1. Background of Low Carbon City Development

(1) Global Warming and Urban Activities

- Approximately 50% of the total CO_2 emissions of Japan are derived from urban activities, thus implementing low-carbon policies in urban areas are a pressing need while the impact of global warming has become apparent.
- In particular, the increase in CO_2 emissions in the business and household sectors is significant compared to other sectors. (The emissions in two sectors in 2012 increased by approximately 1.5 times the level of the base year.)

Figure: Breakdown of CO^2 emissions

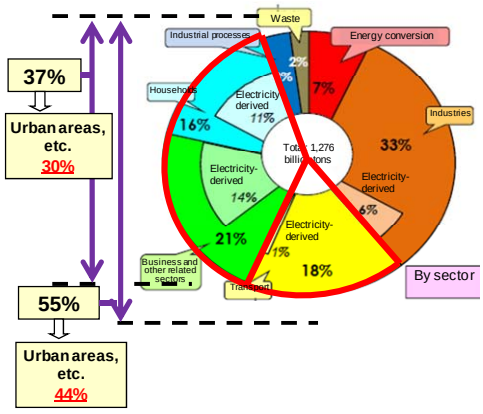


Table: Change in CO^2 emissions by sector from the base year

		Base year of the Kyoto Protocol (proportional composition)	FY2011 (ratio to the base year)	Change from the previous fiscal year	FY2012 (ratio to the base year) [proportional composition]
Total		1,144 [100%]	1,241 (+8.4%)	→ <+2.8%> →	1,276 (+11.5%) [100%]
Energy-derived	Sub total	1,059 [92.6%]	1,173 (+10.8%)	→ <+2.9%> →	1,208 (+14.0%) [94.7%]
	Industrial sector (factories, etc.)	482 [42.1%]	417 (−13.5%)	→ <+0.1%> →	418 (−13.4%) [32.7%]
	Transport sector (automobiles, etc.)	217 [19.0%]	230 (+5.6%)	→ <−1.4%> →	226 (+4.1%) [17.7%]
	Business and other related sectors (commerce, services, offices, etc.)	164 [14.4%]	250 (+52.2%)	→ <+8.9%> →	272 (+65.8%) [21.4%]
	Household sector	127 [11.1%]	189 (+48.1%)	→ <+7.8%> →	203 (+59.7%) [16.0%]
	Energy conversion sector (power plants, etc.)	67.9 [5.9%]	87.6 (+29.1%)	→ <+0.2%> →	87.8 (+29.4%) [6.9%]
Non-energy derived	Sub total	85.1 [7.4%]	67.5 (−20.6%)	→ <+0.8%> →	68.1 (−20.0%) [5.3%]
	Industrial processes	62.3 [5.4%]	41.2 (−33.9%)	→ <+0.8%> →	41.5 (−33.4%) [3.3%]
	Waste (incineration, etc.)	22.7 [2.0%]	26.3 (+15.8%)	→ <+0.9%> →	26.5 (+16.9%) [2.1%]
	Leakage from fuel	0.04 [0.0%]	0.03 (−11.2%)	→ <−2.5%> →	0.03 (−13.4%) [0.0%]

(Unit: million tons of CO^2)

