

*The 3rd Workshop of Japan-UK Joint Research Project
"Roadmap to Low-Carbon World"
Group 4: Barriers and opportunities
: approaches to sensitive LCS sectors
: (Feb. 14th 2008)*

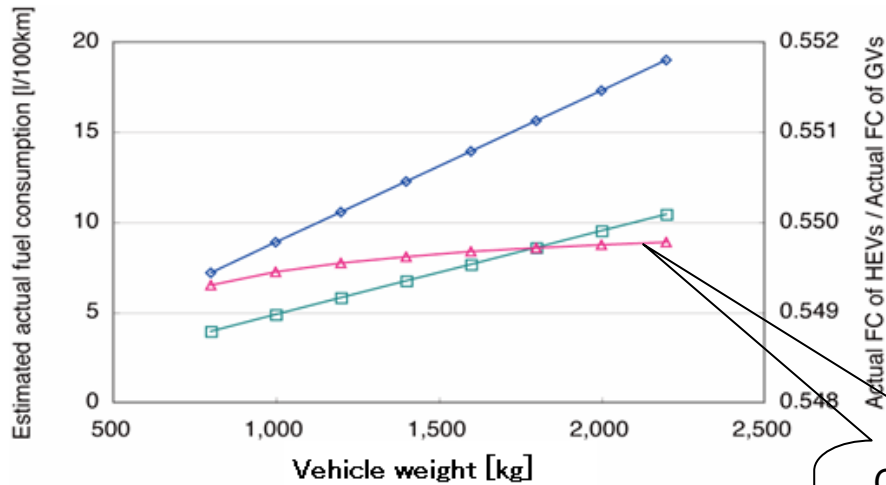
Lifestyle in transport sector

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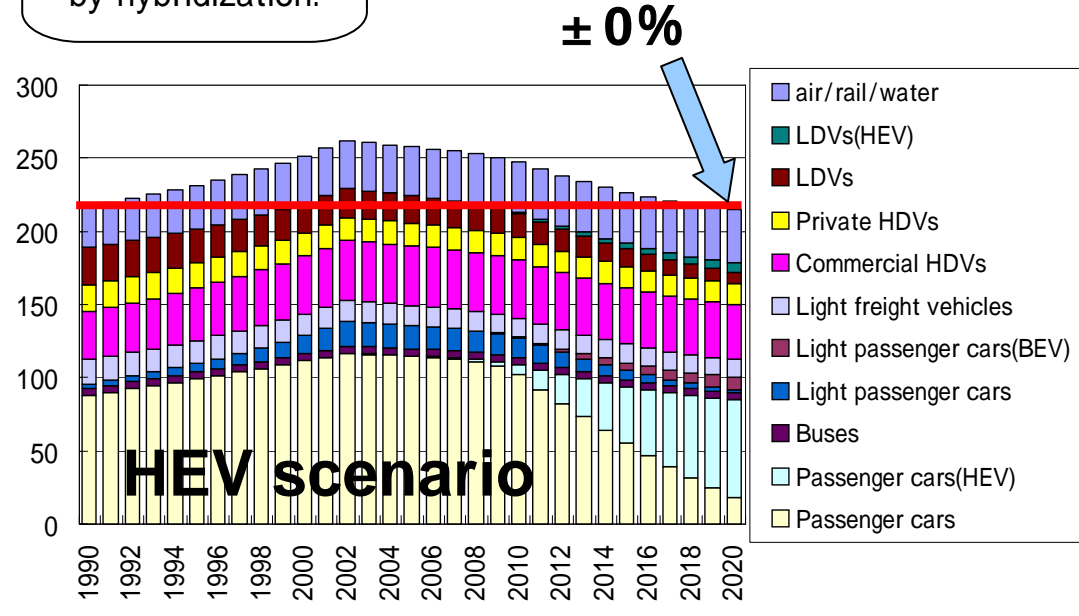
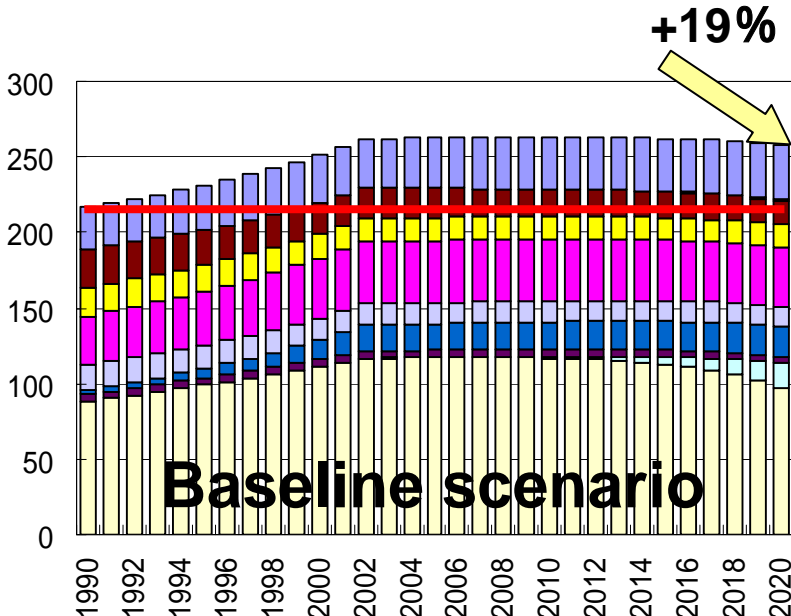
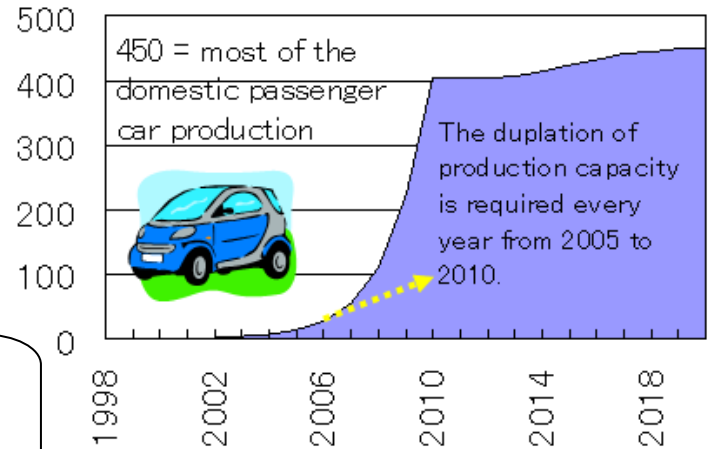
Scenario: Penetration of Hybrid Electric Vehicles (HEV)



CO₂ emissions reduced by 45% by hybridization.

HEV Production Capacity

(ten-thousand vehicles/year)



CO₂ emissions (Mt-CO₂)

Combination of countermeasures which reduce 20% each could cause over 70% reduction as total

$$(1-0.2) \times (1-0.2) \times (1-0.2) \times (1-0.2) \times (1-0.2) \times (1-0.2) = 0.26$$

Demand management
e.g. by information-communication technology
[transport-service per capita]

Modal shift to reduce CO₂ EF
per passenger-km or ton-km

Improve fuel economy
[Fuel consumption per vehicle-km]

$$\frac{\text{CO}_2}{\text{capita}} = \frac{\text{TransServ}}{\text{capita}} \times \frac{\text{Pkm(Tkm)}}{\text{TransServ}} \times \sum_{\text{Mode}} \left(\frac{\text{Vkm}}{\text{Pkm(Tkm)}} \times \frac{\text{Fuel}}{\text{Vkm}} \times \frac{\text{CO}_2 \text{ EF}}{\text{Fuel}} \right)$$

