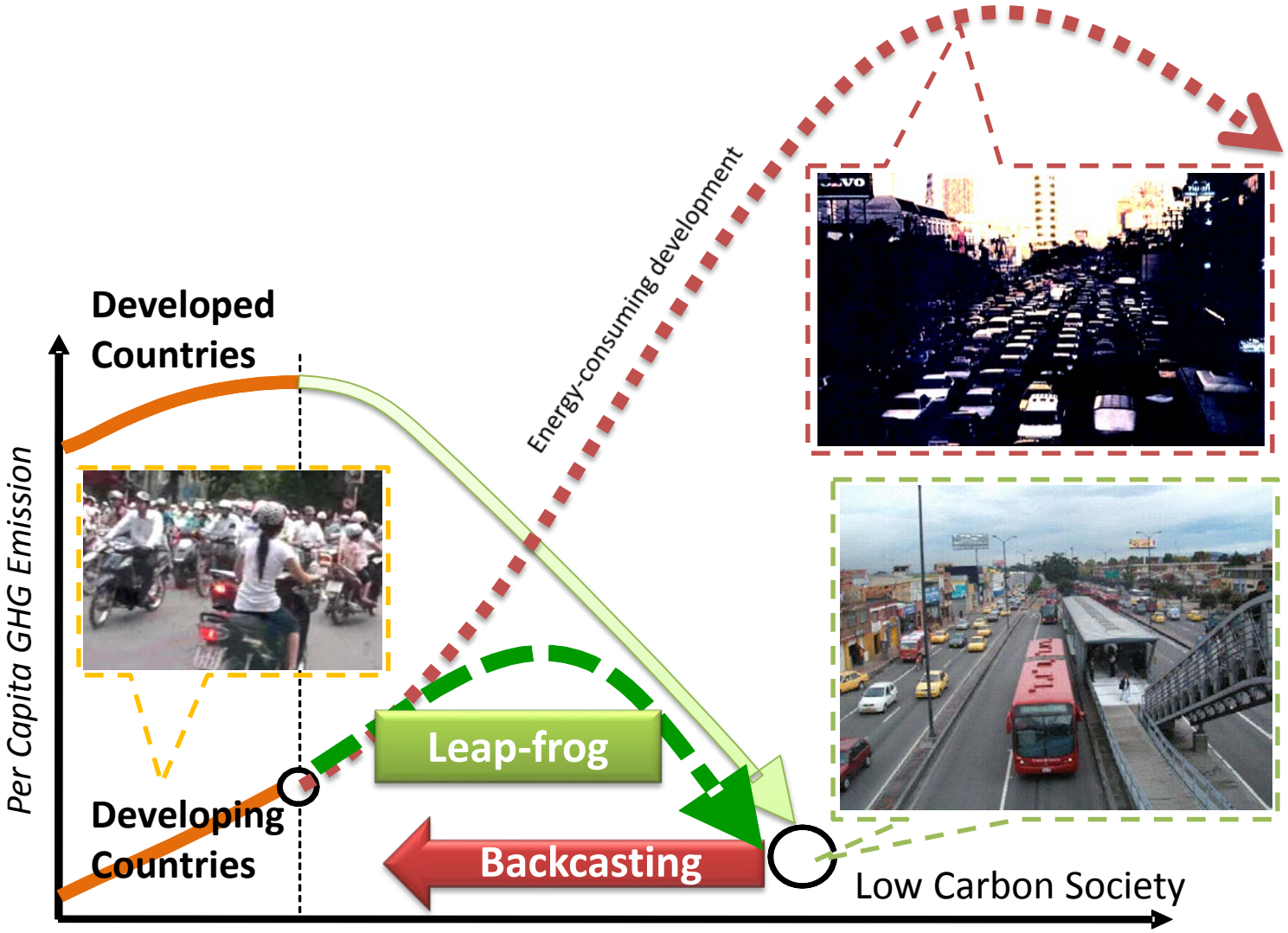
Critical Issues

1. Urban Transport
   1. Low Carbon → Avoid, Shift, Improve strategies + WCTRS-CUTE Matrix
   2. Motorisation – Suburbanisation Nexus
   3. Integrated Transport
   4. Compact city /Smart city /Smart transport ?
2. Sustainability Indicators and Standard Analysis Method
   1. CO_2
   2. Pollution (PM2.5,……..)
   3. Well-Being →QOL approach→CO2/Pollutants Performance for QOL
3. Spatial Scale
   1. Urban Transport → Mega Region Transport → Intercity Transport
   2. Industrial (Re)Location and Transport Provision in mega-regional/ international scale
   3. LCC rapid development vs High Speed Rail
4. Sustainability vs. Resilience?

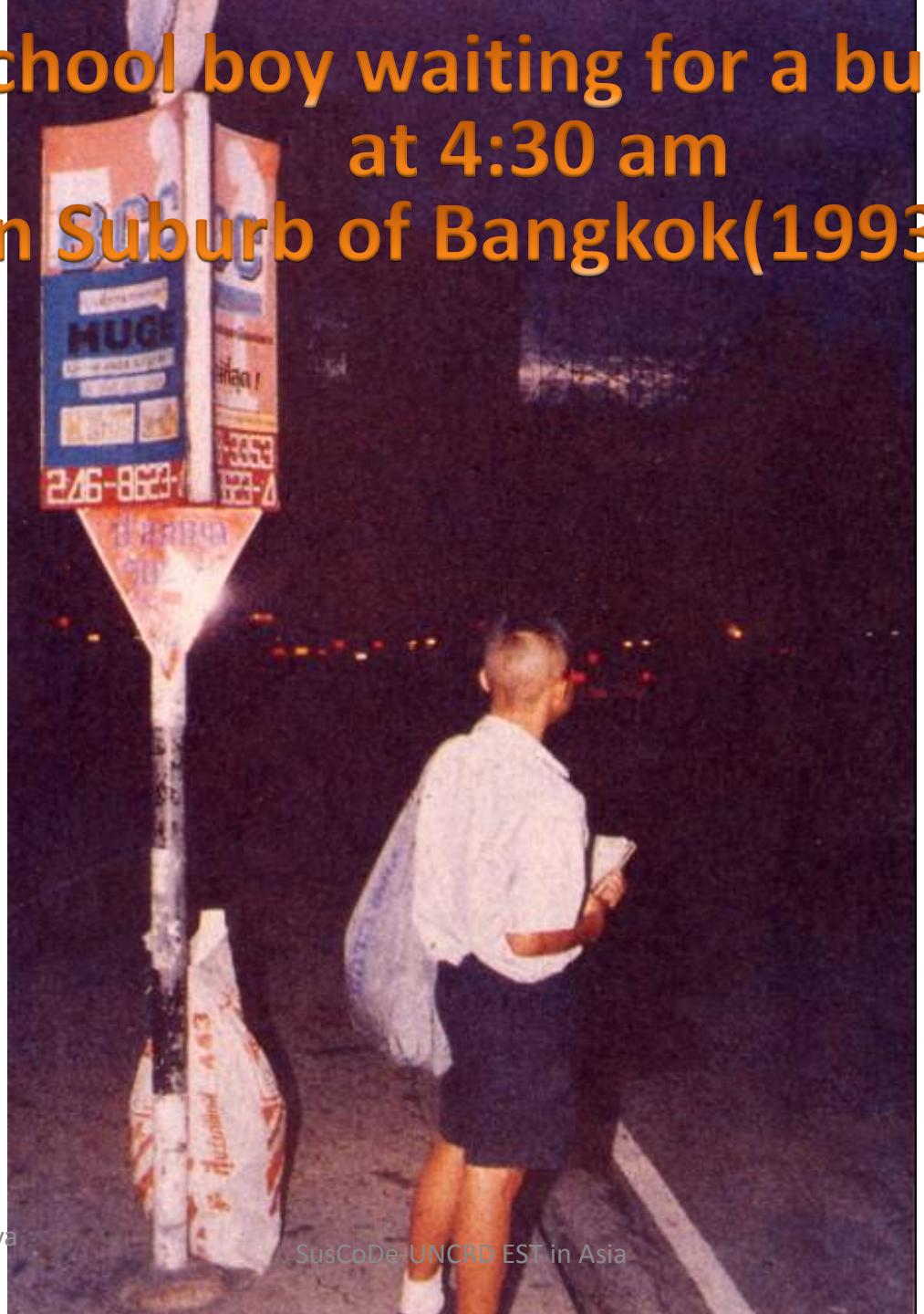
Urban Transport

1. Low Carbon → Avoid, Shift, Improve strategies + WCTRS-CUTE Matrix
2. Motorisation – Suburbanisation Nexus
3. Integrated Transport
4. Compact city /Smart city /Smart transport ?

Risk of rapid growth in CO_2 emission in developing countries in Asia



School boy waiting for a bus at 4:30 am in Suburb of Bangkok(1993)



Bangkok Post
4 Sept 1993

Slower than walkers in Sukunvit Rd., Bangkok 8hrs+ Commuters > 10% (1993)

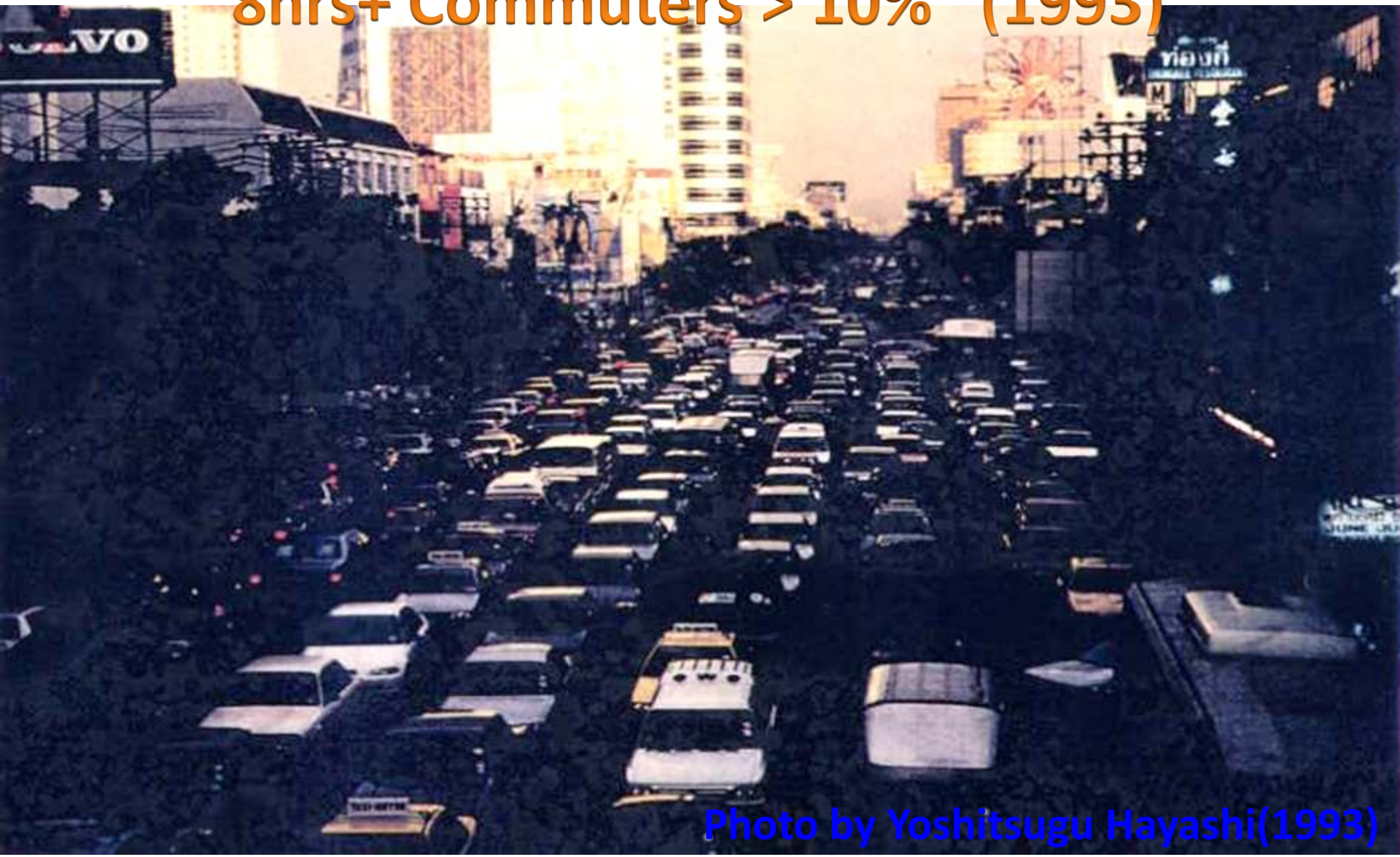


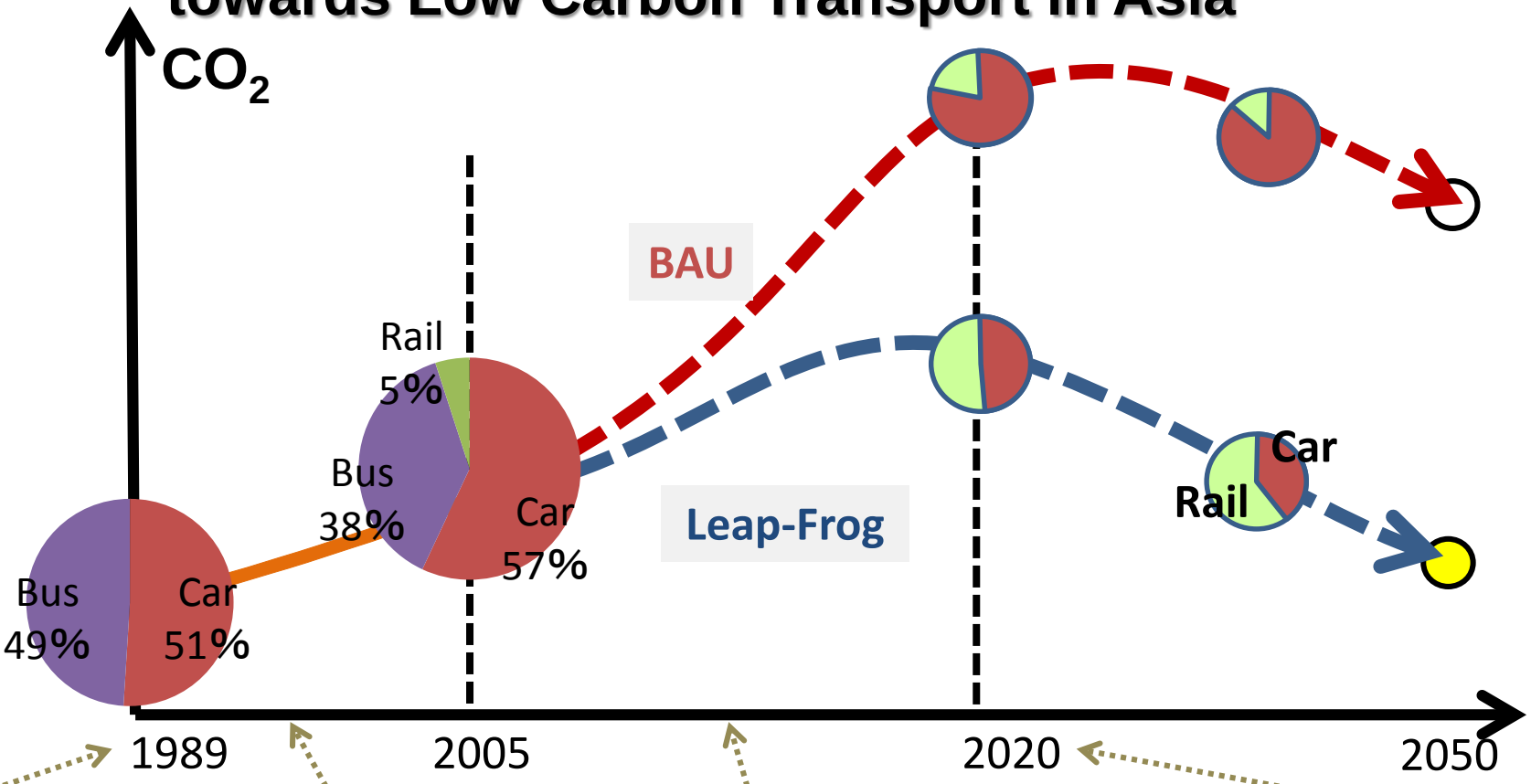
Photo by Yoshitsugu Hayashi(1993)

Neglecting Railways in Bangkok

Yoshitsugu Hayashi, Nagoya Uni

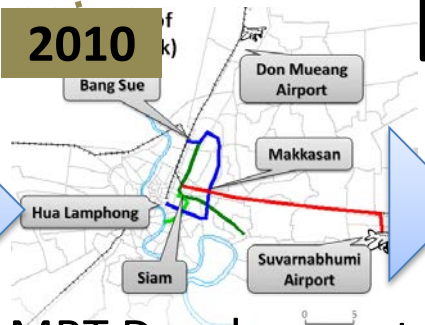
Photo by Hayashi (1994)