Business sector 1990 (base year) → 2012 **Increased by 65.8%**

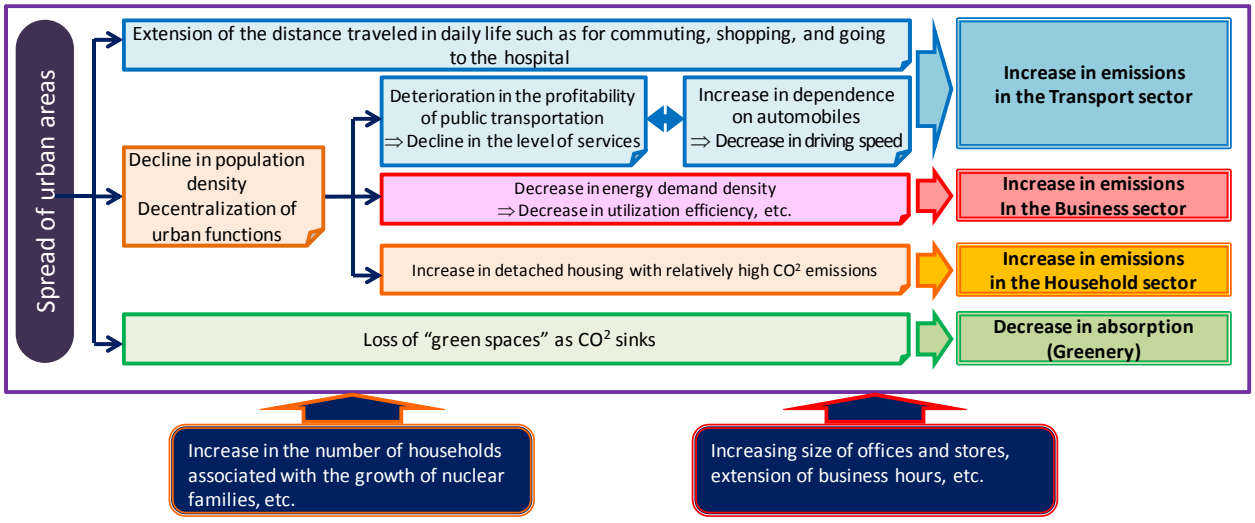
Household sector 1990 (base year) → 2012 **Increased by 59.7%**

Source: Ministry of the Environment: *FY2012 Greenhouse Gas Emissions (definitive values).*

(2) Relationship between Urban Structures and CO_2 Emissions

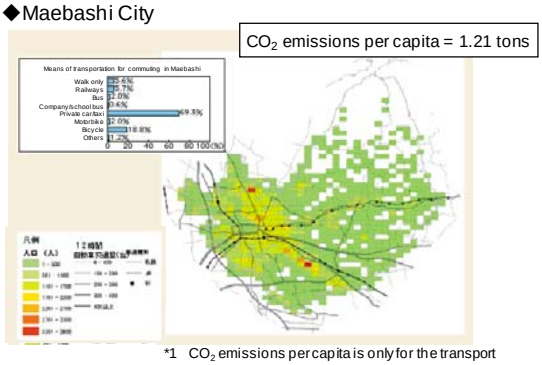
- In Japan, the urban areas had grown "thinner and broader", due to the concentration of population in cities during the population increasing period.
- These changes of urban structures have had a huge impact on the increase in CO_2 emissions.

Figure: Mechanism of CO2 emissions increase (image)



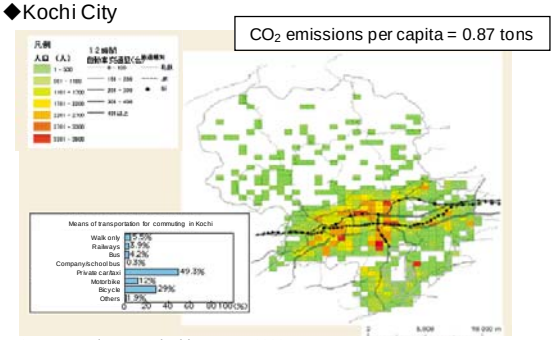
Although the cities of Maebashi and Kochi are almost the same in terms of area and population, Maebashi has a greater expanse of low-density built-up areas and a higher rate of dependence on automobiles. As a result, annual CO_2 emissions per capita in the transport sector are about 40% higher in Maebashi with 1.21 tons compared to Kochi with 0.87 tons.

◆Maebashi City

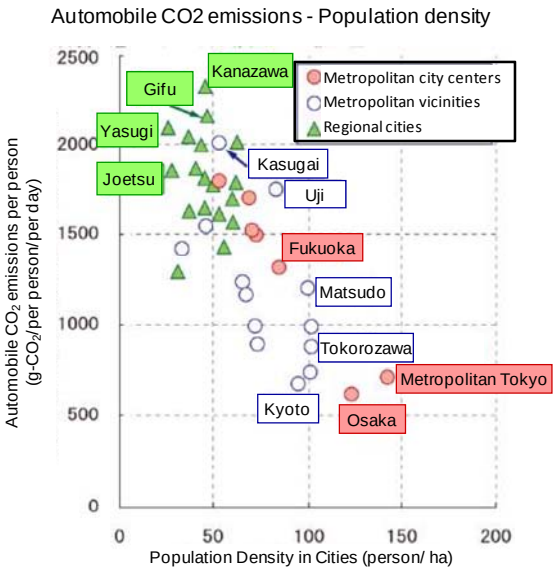


*1 CO_2 emissions per capita is only for the transport sector.