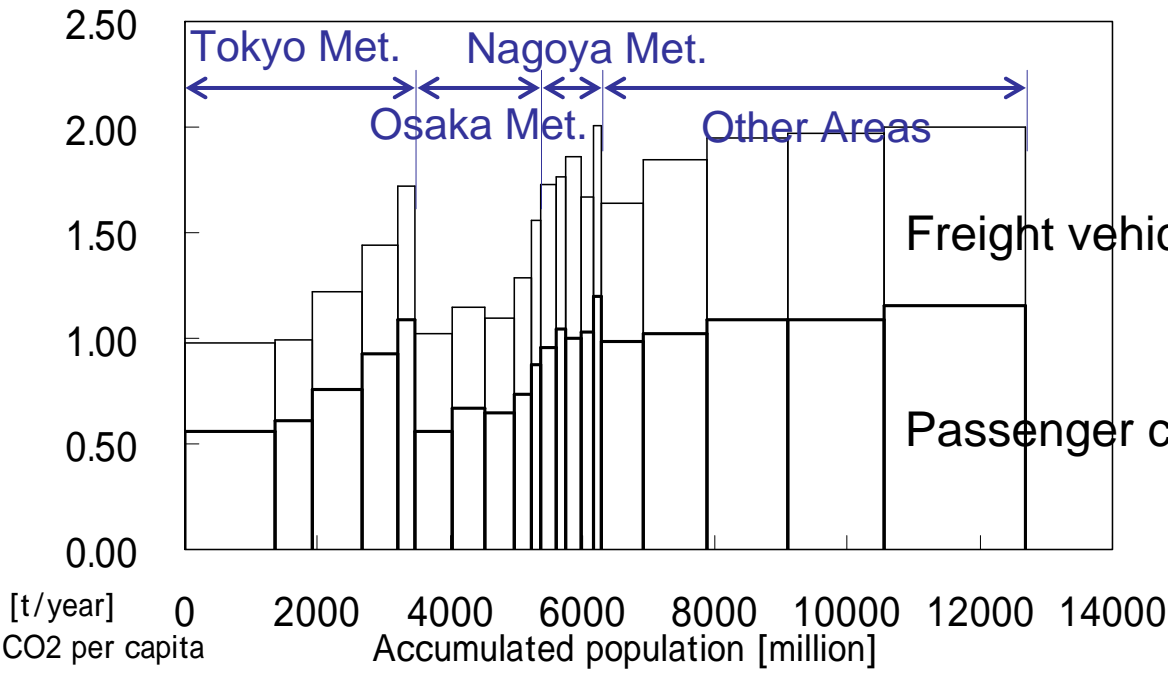
Improve load factor
[vehicle-km per Pkm(Tkm)]

Improve accessibility
[passenger-km or ton-km
per transport-service]

Introduce low carbon energy
[CO₂ emission factor per fuel
consumption]