A Sign for Leapfrog turning to Railways towards Low Carbon Transport in Asia



Heavy Congestion

BTS Sky Train
20km

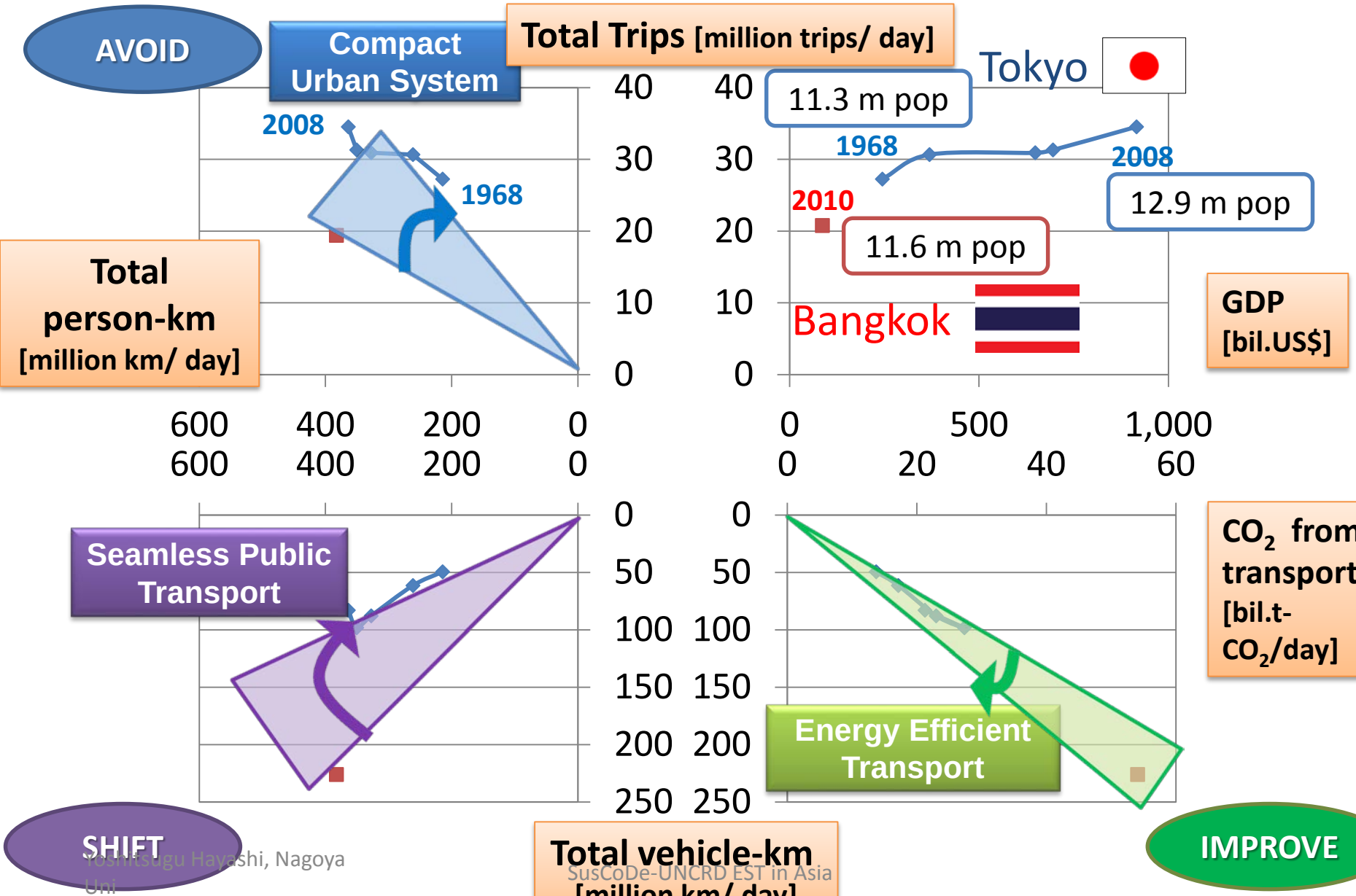


MRT Development
81km

10lines total **464**km

D1:診断

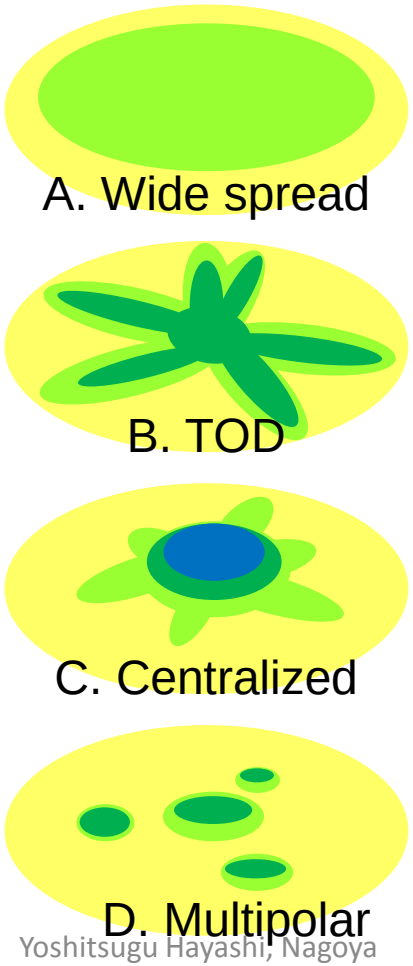
CO2 Emission Caused by Urban Transport (Emission Structure)



Visioning Sustainable Transport & City Systems

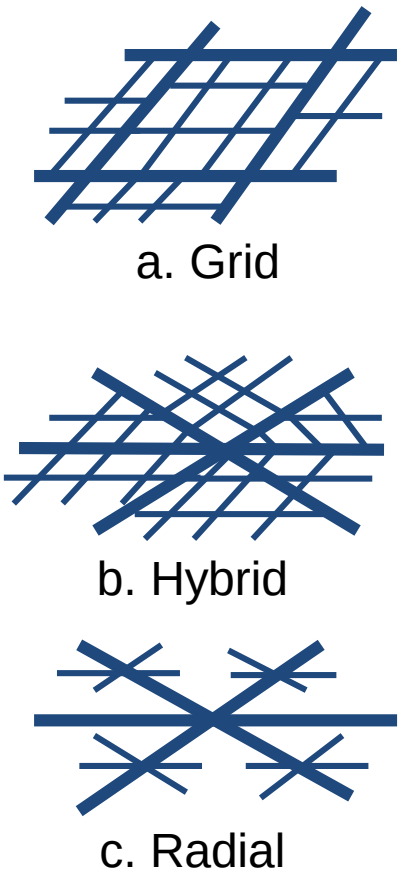
AVOID | SHIFT | IMPROVE

1.Urban Structure



2. Network

Shape



Mode

1) Urban Rail | Bus

2) Urban rail | Para-transit

3) BRT | Bus

4) BRT | Para-transit

3. Technology by mode

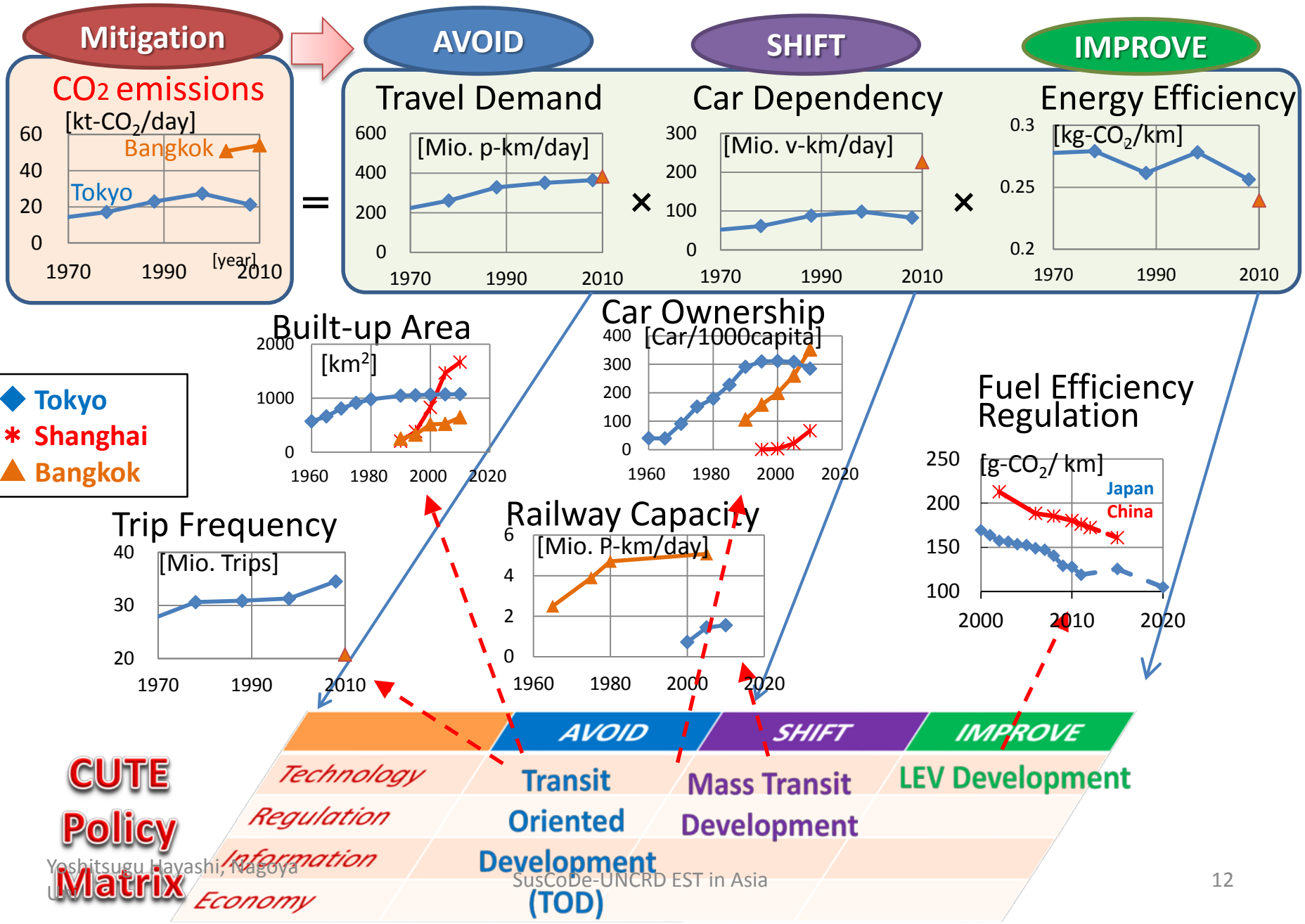
Technological Innovation

New system

Transport Strategy – Policy/Techno Instruments

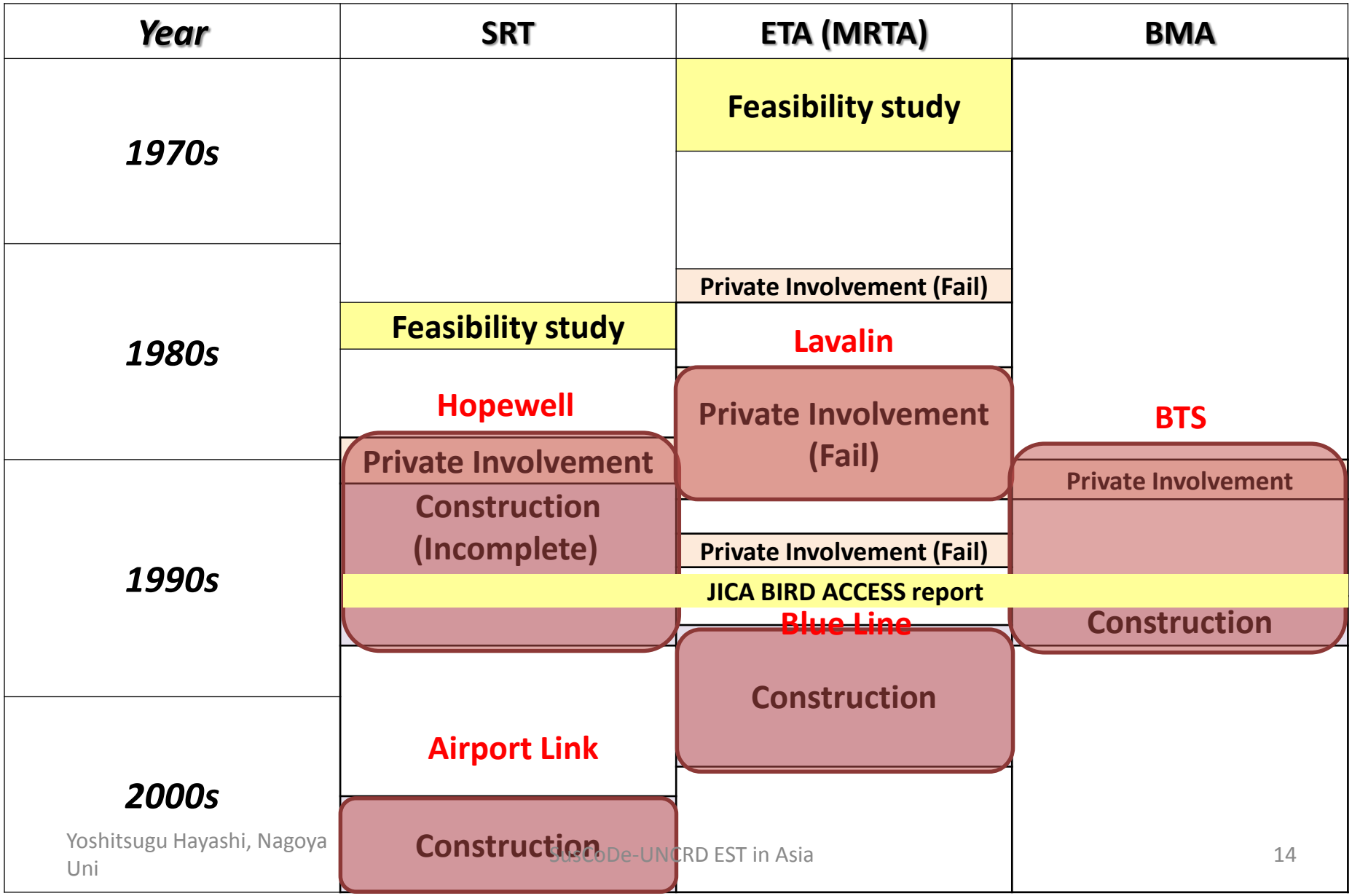
CUTE Matrix		Strategy		
		Avoid	**Shift**	**Improve**
		Reduce traffic demand	Reduce emissions per unit Transported	Reduce emissions per kilometer
Instruments	Technology	■ Pedestrian Ort Dev't ■ Bicycle Ort Dev't ■ Transit Ort Dev't	■ Integrated Public Transport System (BRT+ParaTransit) ■ Highly Competitive Railway	■ LEV, EV ■ Alternative Energy ■ Advanced Infra- Tech ■ Logistic Efficiency
	Regulation	■ TDM ■ Parking Regulation ■ Compact/Mix Land Use	■ Bus/Tram Priorities ■ Non-MT ■ Smarter Modal Evolution	■ Emission Standard ■ Top Runner Program ■ Eco-Drive
	Information	■ ICT ■ Telework ■ Smart Choices for Workplace and Schools	■ Awareness Campaign	■ Knowledgebase ■ ITS ■ Labeling of Vehicle Performance
	Economic	■ Fuel Tax ■ Road Pricing ■ Car Charge / Fee ■ Location Subsidy	■ Fuel Tax ■ Road Pricing ■ Car Charge / Fee	■ Fuel Tax ■ LEV Preferential Tax

CO2 Emission Caused by（林の排出構造動的追跡図）



Miracle Revolution of Bangkok

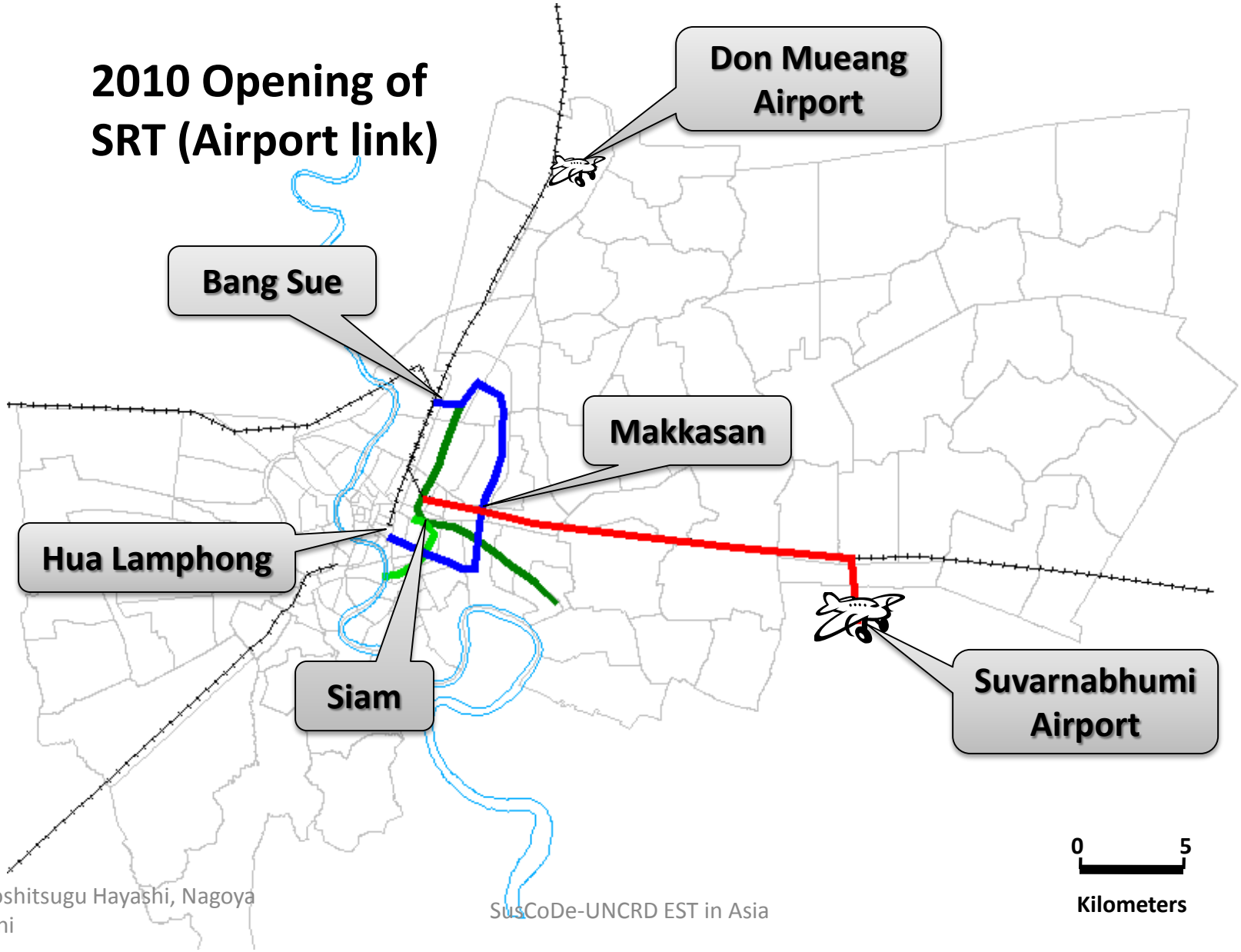
Chronological Summary of MRT Development in Bangkok