◆Kochi City



Source: Environmental White Papers 2006

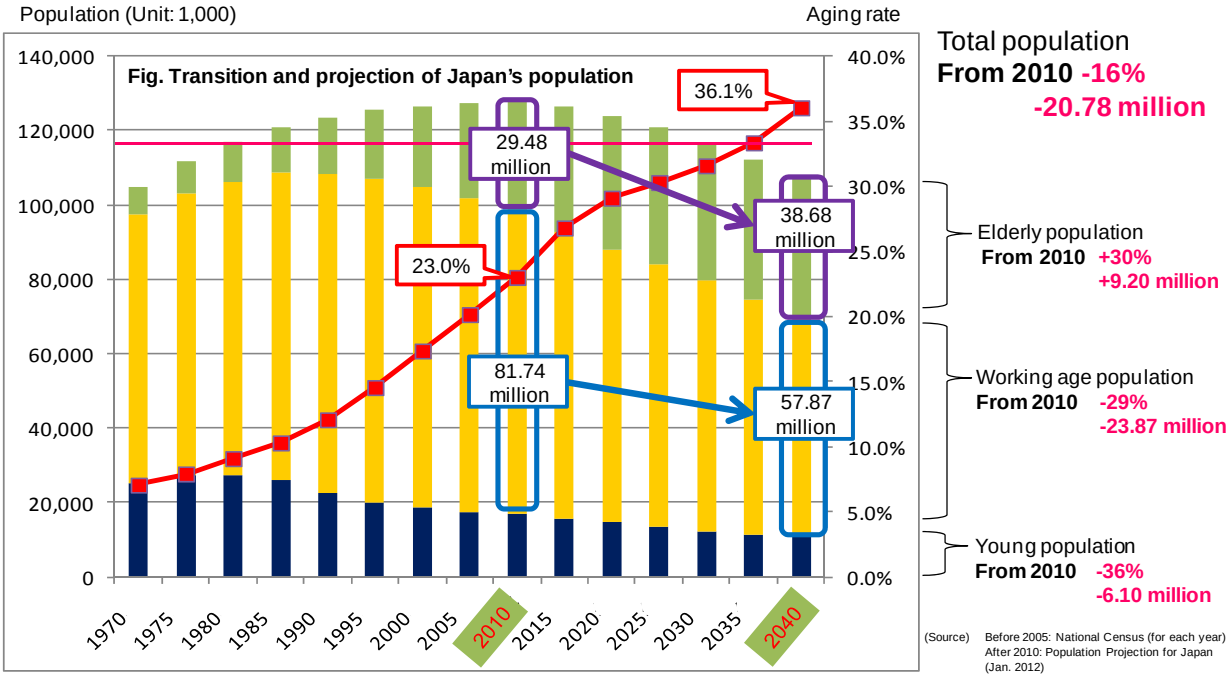


Source: Mamoru Taniguchi: *Time Series Analysis of Automobile CO_2 Emissions from Urban Structures, Journal of City Planning Institute of Japan, No. 43-3, October 2008*

