An Easily Traceable Scenario for 80% CO_2 Emission Reduction in Japan for Local Energy Strategy Development

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Presentation Outline

1. Background and Objective
2. Methodology
3. Discussion
4. Conclusions

1. Background

- Japan's CO_2 emission reduction target of 80% reduction by 2050 and 25% reduction by 2020
- Regional challenges become necessity
- 13 Eco-Model Cities for the Low Carbon Societies are selected and designated by the government (2008-2009).
- A Challenge in R&D by JST-RISTEX

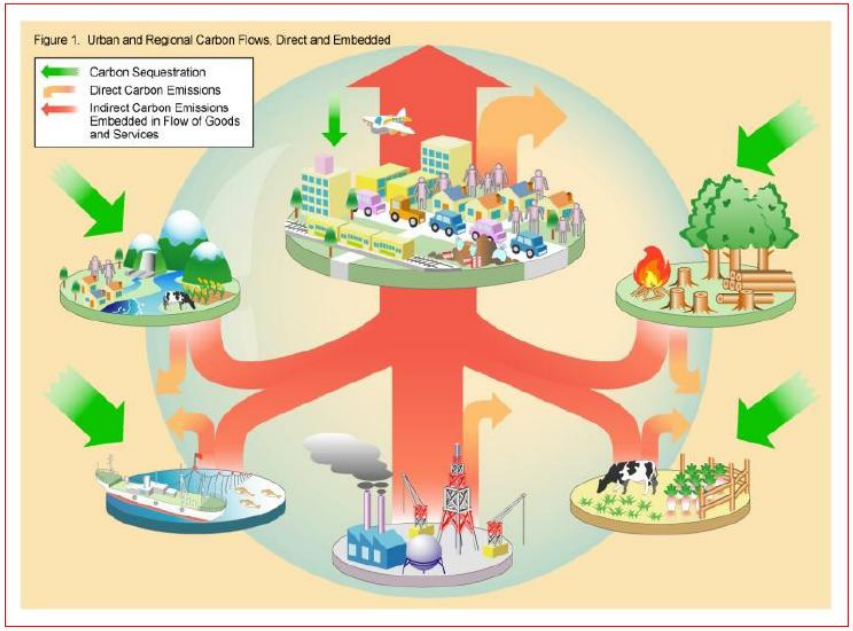
  "Community Based Actions against Global Warming and Environmental Degradation" R&D Area

The existing data dose not show the real "Indirect" emission

◆CO_2 from power and steam generation are only allocated and CO_2 emission from residential sector accounts for only 13%

◆But should be considered all the CO_2 at the final consumptions

◆Objective: to obtain the final consumption related CO_2 emission, then we can see the impact of shifting our final consumption mode into low CO_2 emission mode