After SHIFT

Situation of Sukhumvit after the opening of Skytrain（2002）

Photo by Hayashi(2002)

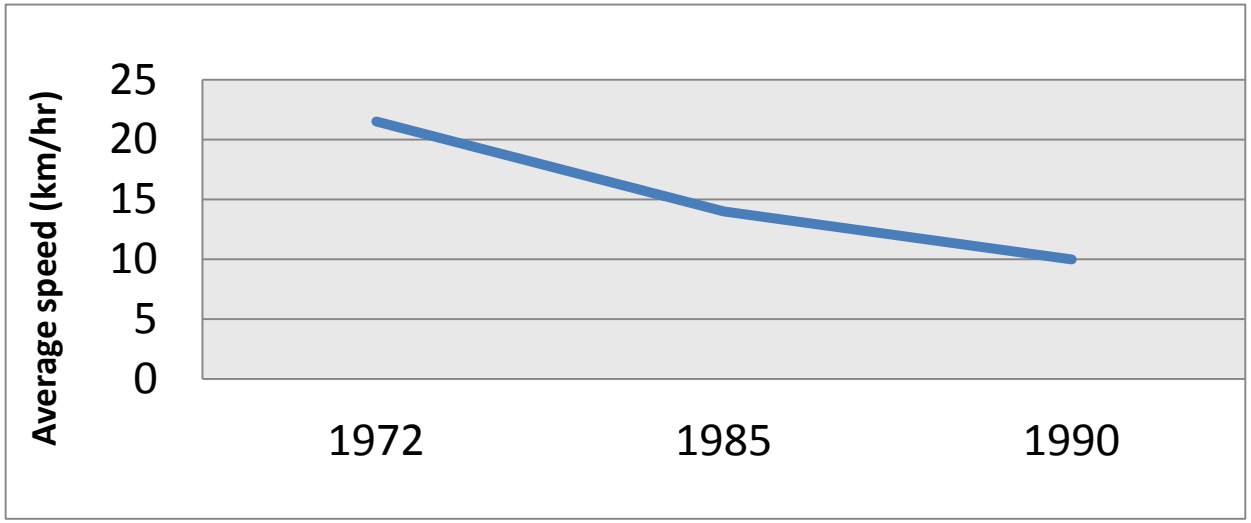

2010 Opening of SRT (Airport link)
Don Mueang Airport
Bang Sue
Makkasan
Hua Lamphong
Siam
Suvarnabhumi Airport
0
5
Kilometers

Bangkok

1990s
(before MRT Development)

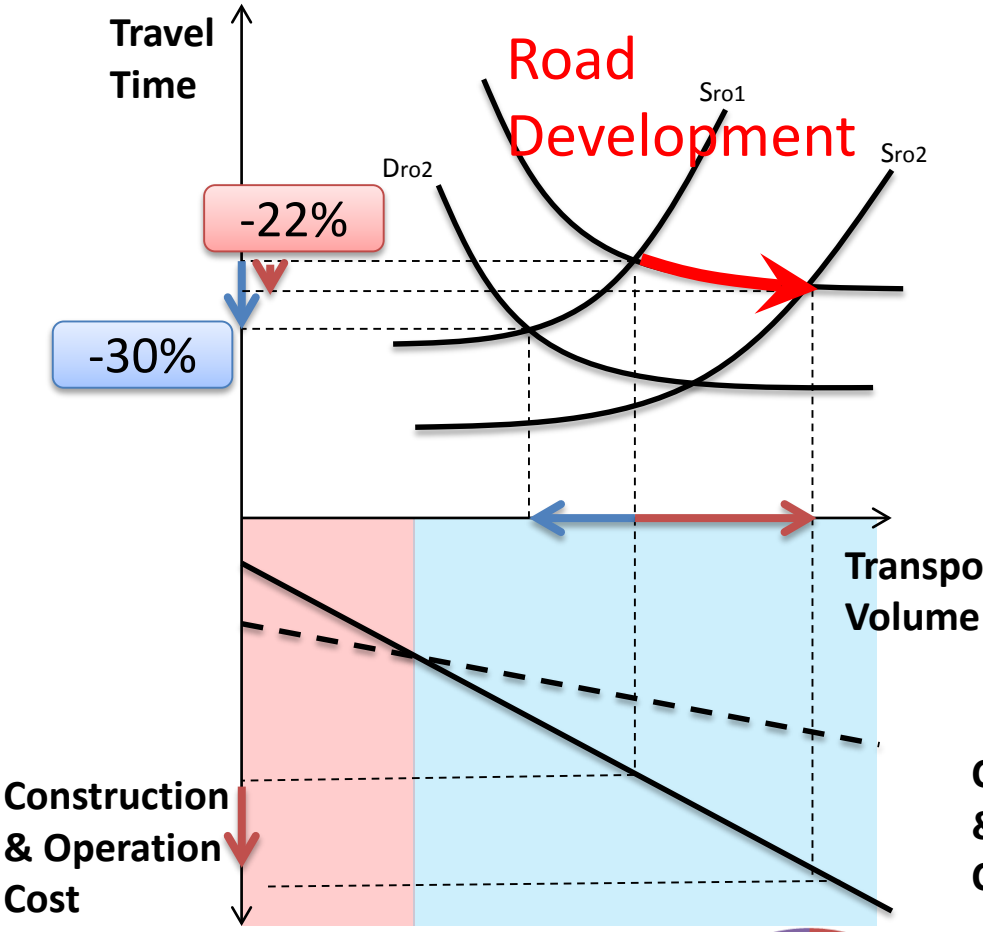
2000s
(After MRT Development)