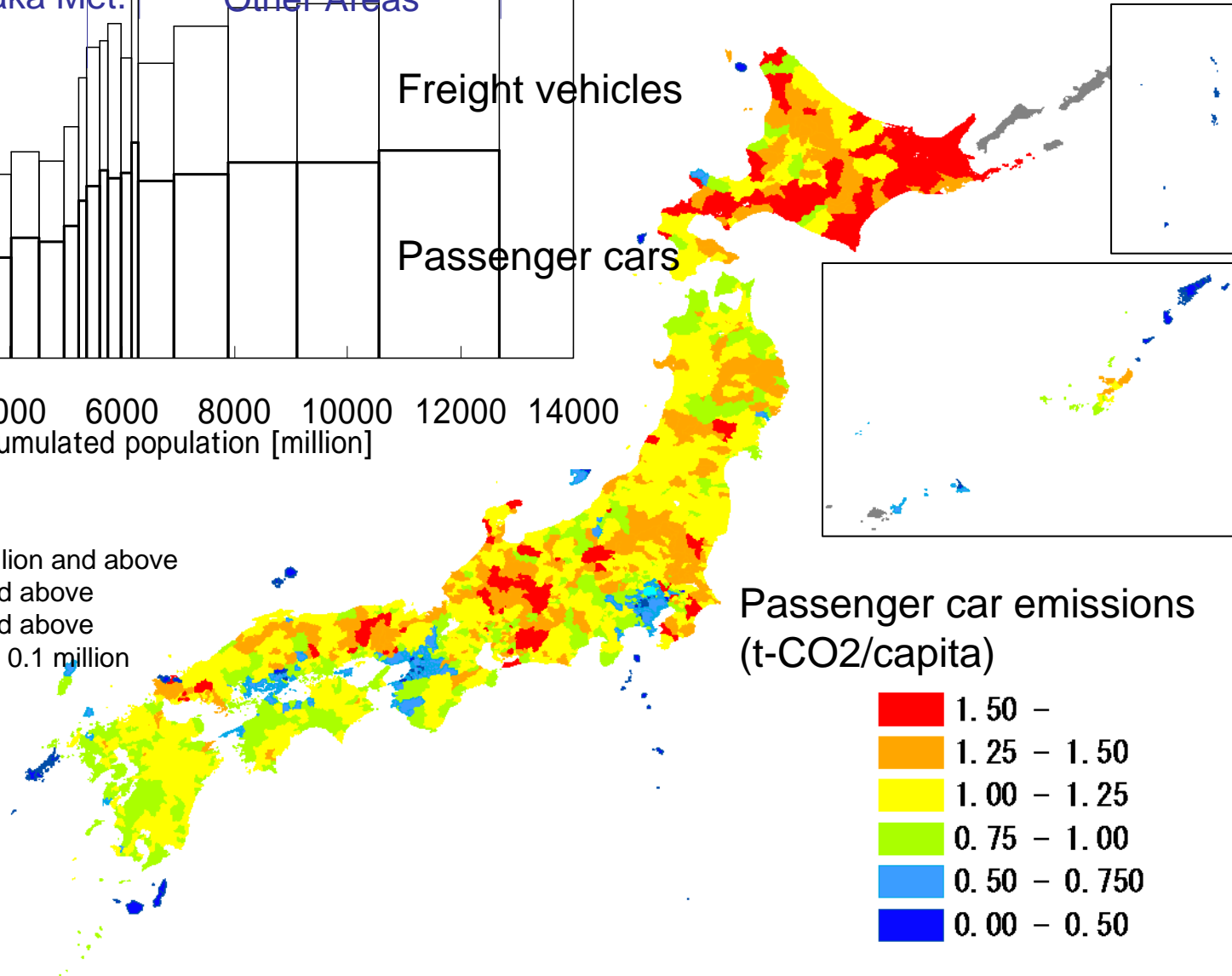
Estimated regional automotive CO₂ emissions

CO₂
capita

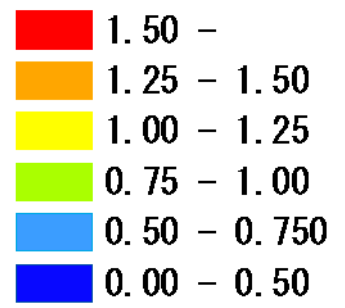


Each Area is categorized in

1. Major cities
2. Cities with a pop of 0.5 million and above
3. Cities with a pop of 0.3 and above
4. Cities with a pop of 0.1 and above
5. Cities with a pop less than 0.1 million
6. Counties

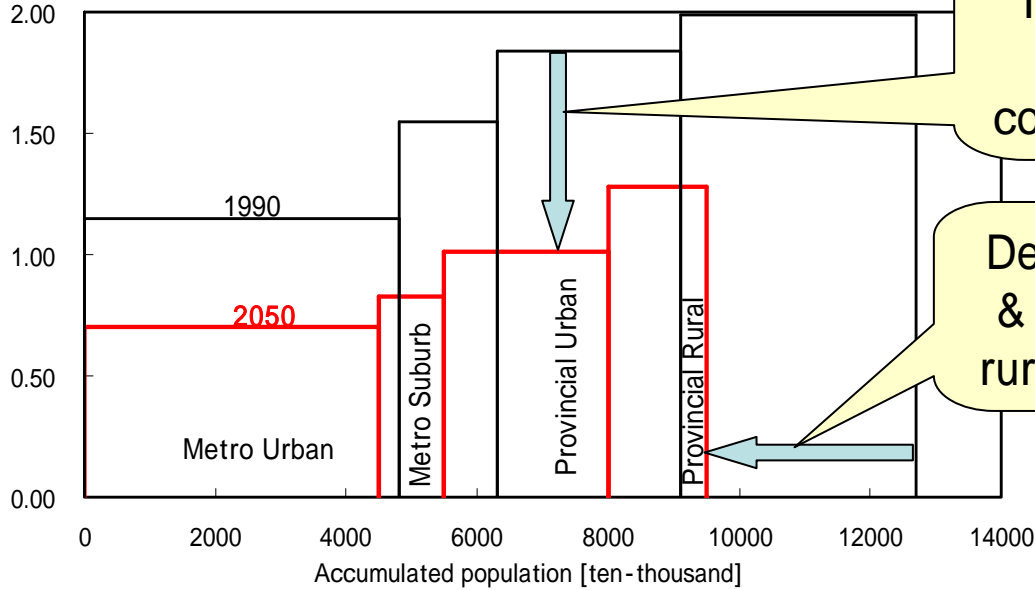


Passenger car emissions (t-CO₂/capita)