(3) Recent Changes in Social and Economic Situation

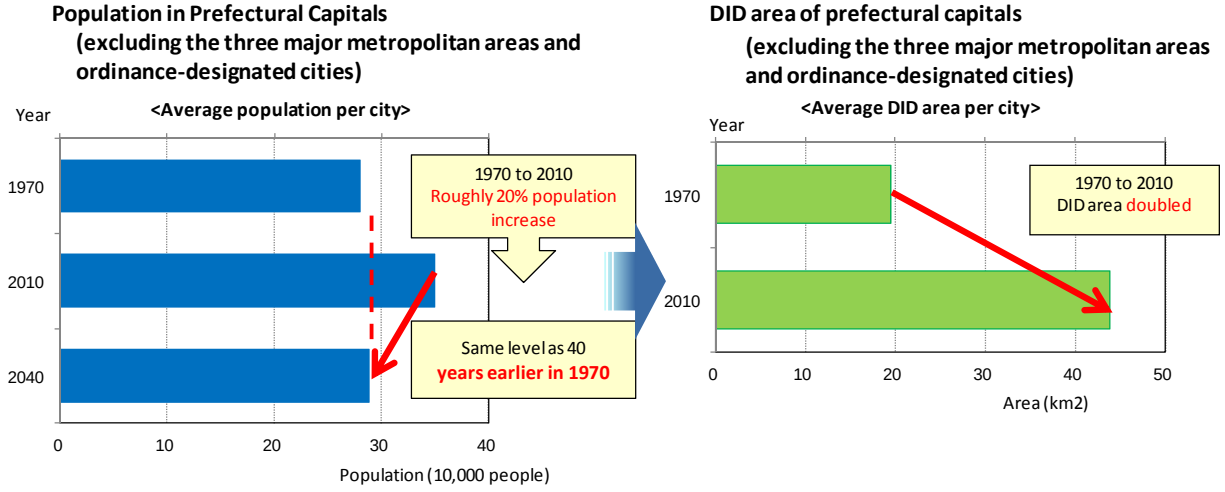
■Declining and Rapidly- aging Population

- Japan's population is forecasted to decline by about **20 million** people in the next **30** years. During this period, the population will be aging and 1 in 3 people will be **65** years old or older in **2030**.



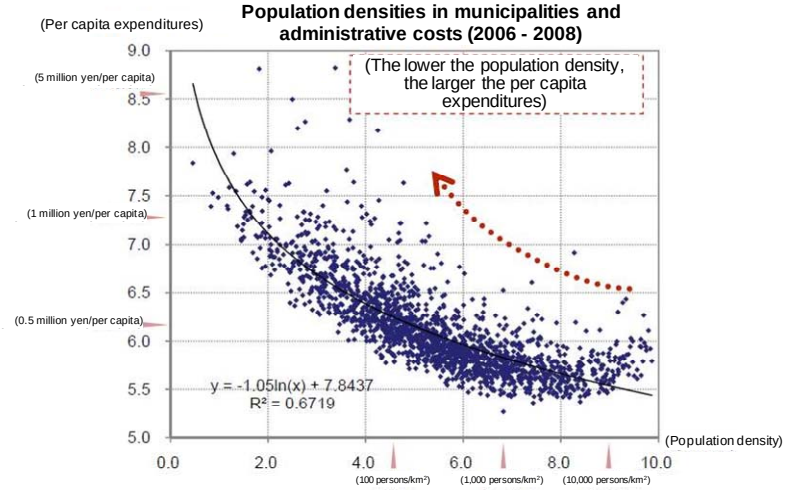
(Source) Before 2005: National Census (for each year)
After 2010: Population Projection for Japan (Jan. 2012)

- The average DID area of prefectural capital cities expanded to double while the average population in those cities increased by 20% in the past 40 years.
- However, it is predicted that the average population will decrease by 20%, the same level as 40 years earlier, in the next 30 years.
- The decline of population would make urban areas much "thinner" without taking any measures. Consequently, it would cause several urban problems, such as highly increase in CO_2 emission, impoverishment of the regional economy, etc.



■Deteriorating Financial Conditions

- The municipal revenue is expected to decrease with the decline of Japan's population, while the municipal expenditure to increase due to such factors as the increase of social security expenditures with the population aging. As a result, the fiscal balance is feared to further deteriorate.
- There is a certain proportional relationship between the density of the population and the per capita administration costs.
- With the financial conditions feared to deteriorate further in the future, it is essential to raise population density and improve efficiency in administrative work in order to maintain sustainable city management.



The National Land Council: Data from the Third Committee for a Long-term Outlook