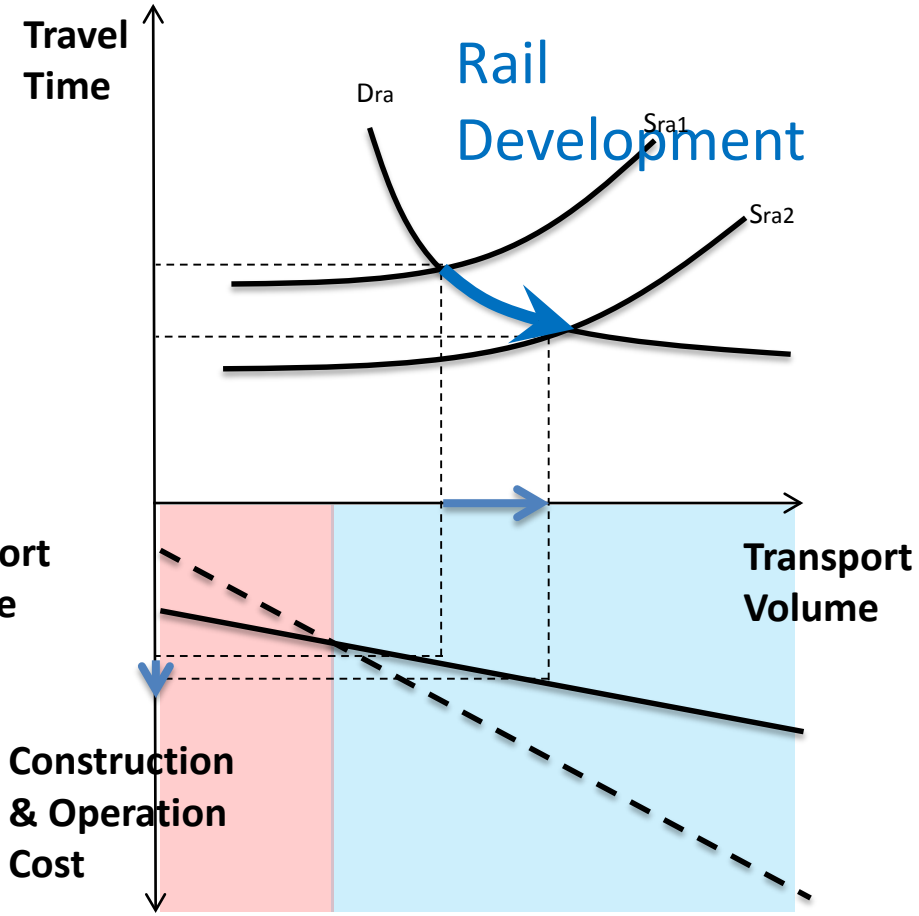
Trend of Traffic Congestion



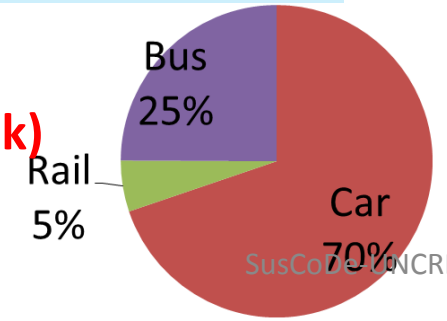
Road vs Rail

: which is more effective for calming traffic congestion



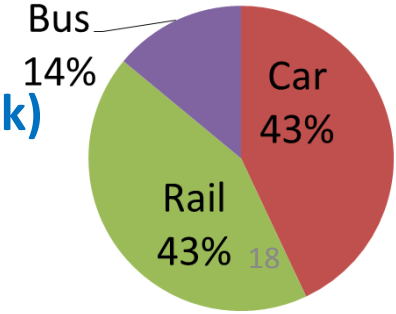


2050 Road-Oriented Development (Bangkok)



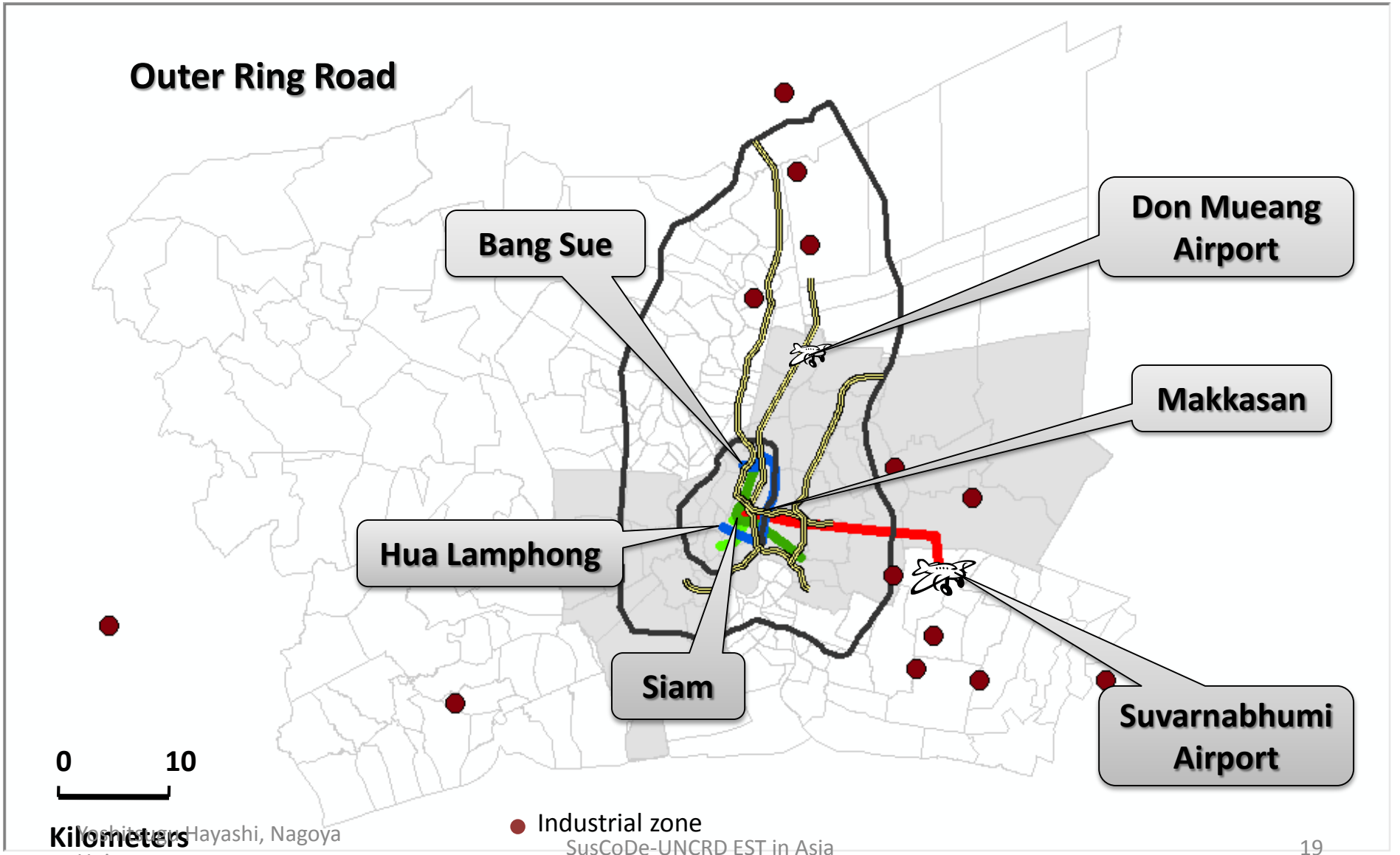
CO_2 Emissions: **-22%**

2050 Rail-Oriented Development (Bangkok)

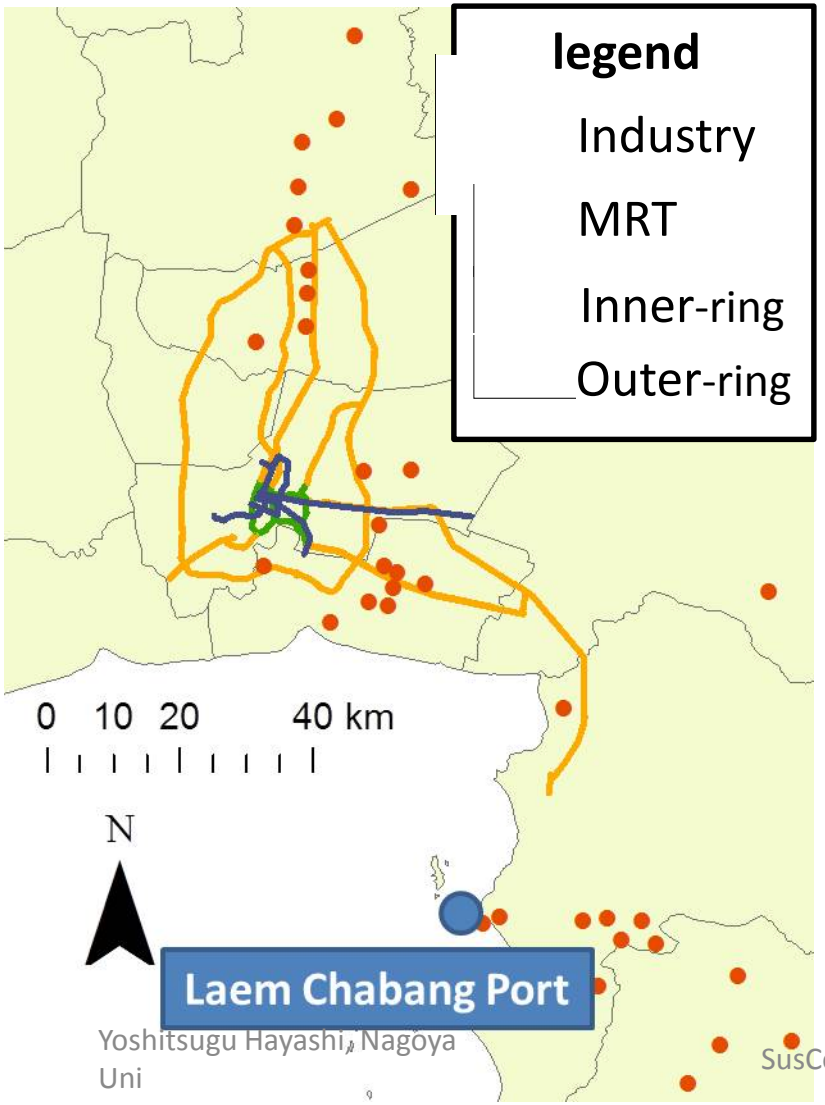


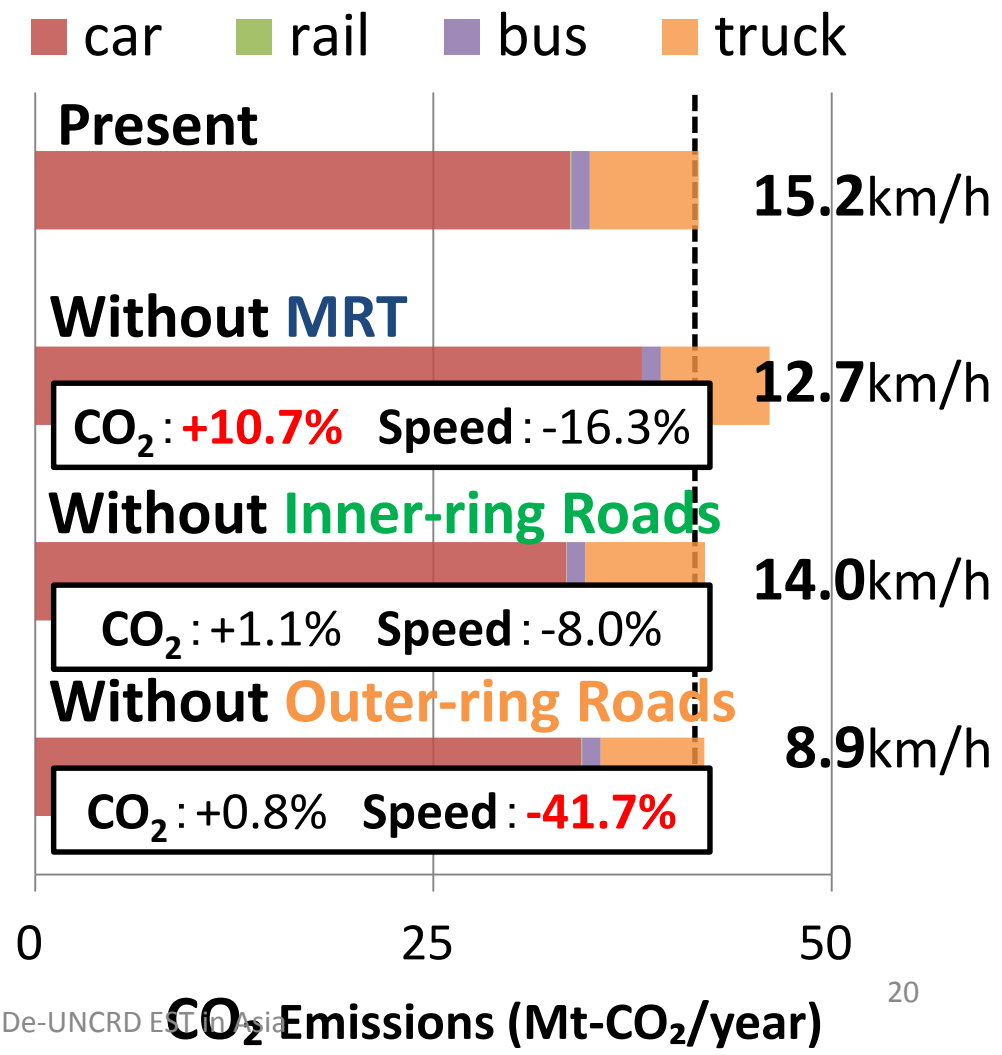
CO_2 Emissions: **-45%**

3 Factors for Drastic Improvement in Road Traffic Congestion



The Effects of Integrated Transport Systems on Traffic Congestion and CO_2 Mitigation





SHIFT

Mass-transit Network of Future Bangkok

Current:

2010yr 84.8km

Planning :

2016yr 236km
2019yr 391km
2029yr 509km
（12lines）

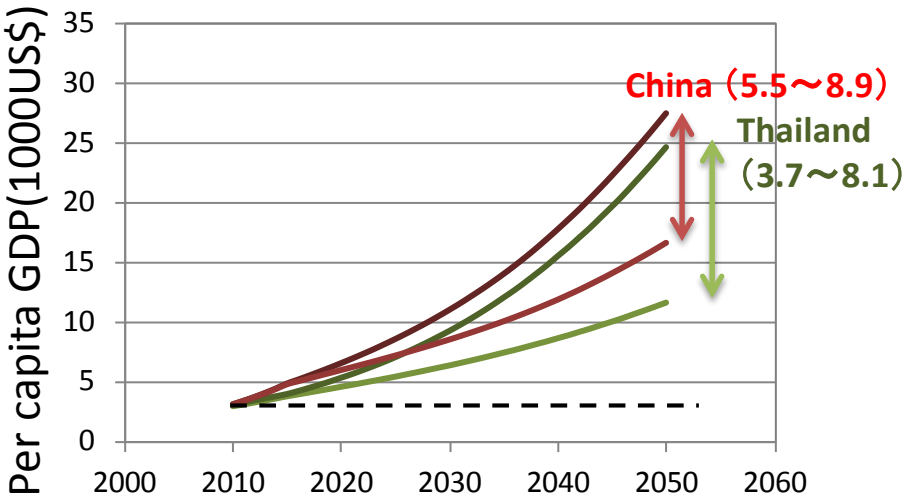
Source:
Master Plan Study to adjust rail mass transit system in Bangkok and its vicinity（2010）

Sustainability Indicators and Life Style

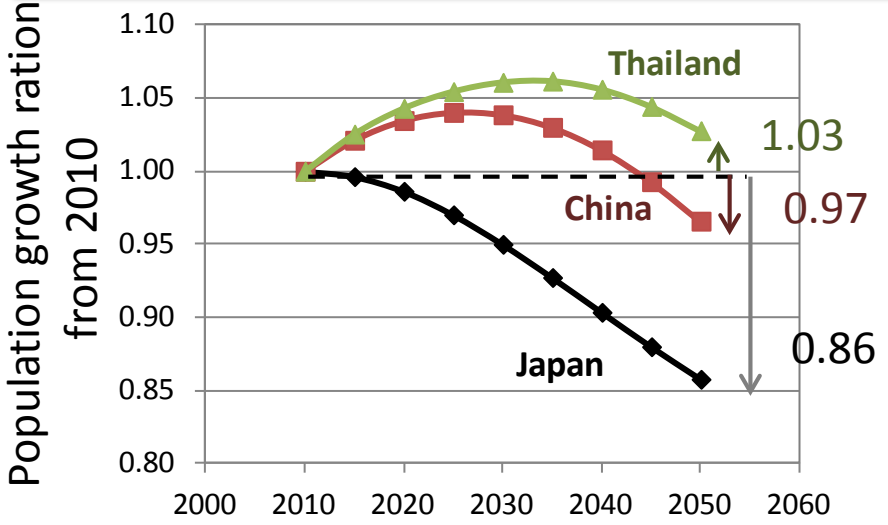
1. CO_2
2. Pollution (PM2.5,……..)
3. Well-Being →QOL approach→CO2/Pollutants Performance for QOL

Driving Forces of Society in Asia

①Economic growth (vs 2010)

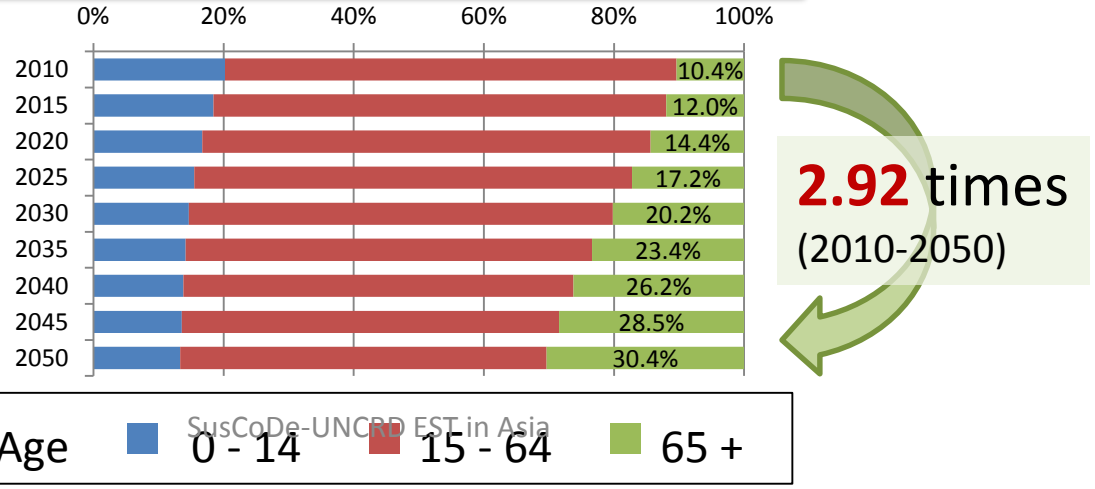


②Population change (vs 2010)



Source: UN World Population Prospects: The 2010 Revision

③Ageing in Thailand（2010-2050）

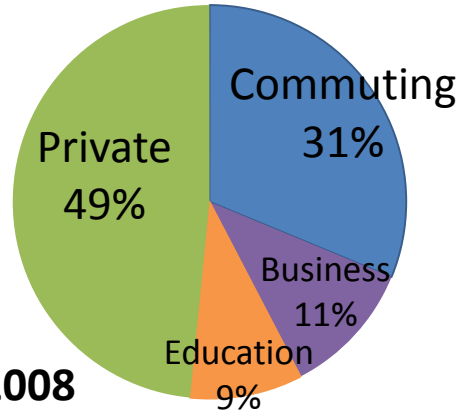


Targeting Low-Carbon Urban Transport Systems

Efficiency Demanding

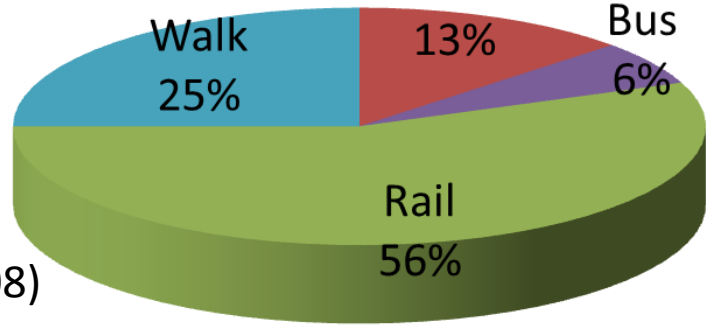
Tokyo 23 district

Trip Purpose



2008

Mode share



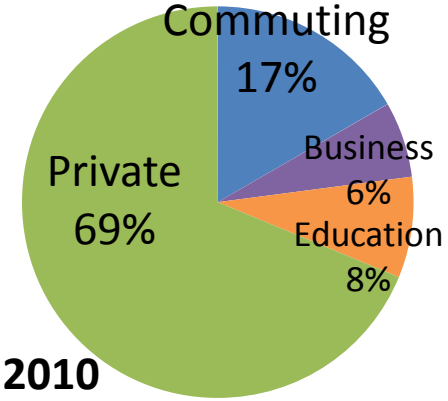
(2008)

CO_2 per Capita from Transport 1.6t (2004)

Sufficiency Seeking

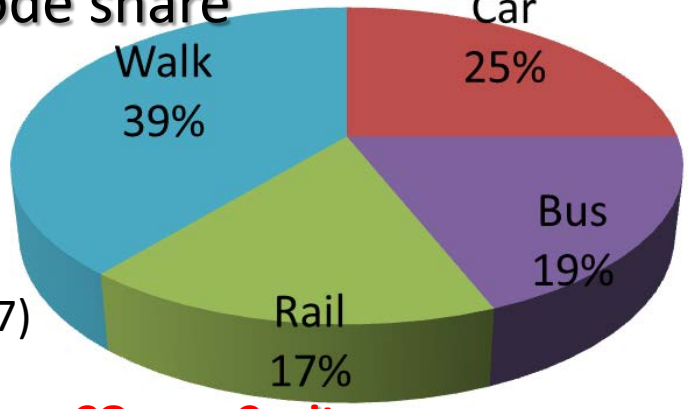
Inner London

Trip Purpose



2010

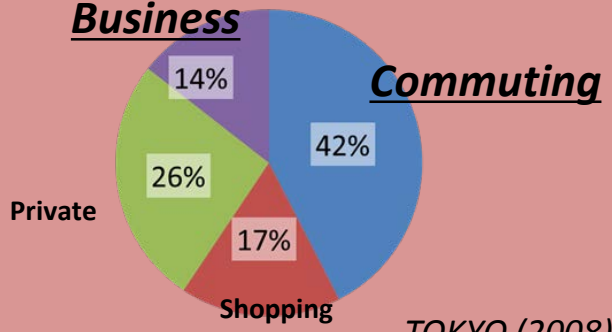
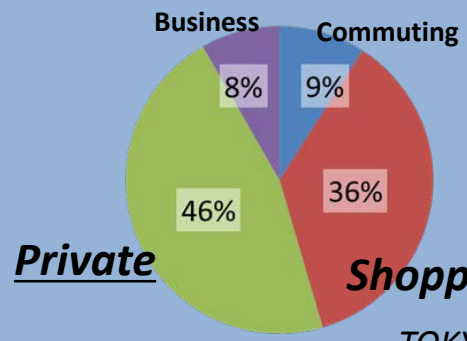
Mode share



(2007)

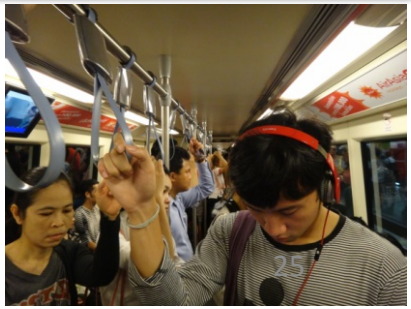
CO_2 per Capita from Transport 1.2t (2010)

Vision of Future Society needed for Low Carbon Transport in Asia

	Aggressive Growth (Efficiency Demanding)	Moderate Growth (Sufficiency Seeking)
Society	**Economically Developed**	**Socially Matured**
Production	**Mass** Production for Mass Consumption	More **Local** Production for Local Consumption
Lifestyle	**Work Oriented**	More **Social Activities**
Travel Purposes	*Working Age*  *TOKYO (2008)*	*Elderly*  *TOKYO (2008)*

Quantity-based Spatial Design

Quality Human-Oriented Spatial Design

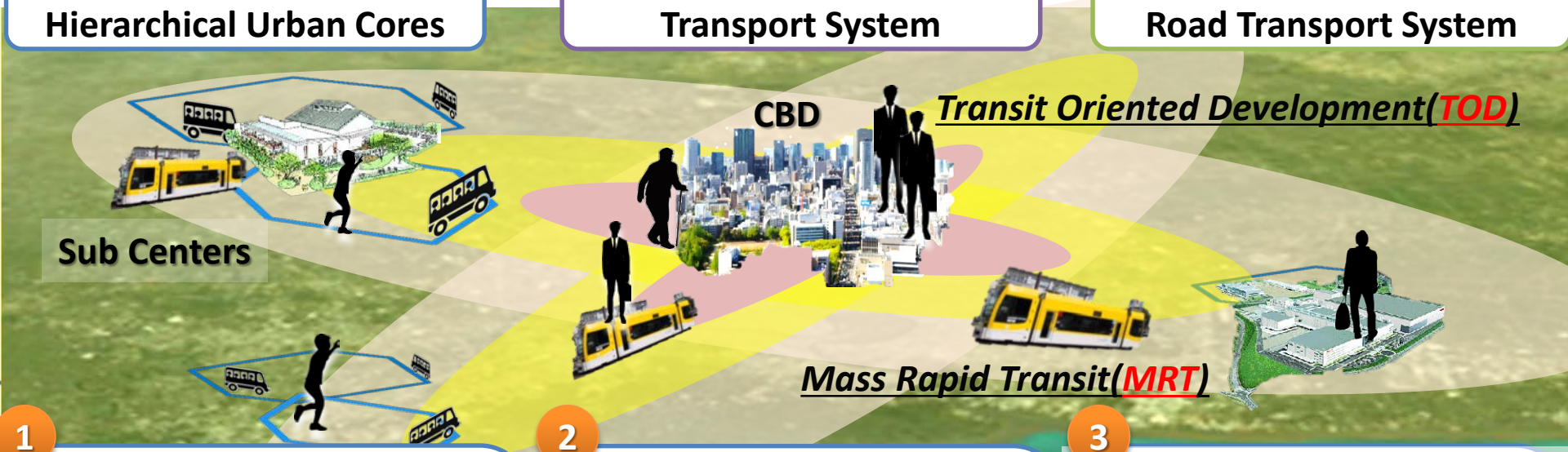


Vision of Urban Transport System: Hierarchically Connected Compact City

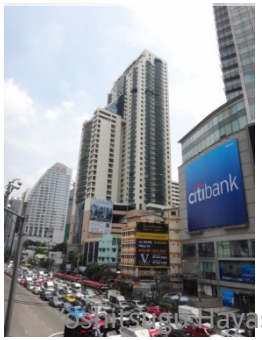
AVOID
Well-Connected Hierarchical Urban Cores