LCS2050: a draft vision (Regional emissions)

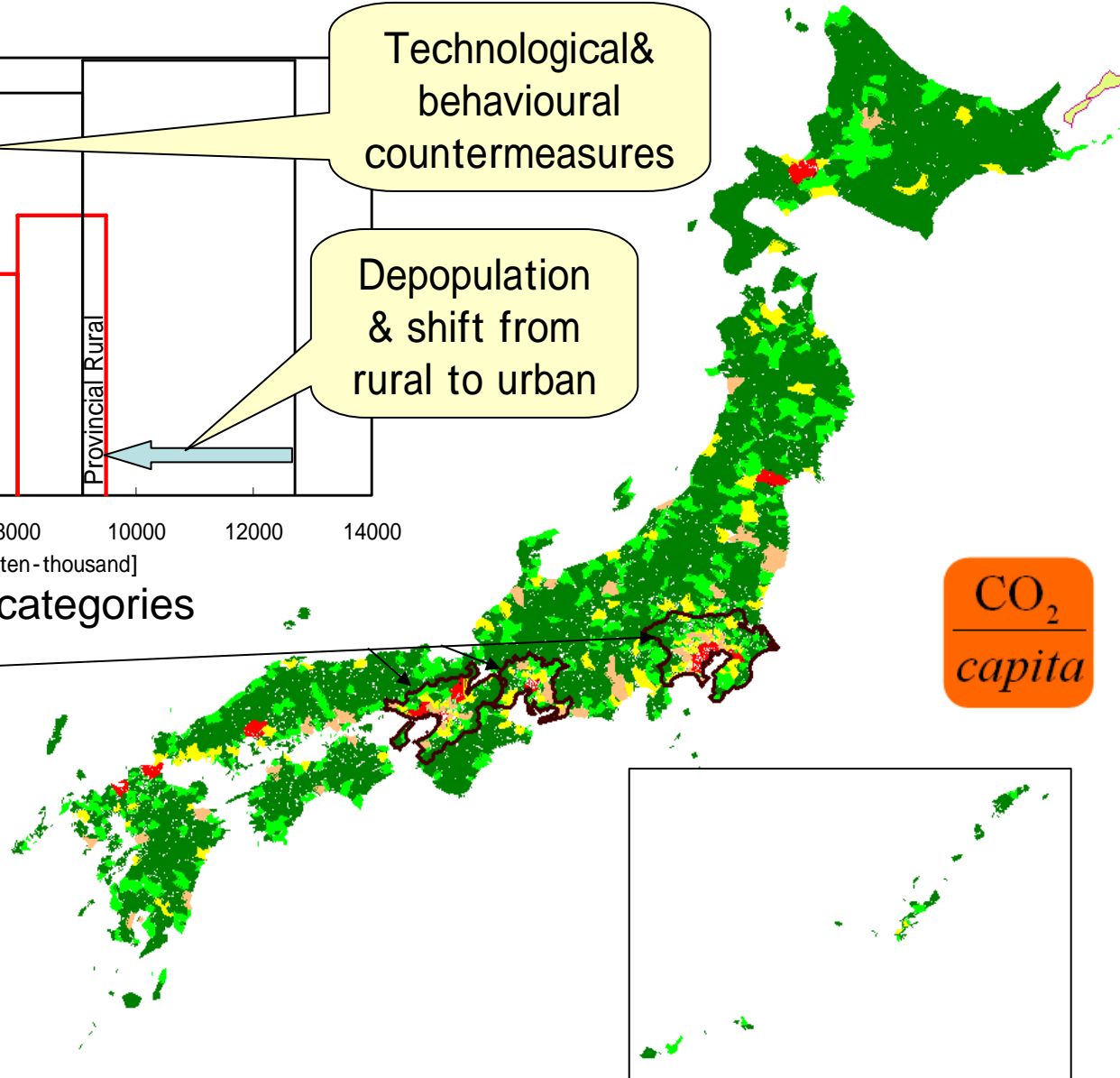
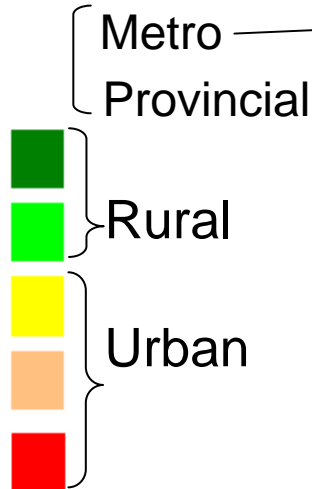
Transport CO₂ [t/capita/year]