Source: GCP Tsukuba International Office

Outline of this work

Step1

Model calculation of the final consumption related CO_2 emissions

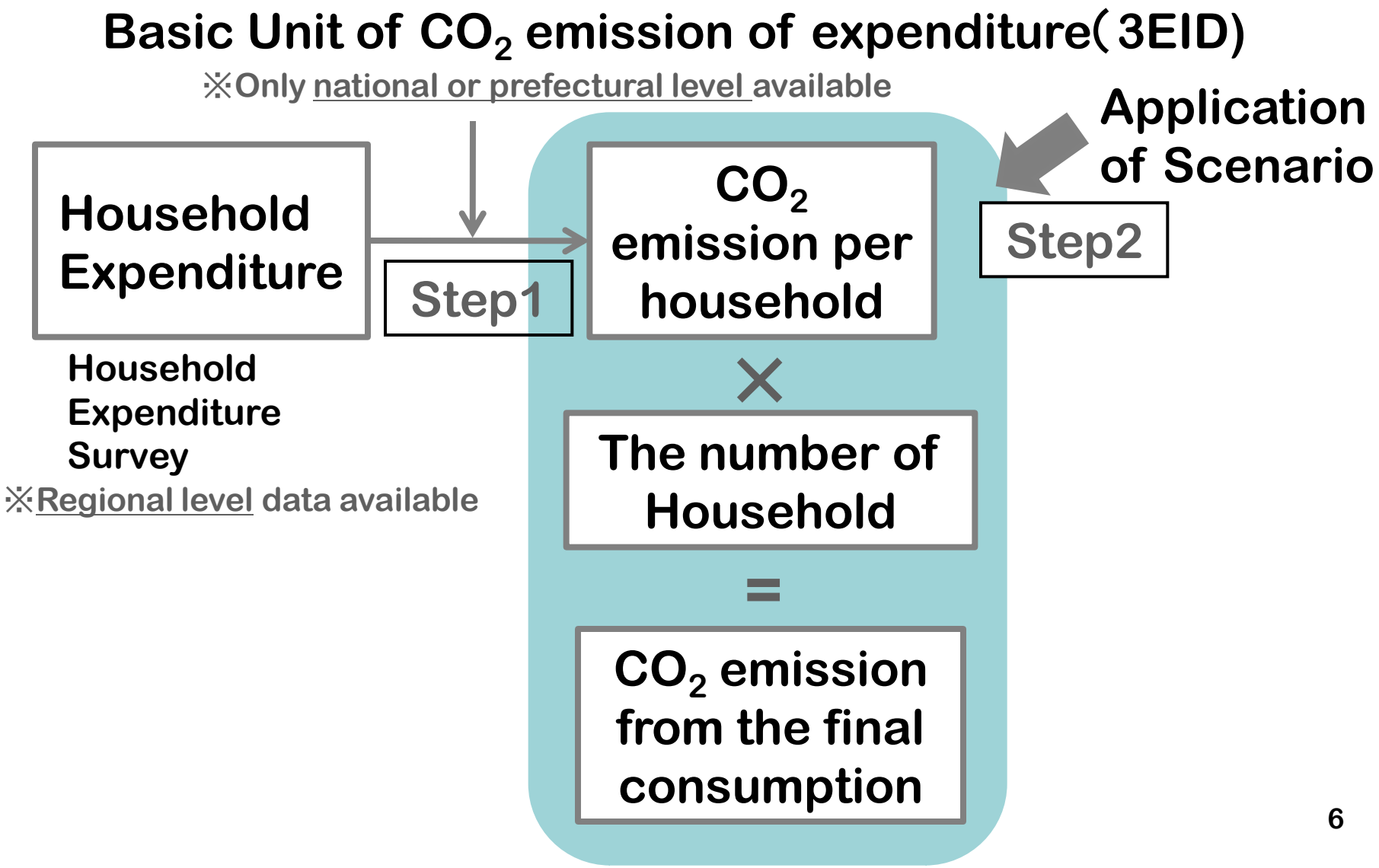
Step2

Proposition of the technology scenarios that could be appropriate to achieve massive CO_2 emission reduction from the final demand side

Step3

Examination of the effect by applying the scenarios to Kyoto

Method to determine realistic CO_2 data of regional consumption



Step3

Regional Scenario based on appropriate technology

(1) All Electric Transportation

(2) Woody Housing and Household Energy Saving

(3) Renewable Energies

(4) Efficient Energy Utilization of Wastes

Case study region: Kyoto

◆One of Eco-model cities

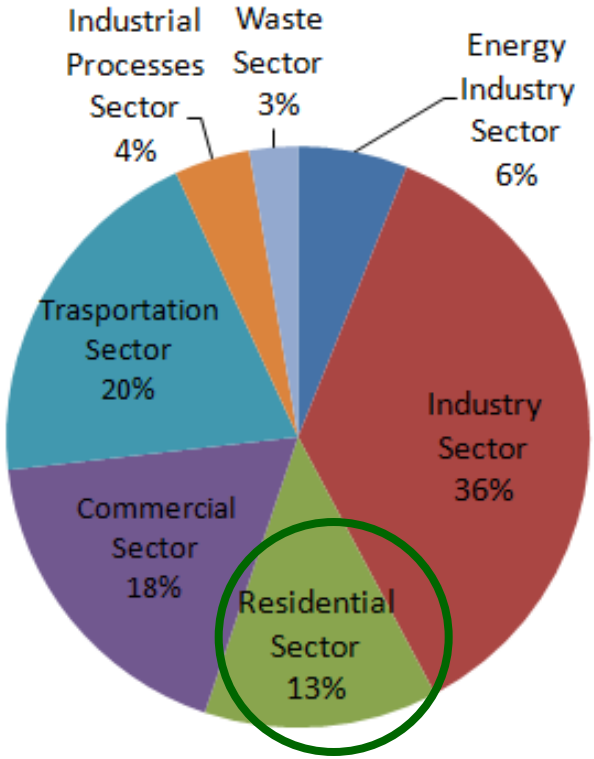
◆40%CO_2 emission reduction by 2030, and 60% by 2050 through the following strategic actions:

(a)Creation of a pedestrian friendly city;
(b)Formation of low carbon landscape through recognition of woody culture;
(c)Lifestyle change and technology innovation;
(d)The maximum utilization of renewable energy and wastes.