SHIFT
Hierarchical Public Transport System

IMPROVE
Low-Carbon & Efficient Road Transport System

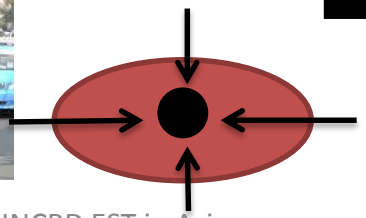


1 Car-Oriented Station Front



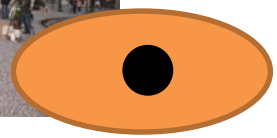
Attractive Urban Development

2 Feeder-Improved Station Hinterland



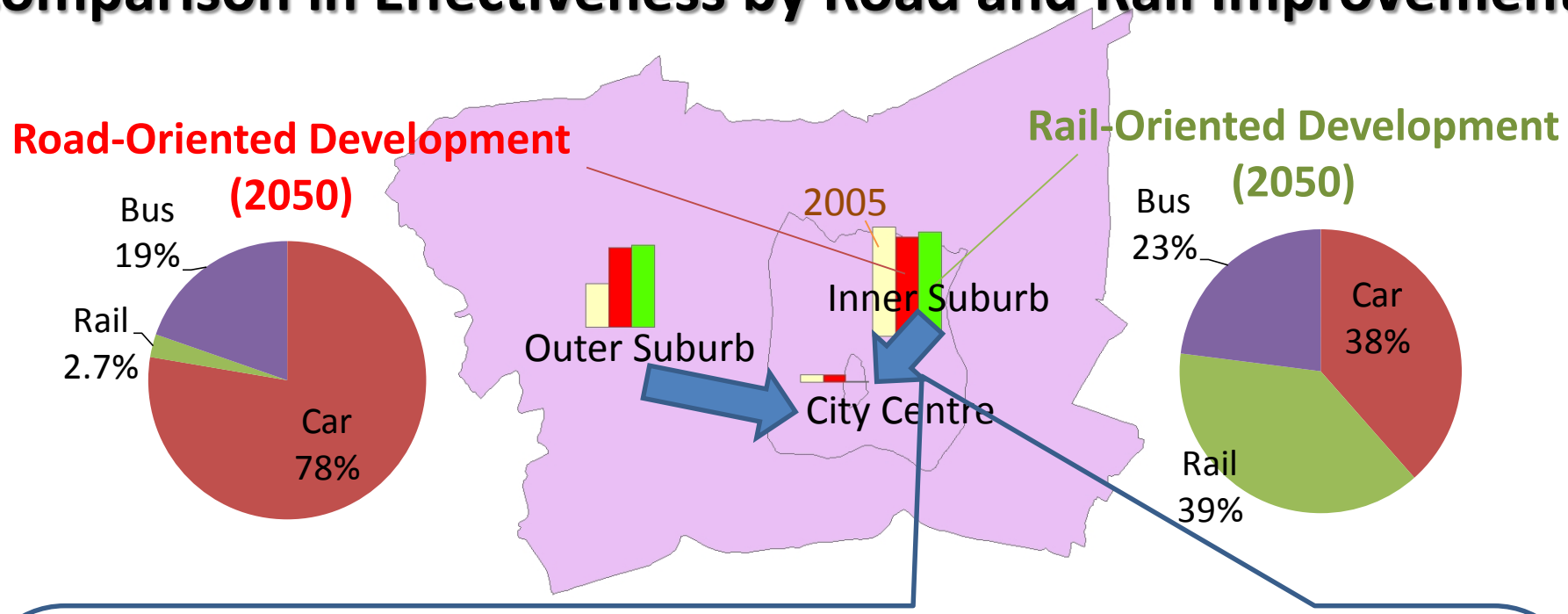
Frequent Feeder Services

3 Car-Free Station Front

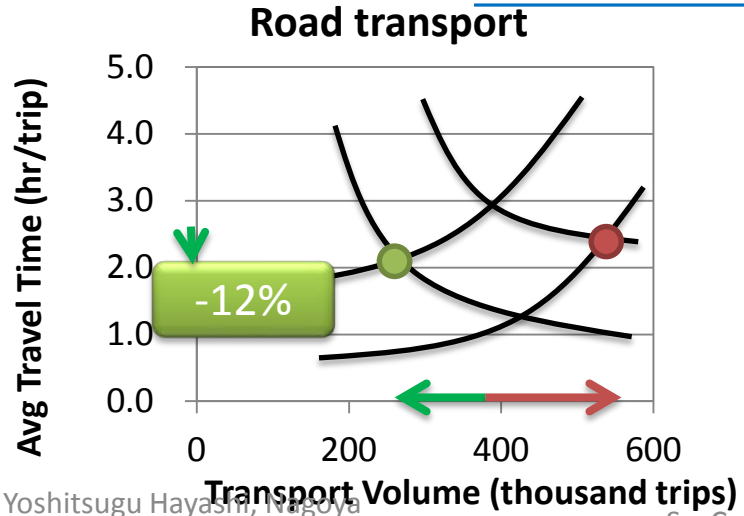


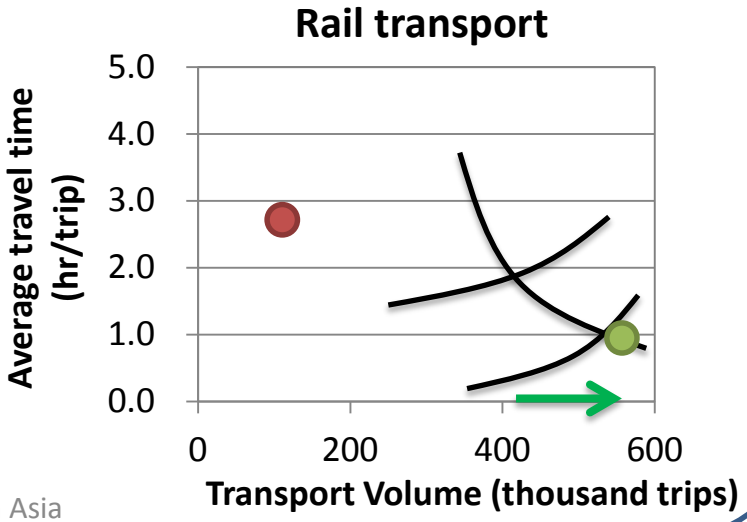
Quality Openspace

Comparison in Effectiveness by Road and Rail Improvements



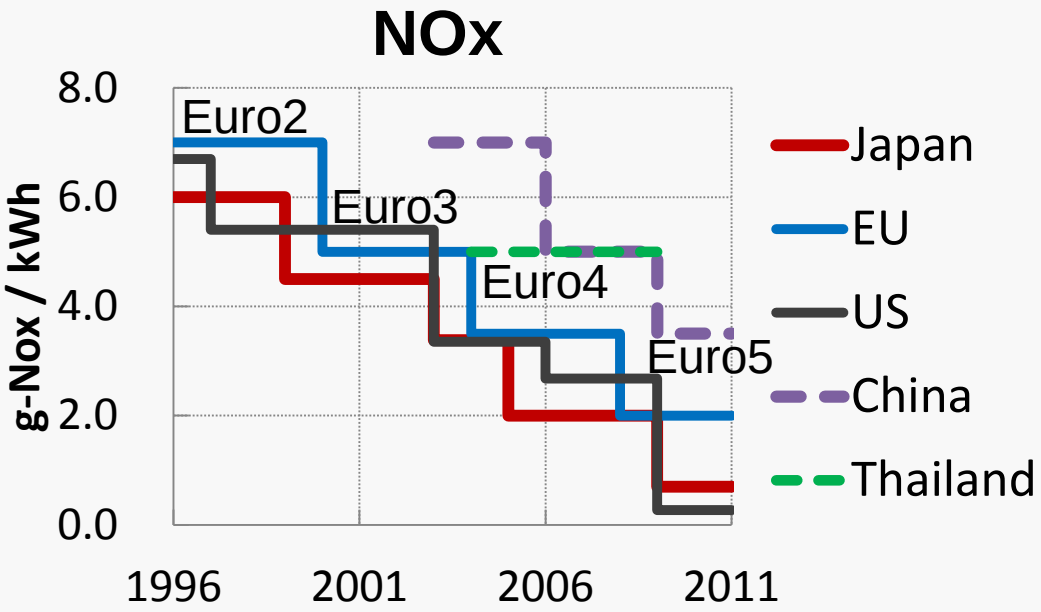
Travel from Inner Suburb to City Centre

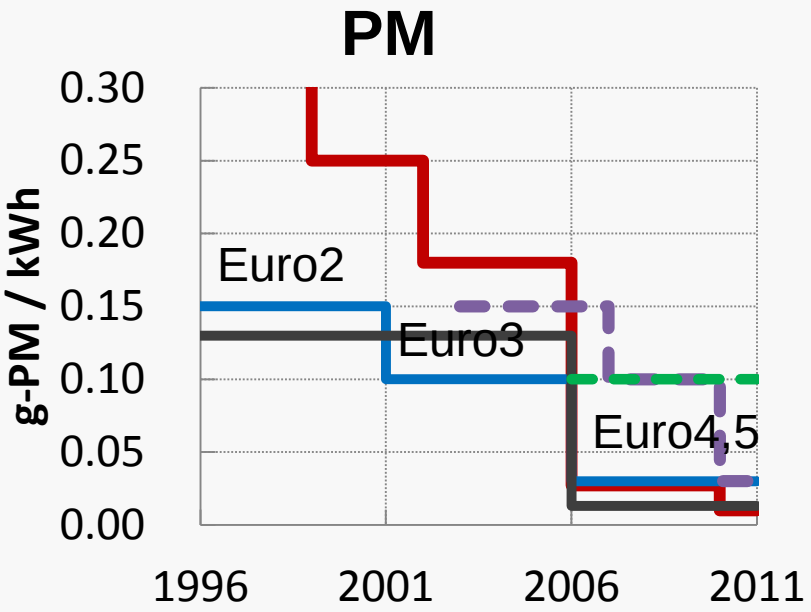




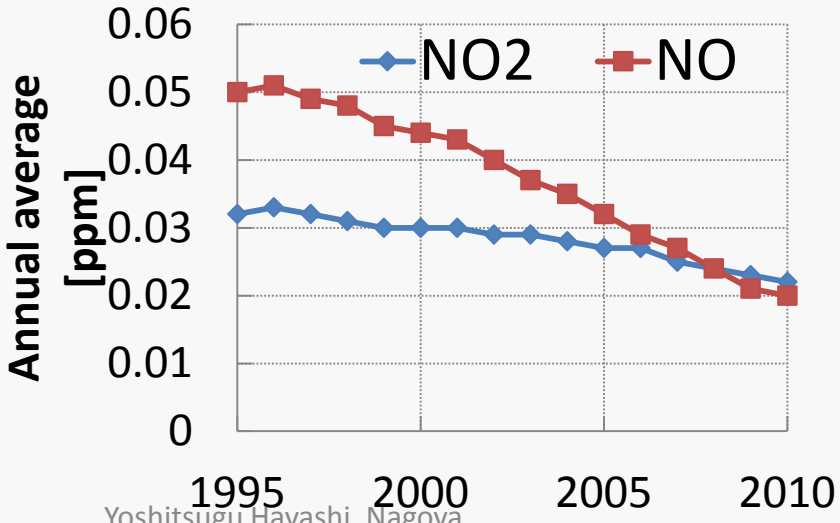
IMPROVE

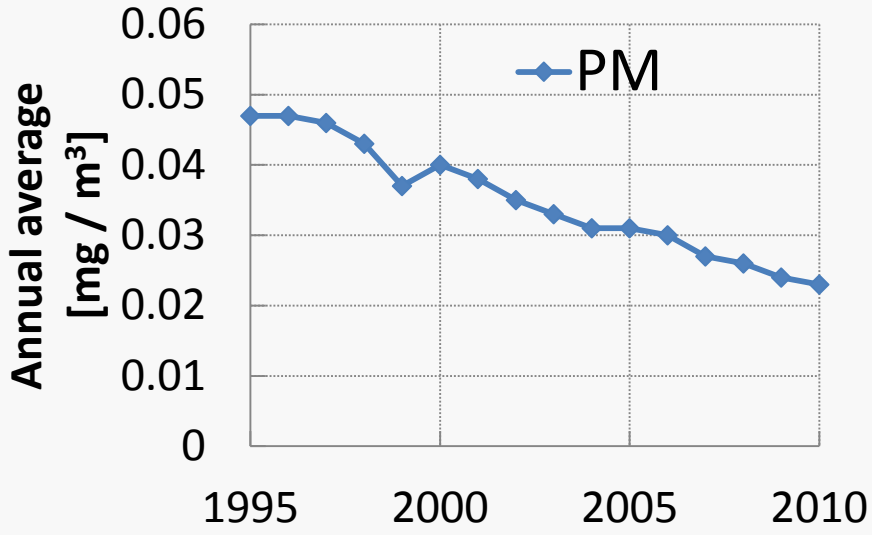
Emission Standards in the World





Atmospheric Concentrations of NOx and PM around roads in Japan

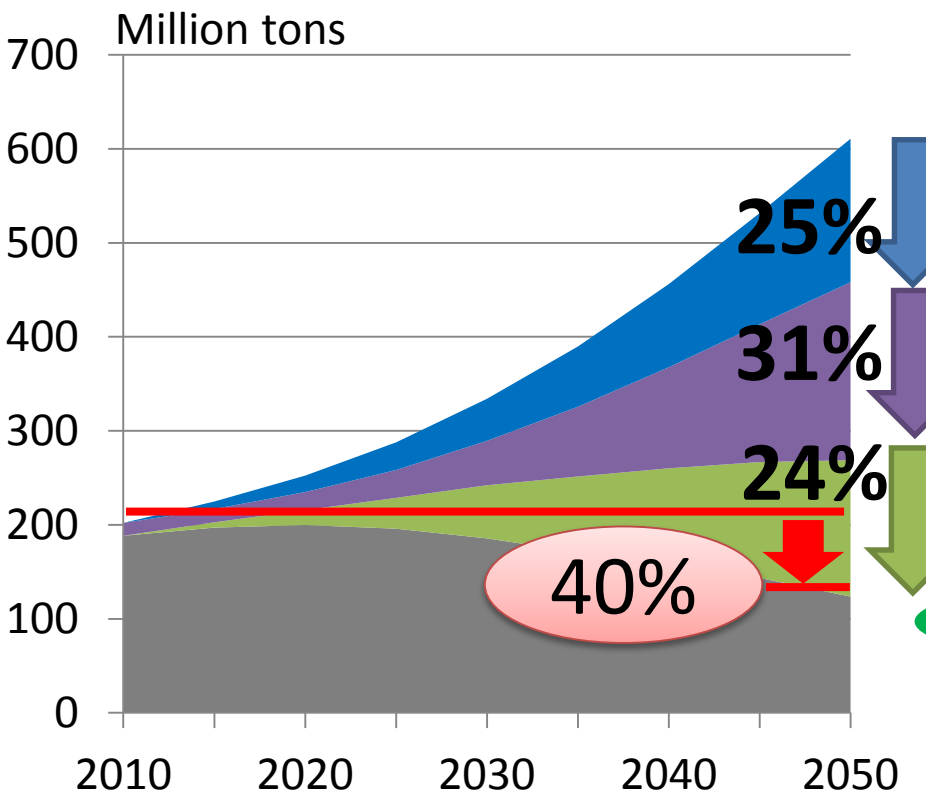




Source: Ministry of Environment ,Japan, www.env.go.jp/air/osen/index.html

The Roadmap for Low-Carbon Urban Transport Development in ASEAN Megacities

CO_2-emission reduction



AVOID

Land-use control (3% less annual expansion of built-up area)