Technological & behavioural countermeasures

Depopulation & shift from rural to urban

Index of the regional categories



New concepts for personal mobility



the Segway Human Transporter



Yamaha: EC-02

$\frac{V_{km}}{P_{km}(T_{km})}$	$\frac{Fuel}{V_{km}}$	$\frac{CO_2 EF}{Fuel}$
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Toyota: i-REAL

■ 新スリーターの特長

電動自転車
充電式バッテリー
のアシストで坂道
も快走

保冷ケース
クール宅急便の荷
物も集配可能

リヤカー
ヤマトのオリジナル特注
品で、タイヤストップバー、
スタンドも装備



Yamato: Power-assisted delivery bicycle



Kawamura cycle KE

(catalog information)

Example of vision: prepared for OECD/EST in Nagoya(2003)

Picture of EST3 (Combination)

$$\frac{\text{TransServ}}{\text{capita}}$$

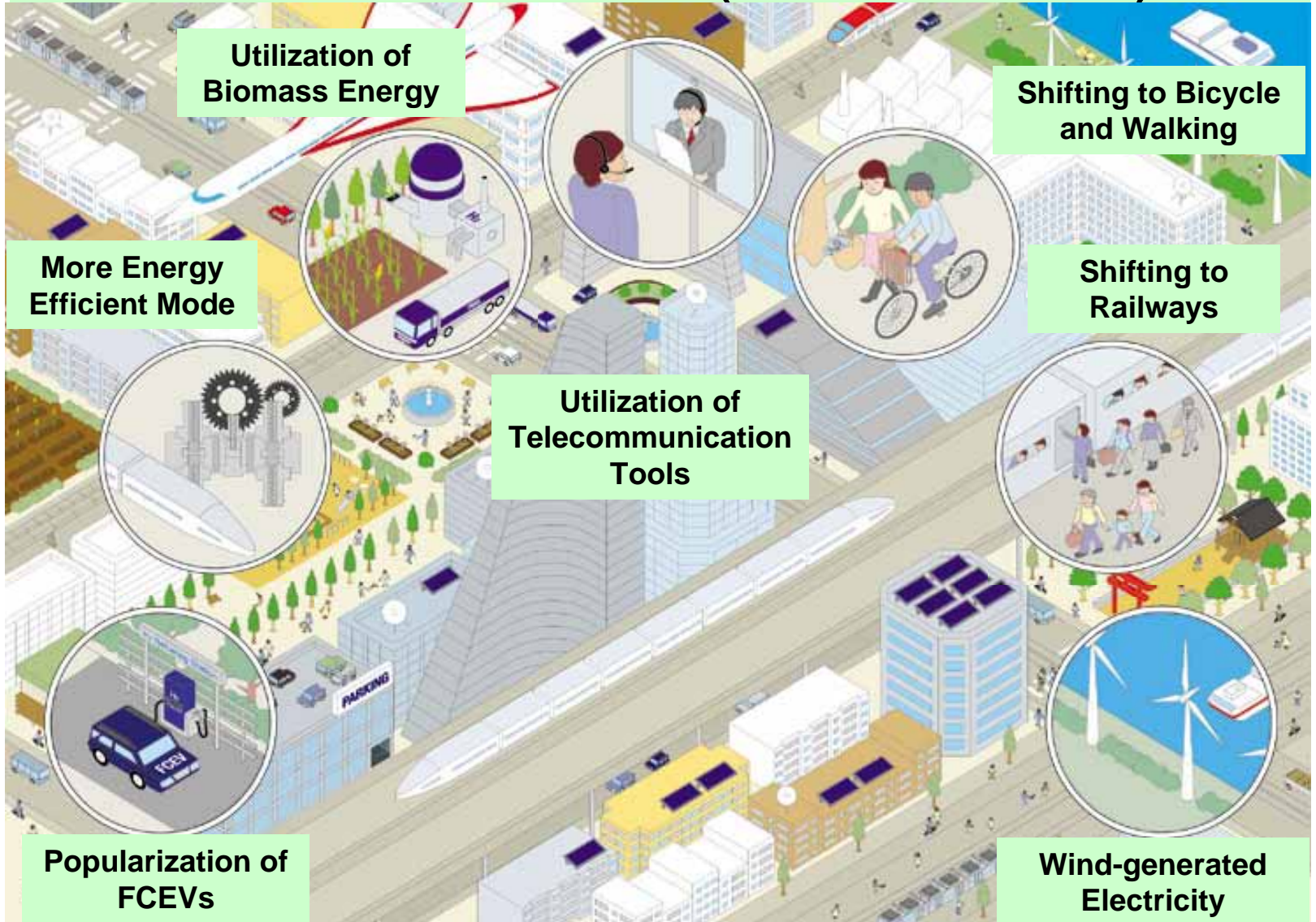
$$\frac{\text{Pkm(Tkm)}}{\text{TransServ}}$$