SHIFT

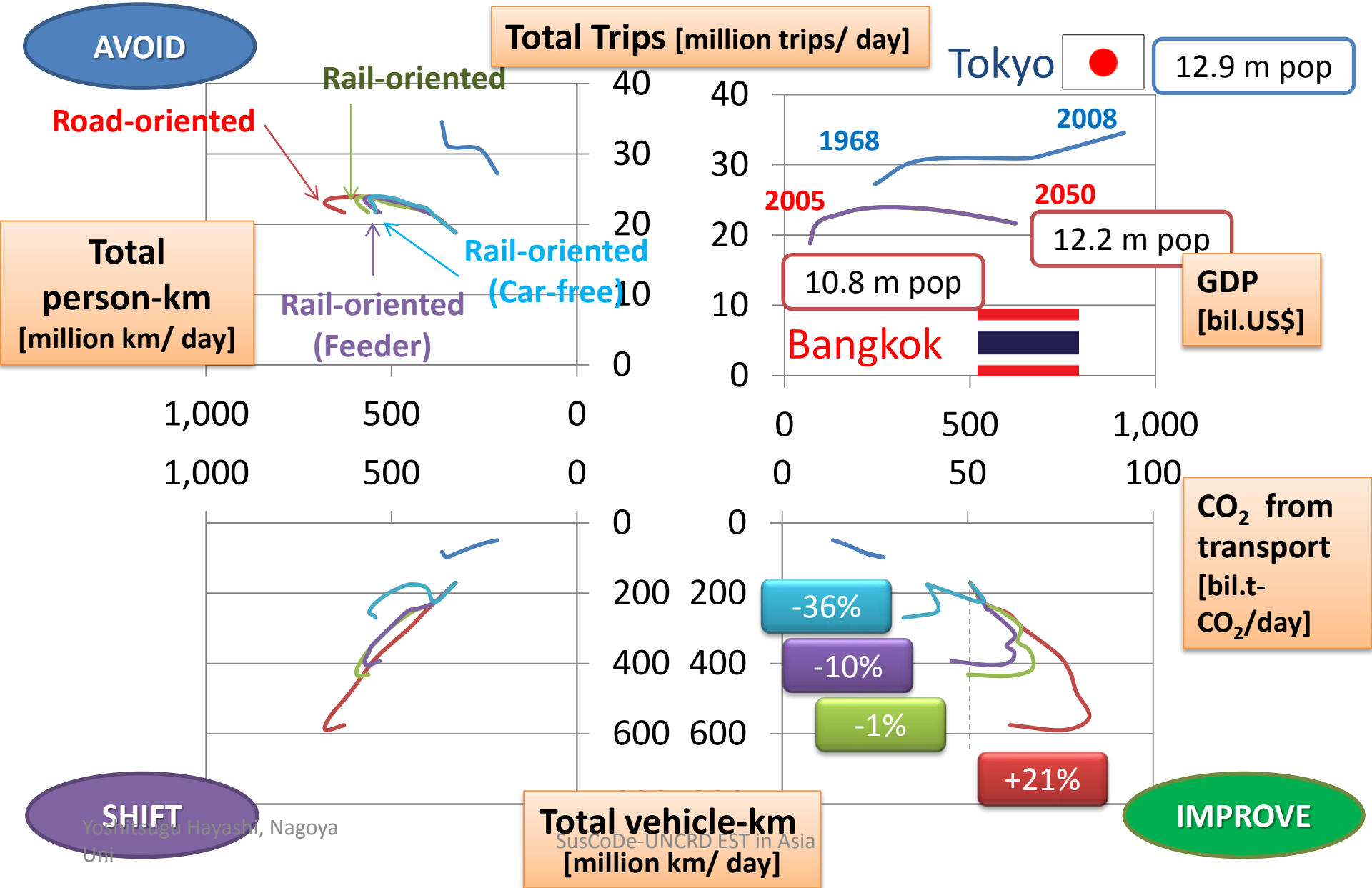
4,568 km MRT development, (6cities, Ave.: 760 km/city)

23,337km BRT development (23cities, Ave.:1015km/city)

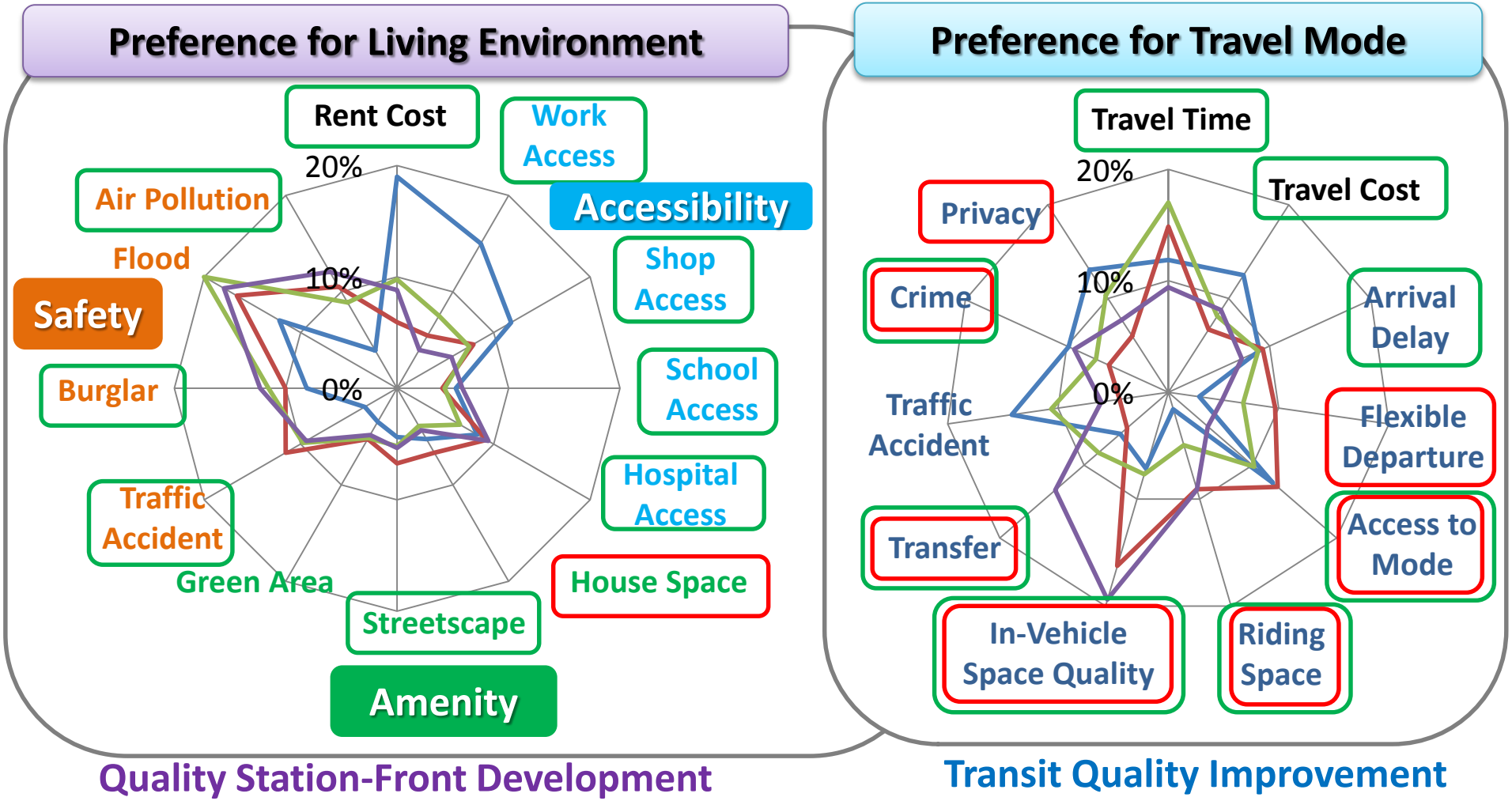
IMPROVE

Increasing LEV share (EV76%, HV23%),
Improving Fuel Efficiencies (by 28%)
Emission intensity of power generation
(2005:1269g-CO_2/kwh
2050: 546g-CO_2/kwh)

Possibility of CO2 Reduction By AVOID/SHIFT/IMPORVE



Indicators of Quality of Life -Bangkok-



SHIFT

LRT Integrated with MRT in Singapore

Bukit Panjang LRT

- 8 km, 14 stations
- Opened in 1999

Sengkang LRT

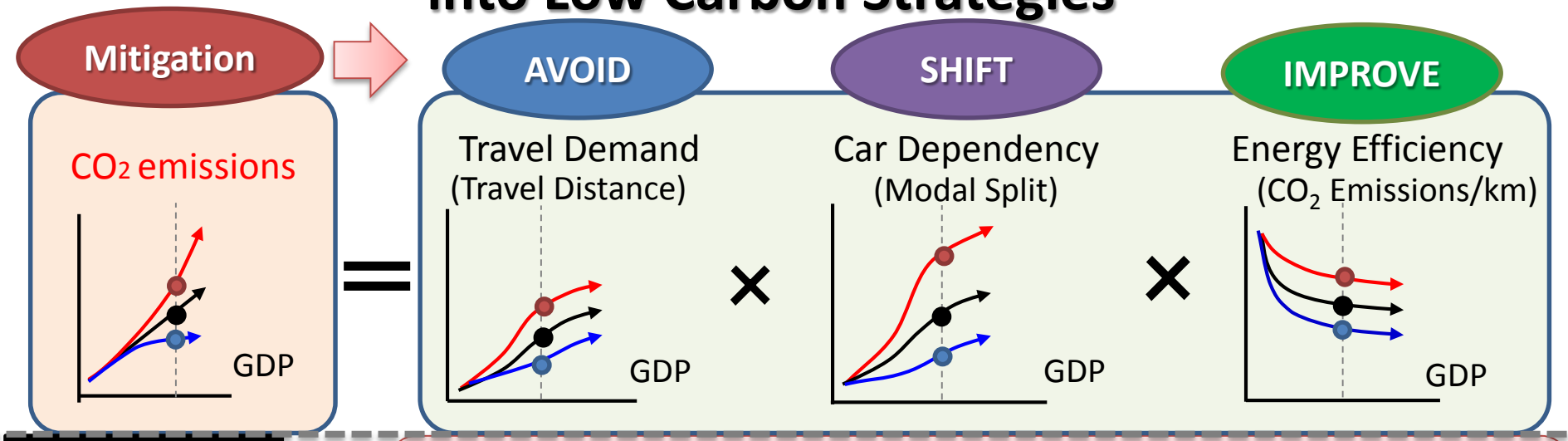
- 11km, 14 stations
- Integrated with Sengkang MRT
- Fully-automated system
- Opened in 2003

Punggol LRT

- 10km, 15 stations
- Integrated with Punggol MRT
- Fully-automated system
- Opened in 2005

(Sun, G., LTA)

Decomposing the Vision(Target) of Urban Transport Systems into Low Carbon Strategies



Aggressive Growth (Efficiency Demanding)

Moderate Growth (Ageing / Sufficiency seeking)

Road-Oriented Development

Urban Sprawl | **Motorisation** | **Congestion**

Downsizing Transport

Seamless Public Transport Mobility

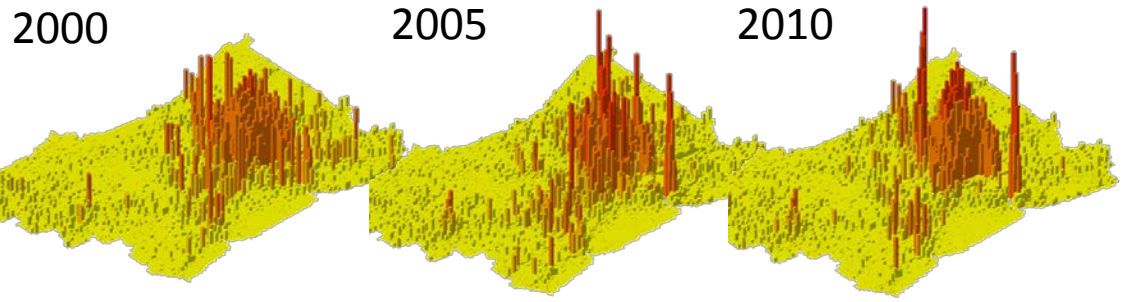
Energy Efficient Technology & Supply Chain

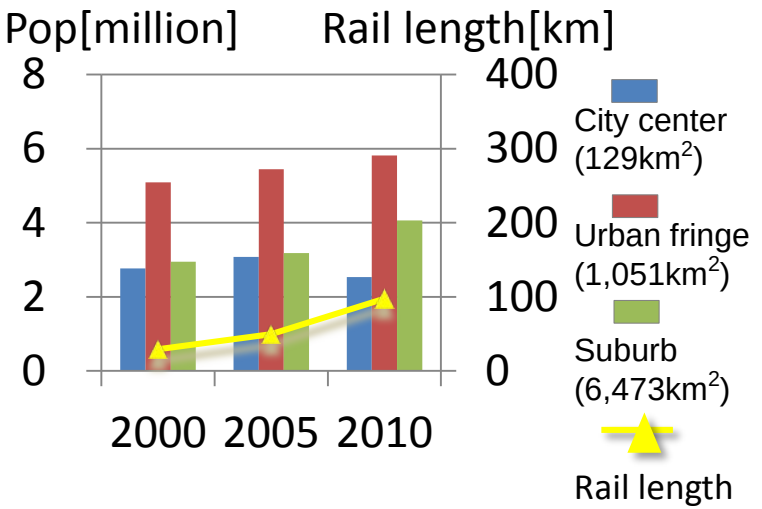
Transit Oriented Urban Lifestyle

Environmentally-Friendly Industrial Complex

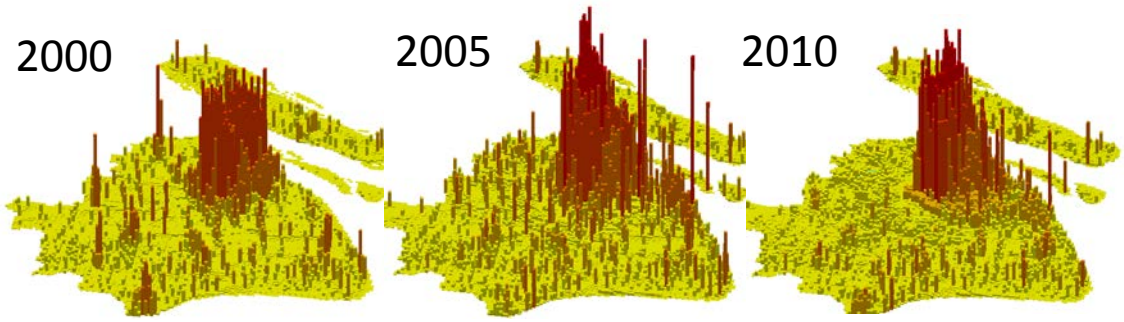
Changes in MRT Networks and Urban Forms

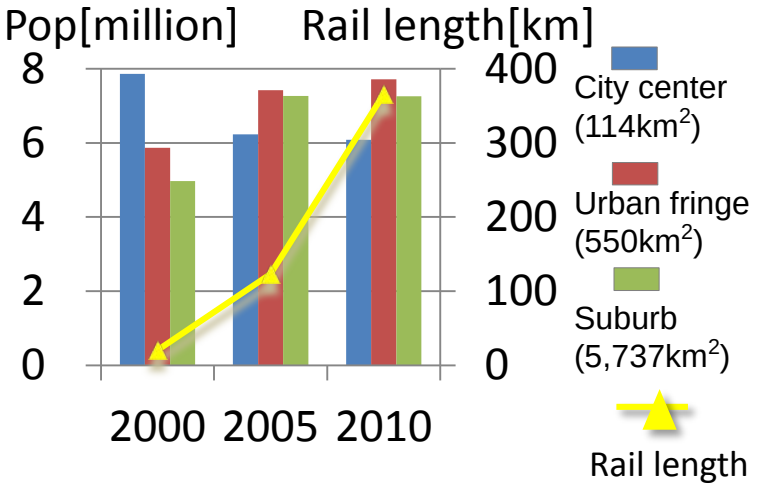
Bangkok (7,650km^2)





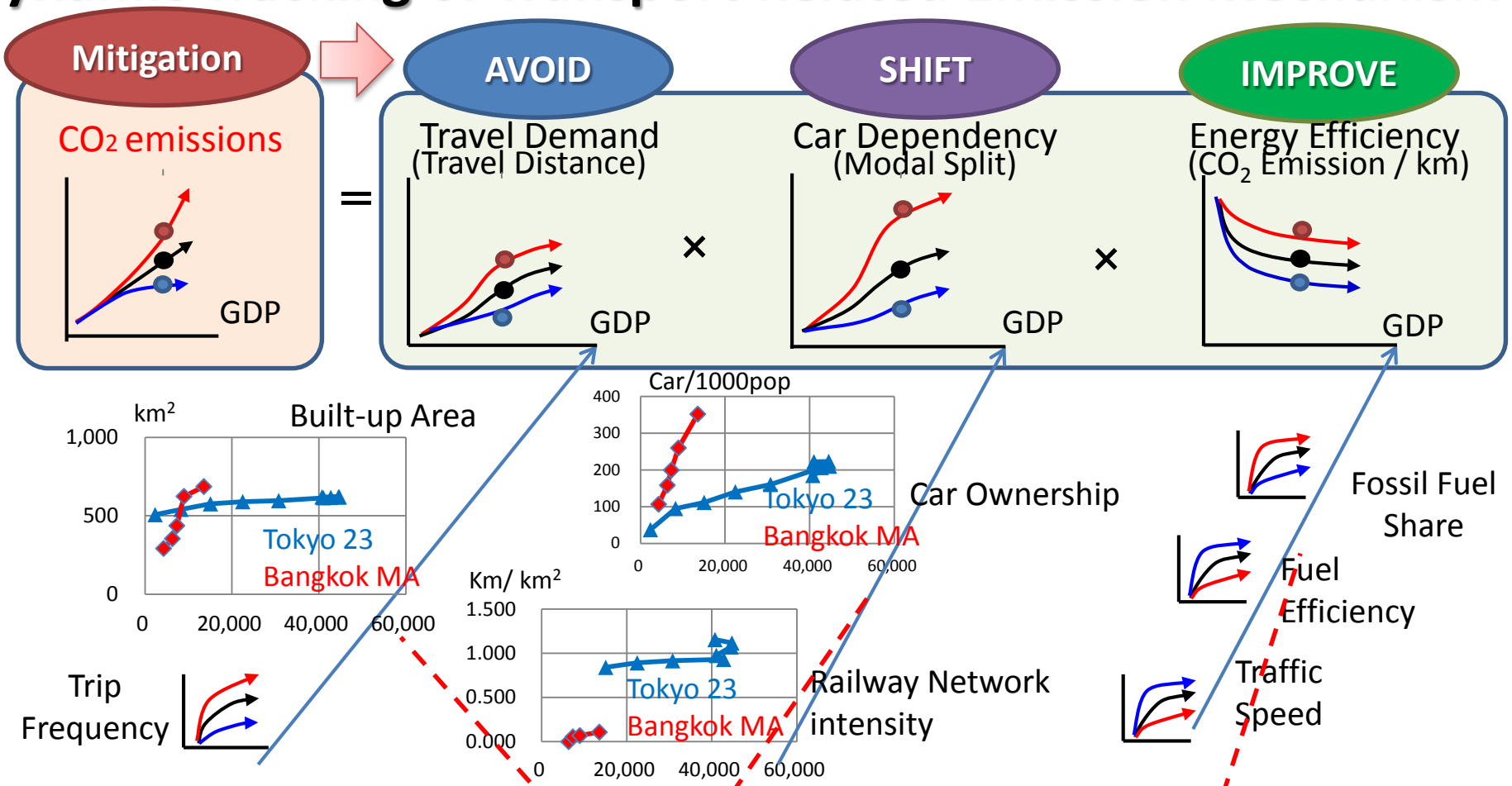
Shanghai (6,400km^2)





Population [person] ~5,000 ~10,000 ~30,000 ~50,000 ~100,000

Dynamic Tracking of Transport Related Emission Mechanism



CUTE Policy Matrix

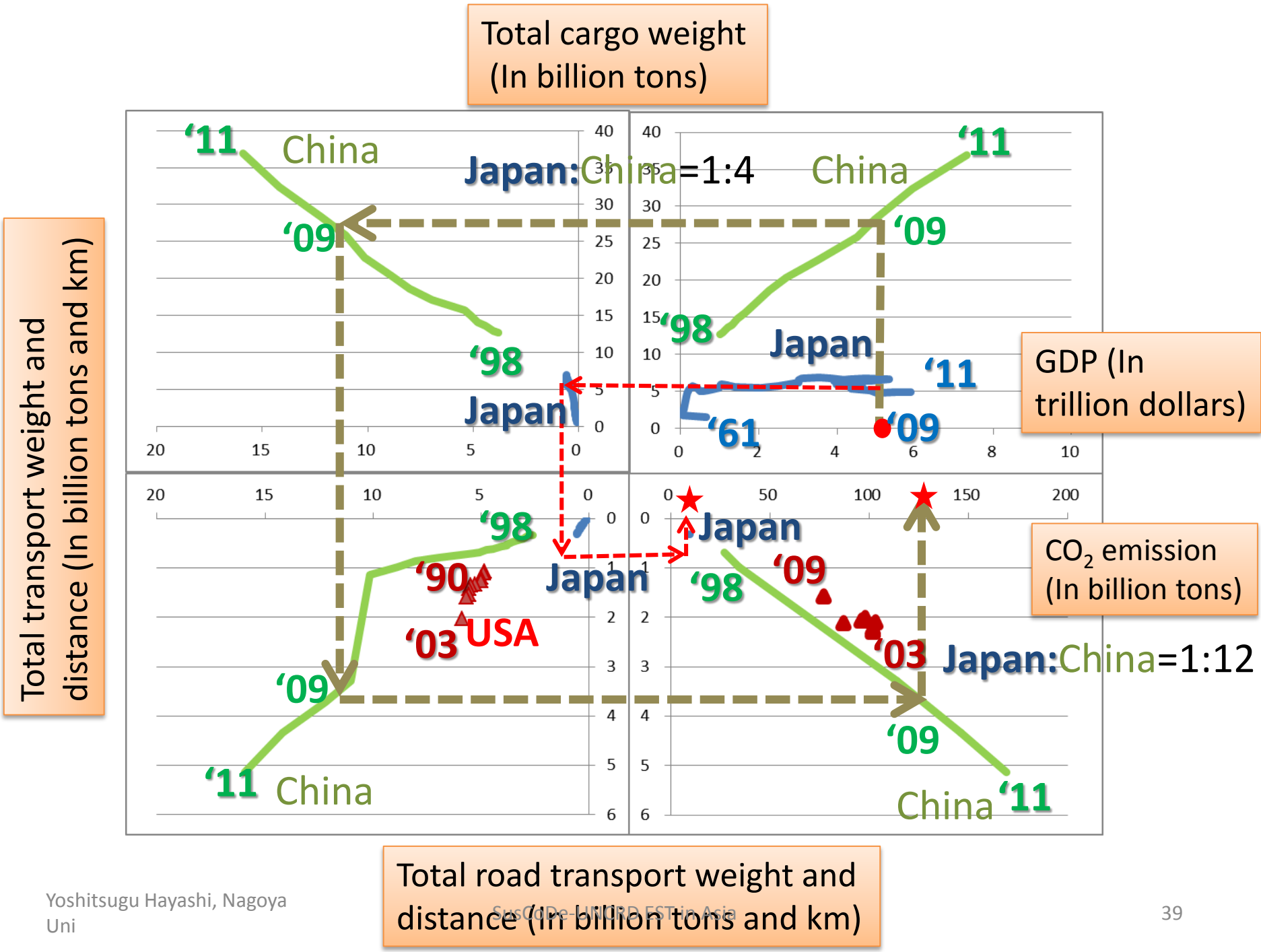
	AVOID	SHIFT	IMPROVE
Technology	Transit Oriented Development (TOD)	Mass Transit	LEV Development
Regulation			
Information			

Spatial Scale

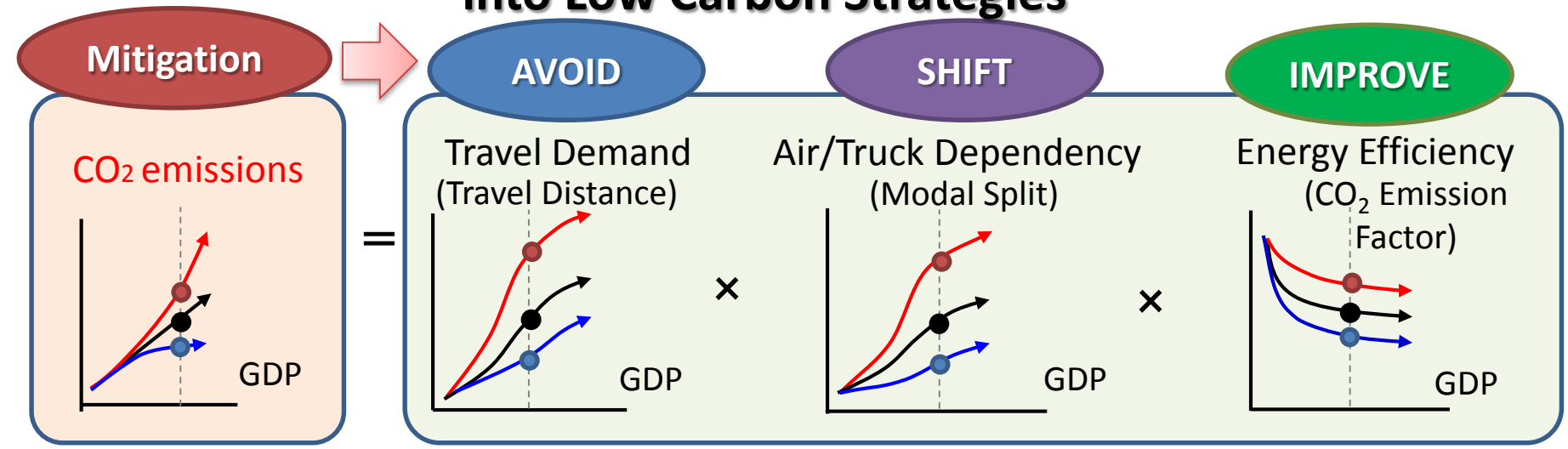
1. Urban → Mega Region → Intercity
2. Industrial (Re)Location and Transport Provision in mega-regional/ international scale
3. LCC rapid development vs High Speed Rail

Air Pollution in Shijia Zhuong

Lorries transporting consumer goods back to Beijing →Moving emission


Total cargo weight
(In billion tons)
Total transport weight and distance (In billion tons and km)
GDP (In trillion dollars)
CO_2 emission
(In billion tons)
Total road transport weight and distance (In billion tons and km)
Japan:China=1:4
Japan:China=1:12
'11
China
'09
'98
Japan
'61
'90
'03
USA

Decomposing the Vision(Target) of Interregional Transport Systems into Low Carbon Strategies



Economic Growth

Global Industrialisation (Block Economies)

Growth in **Low Cost Carriers & Motorisation**

Efficient Supply Chain

Low-Carbon Public Transport Mobility

Energy Efficient Technology & Operation

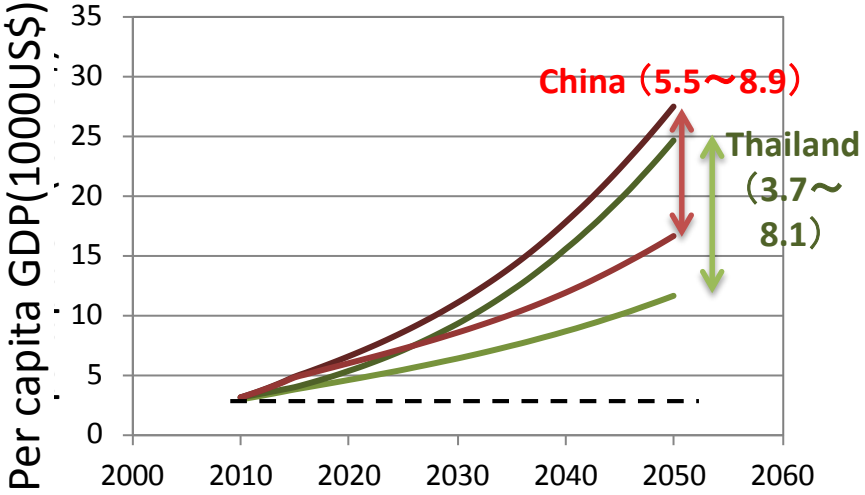
Rail-Oriented Lifestyle

Rail-Oriented Industrial Renovation

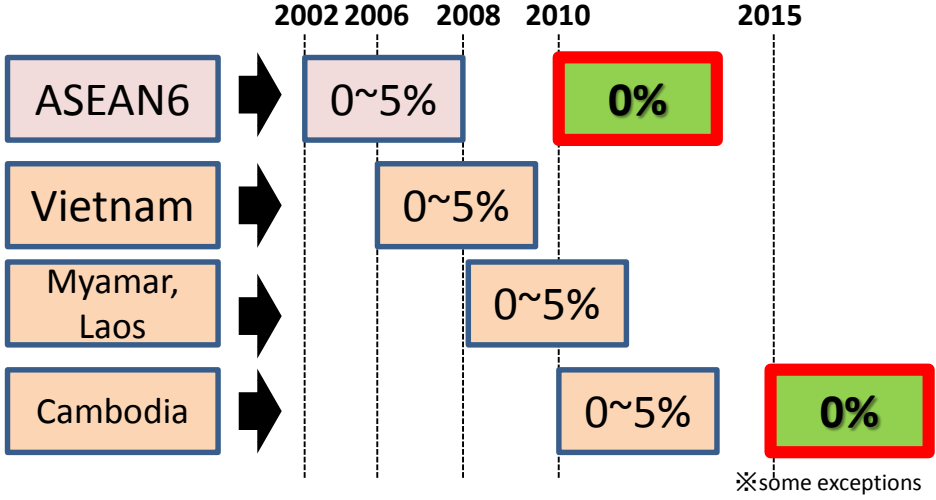
Yoshitsugu Hayashi, Nagoya Uni

Future Society and Requirements for Transport Systems

Rapid Economic Growth (-2050)



Abolition of Customs



Increase in Freight

Interregional Competition

①Bulky Transport System

②Higher Speed

3 Requirements

③Low Carbon

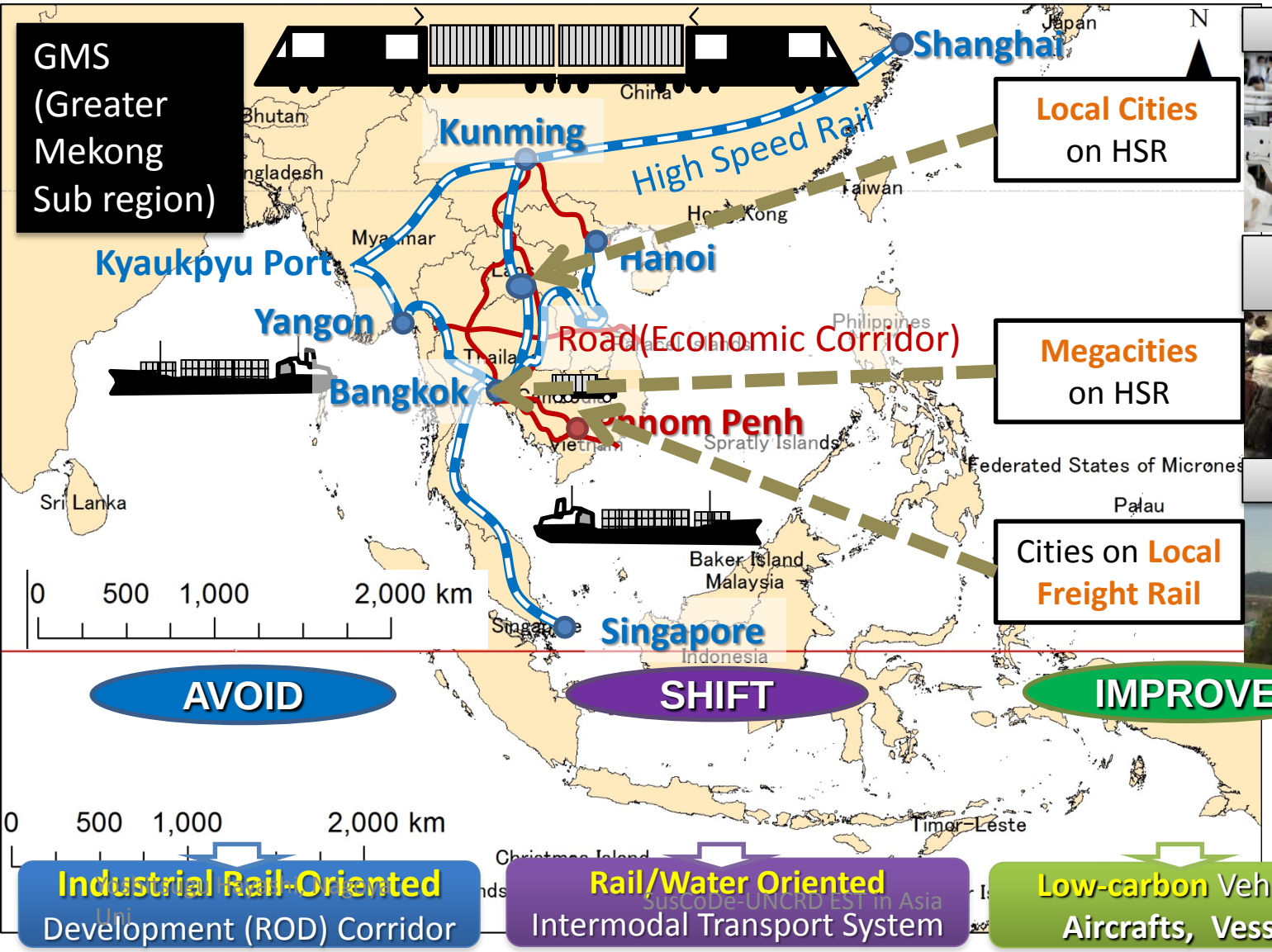
Yoshitsugu Hayashi, Nagoya Uni

Prepared by Shinya Hanaoka

Proposing Vision:

Mainstreaming Rail and Water in Interregional Transport

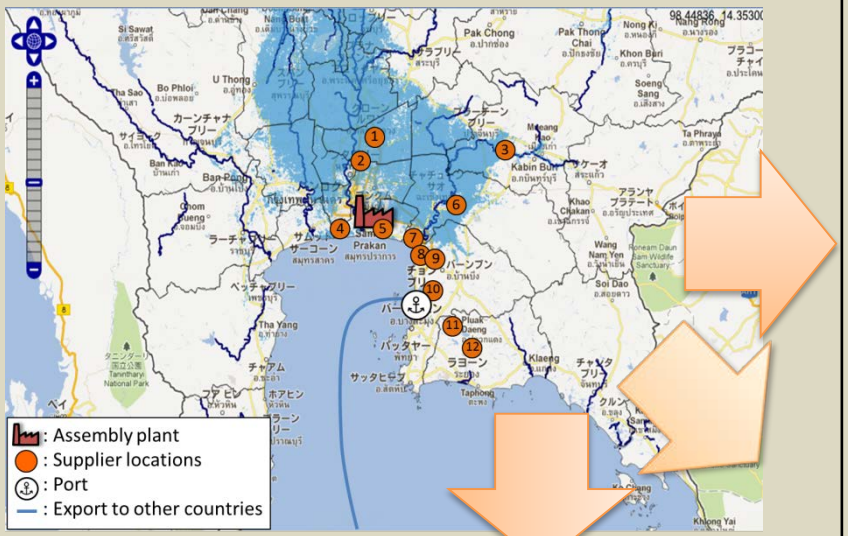
Inland Freight High Speed Rail (HSR) Development between Port Hubs