$$\sum_{\text{Mode}}$$

$$\frac{\text{Vkm}}{\text{Pkm(Tkm)}}$$

$$\frac{\text{Fuel}}{\text{Vkm}}$$

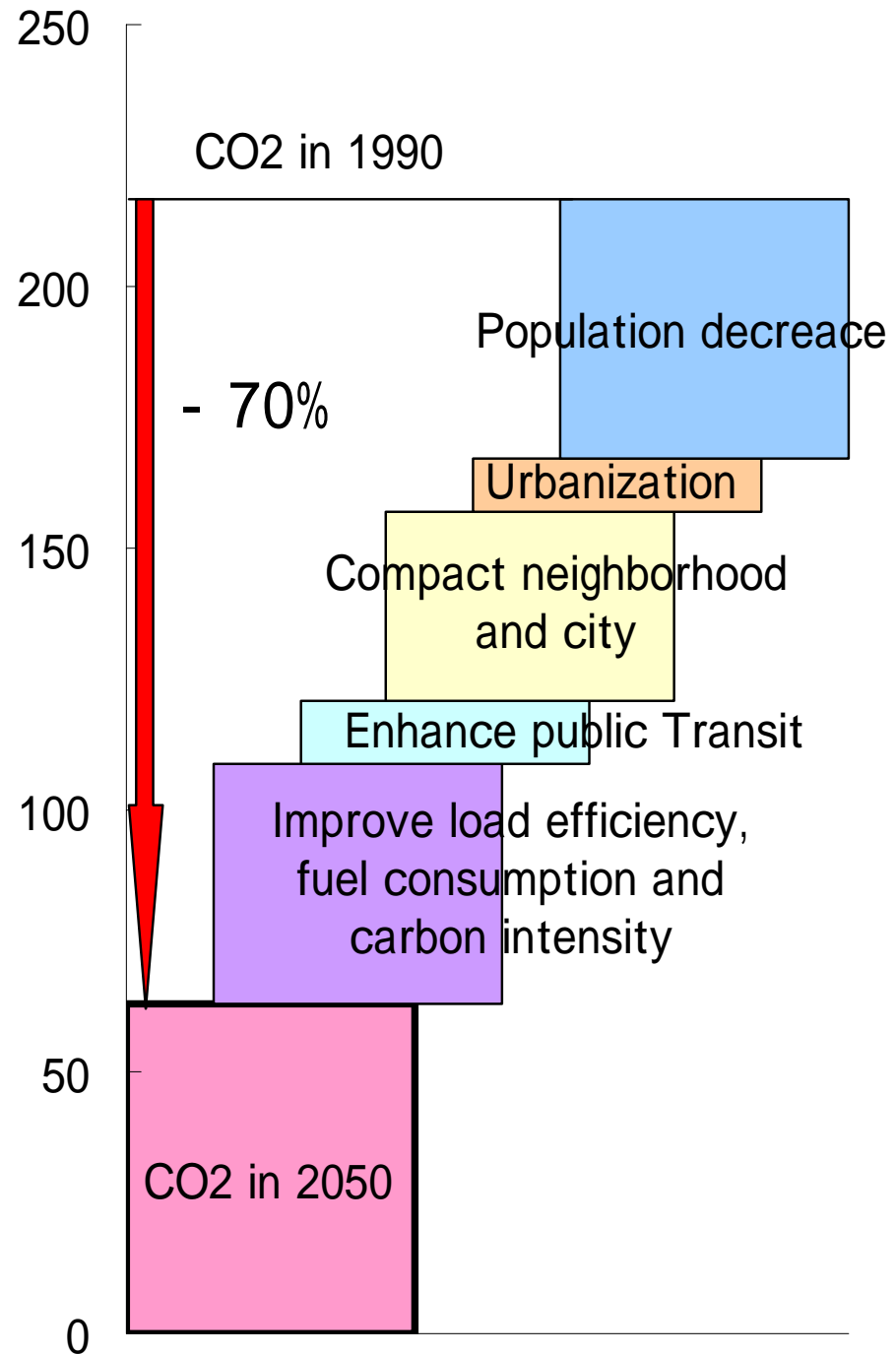
$$\frac{\text{CO}_2\text{EF}}{\text{Fuel}}$$