Efficient Industrial Supply Chain

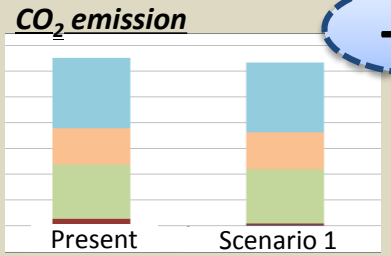
Impact analysis to reduce CO_2 emissions by plant location change

Current Industrial location (Bangkok)



Scenario 1 :

Priority to resilience for disaster



-3%

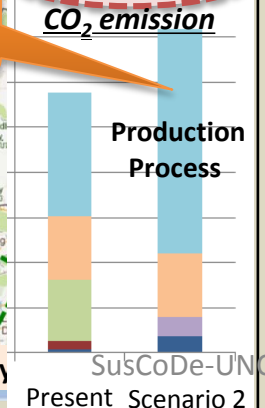
Proximity location of Assembly plant and supplier

Scenario 2 :

Priority to low labor cost (Cambodia)

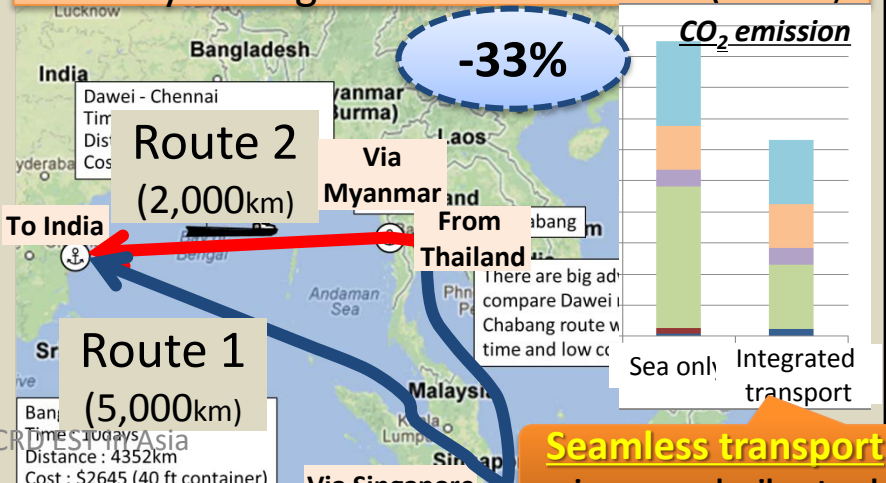
Need of improving Production process

+25%



Scenario 3 :

Priority to larger economic market(Indian)

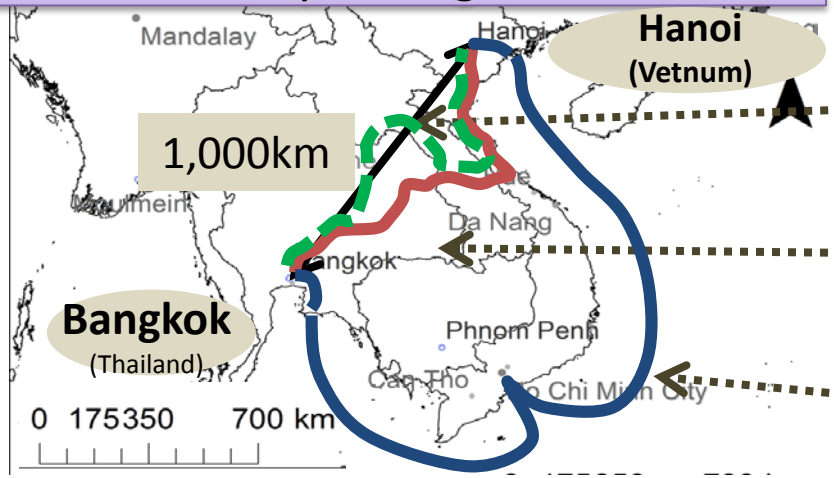


-33%

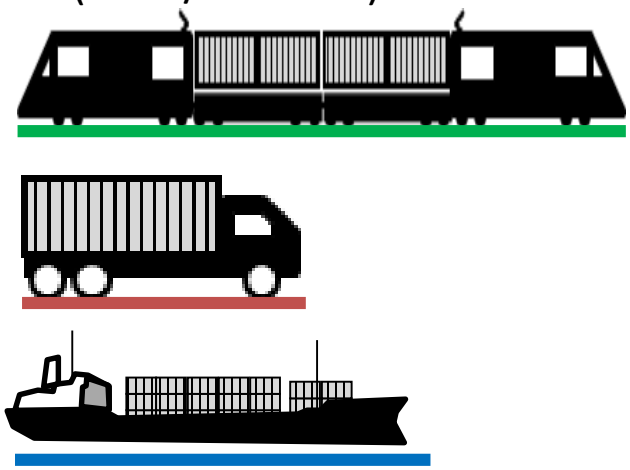
Seamless transport using sea and rail or truck

Targeting Necessary Rail Use for Low-Carbon Interregional Development

Case Study: Bangkok – Hanoi



(with / without)

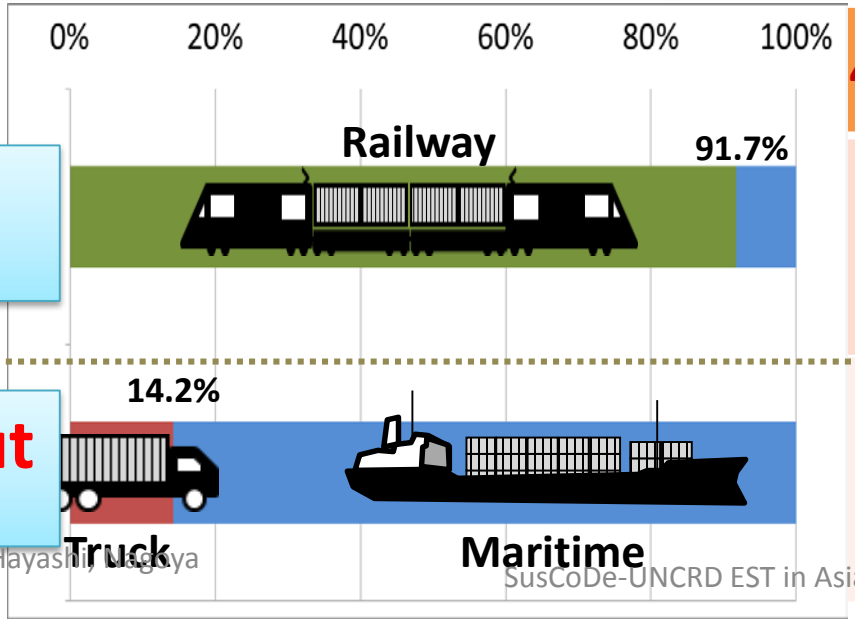


Optimal Modal Splits for reducing 40% CO_2 emission

30% time Saving

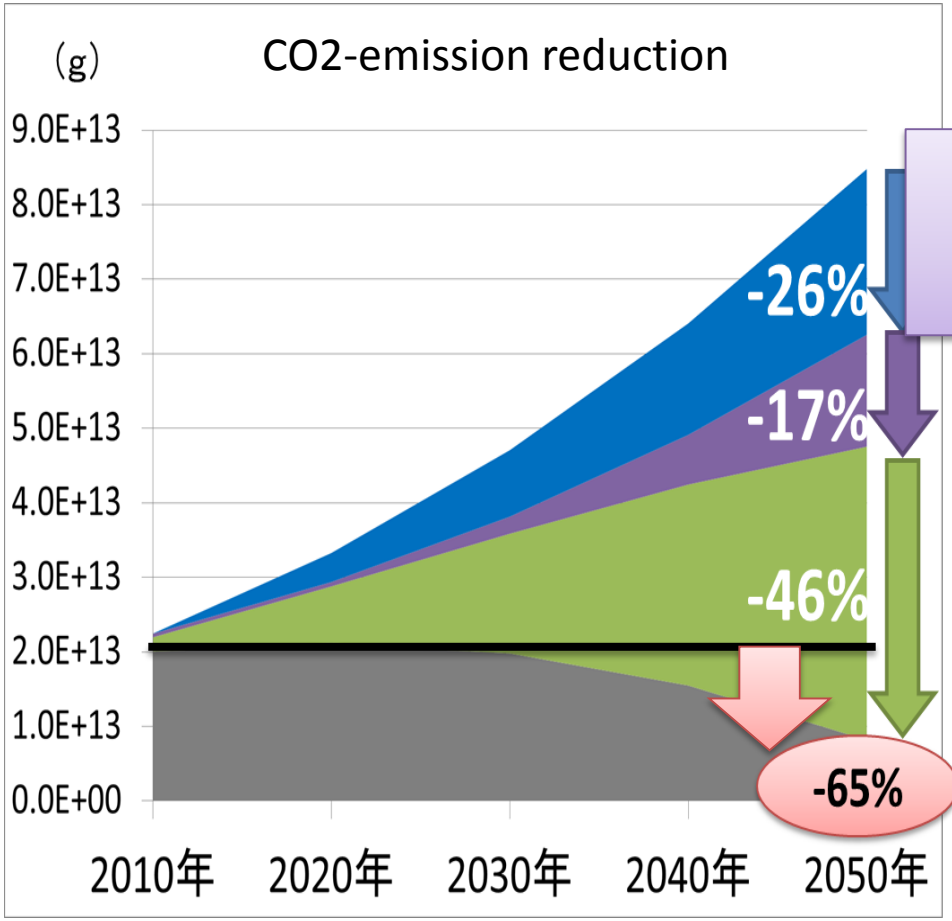
With railway

Without railway



40% CO_2 mitigation	30% time saving
○	○
×	○

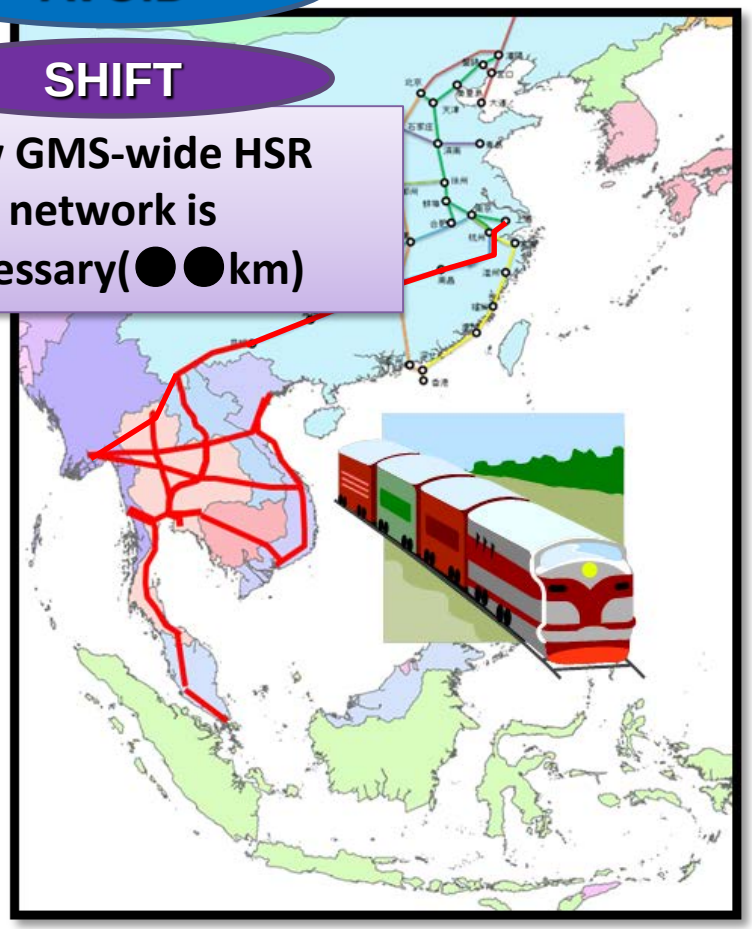
The Roadmap for Low-Carbon Interregional Transport Development in ASEAN and China



AVOID

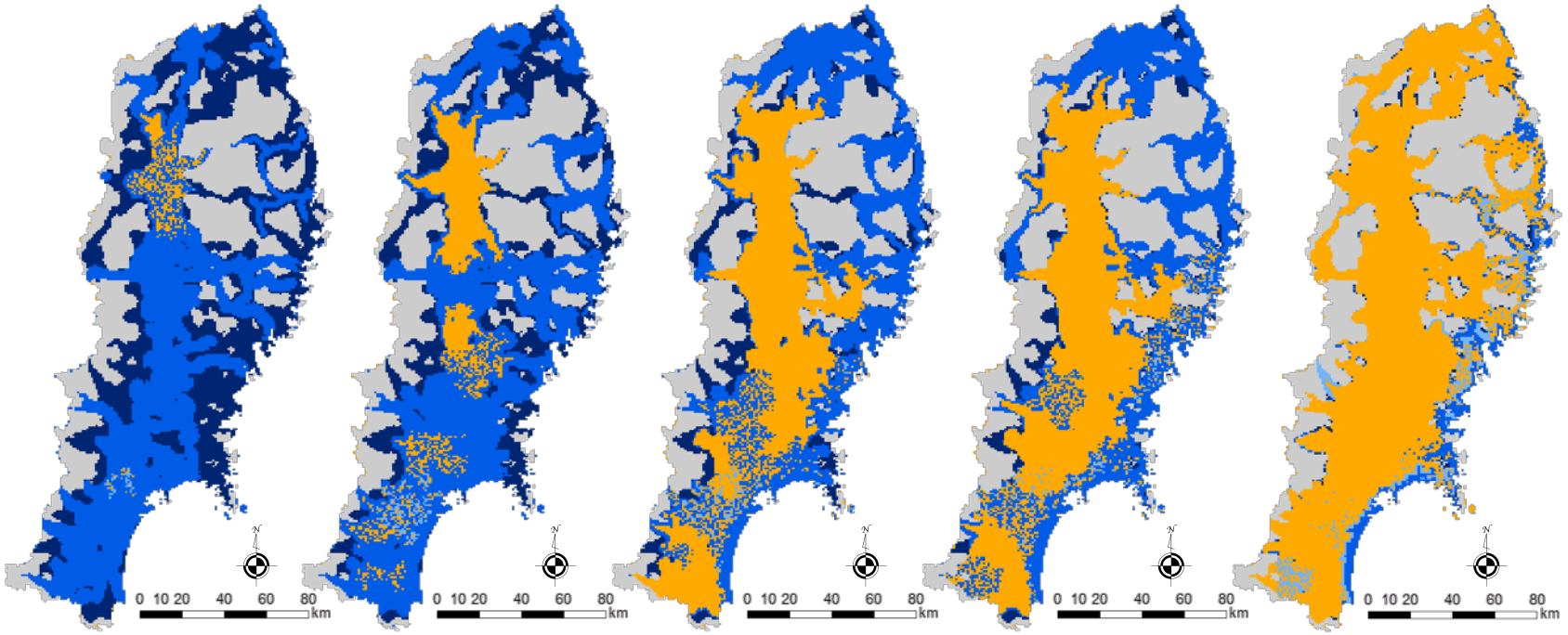
SHIFT

New GMS-wide HSR network is necessary(●●km)



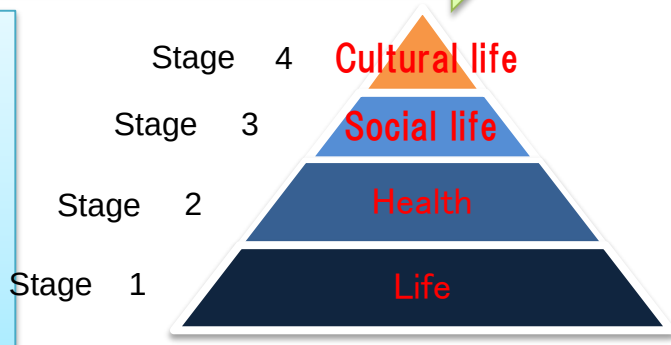
Sustainability vs. Resilience?

Resilience: QOL Transition after Earthquake



3/14（被災3日後） 3/18（7日後） 3/31（20日後） 4/11（1ヶ月後） 5/11（2ヶ月後）

- QOL indices are recovered from coast towards inner areas, after roads and facilities were re-open
- Areas of QOL stage 2 are bigger than flooding areas from tsunami at 3/31 and 4/11



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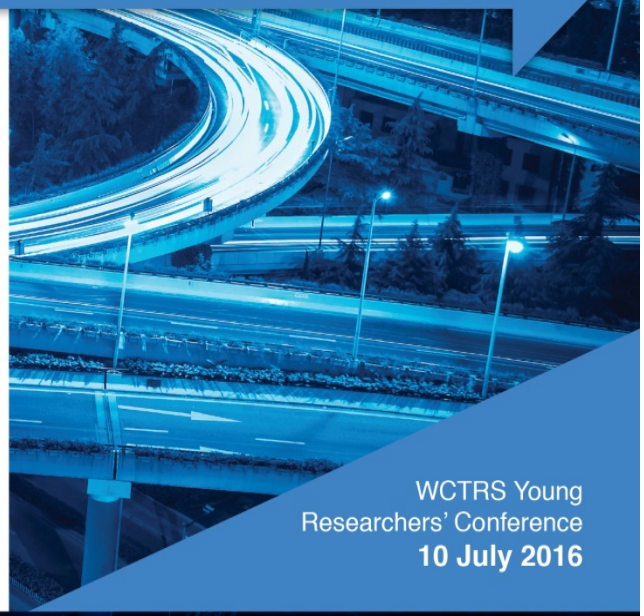

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Thank you.