LCS2050: a draft vision

	Metro Urban	Metro Suburb	Provincial Urban	Provincial Rural	total
$\frac{TransServ}{capita}$ Compact neighborhood	less room for improve.	Rehabilitation	Rehabilitation	Compact Settlement	217->63Mt To 1990
$\frac{Pkm(Tkm)}{TransServ}$ Compact city	City center renewal	✗	City center renewal	✗	- 71%
\sum_{Modes} Enhance public transit	✗ passenger freight	Park & Ride etc.	LRT	van pool, shared taxi	Index: : - 30%
$\frac{Vkm}{Pkm(Tkm)}$ Improve load efficiency	Utilize small vehicles	Utilize small vehicles	Enhance sharing	✗	: - 20%
$\frac{Fuel}{Vkm}$ Improve fuel consumption	Urban mode	Urban mode	local mode	local mode	: - 10%
$\frac{CO_2EF}{Fuel}$ Low carbon energy	less room for improve				✗ : no room Freight and regional transports are to be considered.
$\frac{CO_2}{capita}$ pop(million)	46 45	15 10	27 25	35 15	124 95
t-CO ₂ /capita	1.27 0.56	1.72 0.62	2.04 0.68	2.20 1.01	1.76 0.67

The share of the reduction in a draft LCS2050 vision



LCS2050: Policy recommendations

	Metro Urban	Metro Suburb	Provincial Urban	Provincial Rural	total	
$\frac{TransServ}{capita}$	less room for improve	Redevelopment	Rehabilitation	Compact Settlement	217->63Mt To 1990	
$\frac{Pkm(Tkm)}{TransServ}$	Renewal	×	Preferential tax treatments	×	- 71%	
\sum_{Modes}	×	Infrastructure, Subsidy	×	Approve shared taxi	index: : - 30% : - 20% : - 10%	
$\frac{Vkm}{Pkm(Tkm)}$	Utilize small vehicles	Utilize small vehicles	Enhance local mode	×	× : no room	
$\frac{Fuel}{Vkm}$	Urban mode	Urban mode	local mode	local mode	Freight and regional transports are to be considered.	
$\frac{CO_2EF}{Fuel}$	less room for improve	Setting goals for Engineering developments Provision of infrastructures				
$\frac{CO_2}{capita}$	pop(million)	46 45	15 10	27 25	35 15	124 95
	t-CO ₂ /capita	1.27 0.56	1.72 0.62	2.04 0.68	2.20 1.01	1.76 0.67