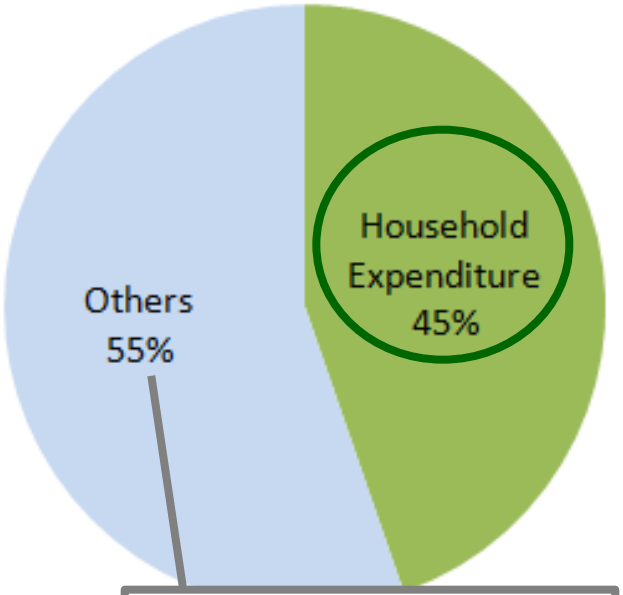
Result1: Indirect emission through commodity consumption is significant (wo/13%→w/45%)

1,273 million t-CO_2(2005)

Indirect emission



Real Indirect emission



Public and private infrastructure

Source: Greenhouse Gas Inventory Office, Japan

CO_2 emission reduction scenario application to household in Kyoto

Emission groups	CO_2 emission in 2005 [kg-CO_2/year]	CO_2 emission under the scenario [kg-CO_2/year]	Reduction ratio [%]
Fuel and light	6,043	1,209	80
Transportation and communication	836	461	50
(Gasoline)	(375)	(0)	(100)
Disposals	116	0	100
Food	1,558	779	50
Others	2,431	1,216	50

(1) All electric transportation

EV and modal shift from vehicles and trucks to rails and other electric transport

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Transportation and communication	836	461	50
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Food	1,558		50
Others	2,431	1,216	50
Total CO_2 emission per household	10,984	3,664	33.4

Towards zero

(2)Woody housing and household energy saving

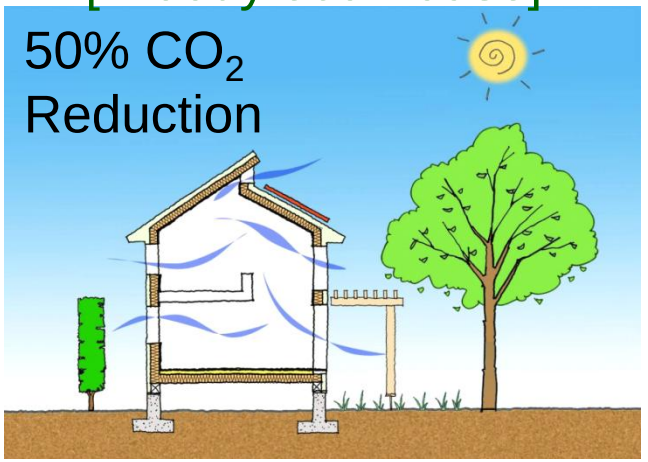
About 67% of land is forest

Devastated in the last several decades

Revitalization of domestic forest industry is a crucial issue in Japan.

Revitalization of forest industry

[Woody eco-house]



+ Energy saving home applicants(15%)

+ Utilization of renewable energy(15%)

= 80% CO_2 emission reduction

Source: Woody eco-house guideline(Hino-city, Tokyo)

(3) Renewable energies

One of the highest possibilities of renewable energy introduction by 2050 in Japan estimates:

Electricity:
59% of system power supply and 79% of dispersed power supply can be provided by renewable energies

- Hydro
- Geothermal
- Biomass
- Photovoltaics
- Wind

Heat supply:
100% of household heat supply can be provided by renewable resources

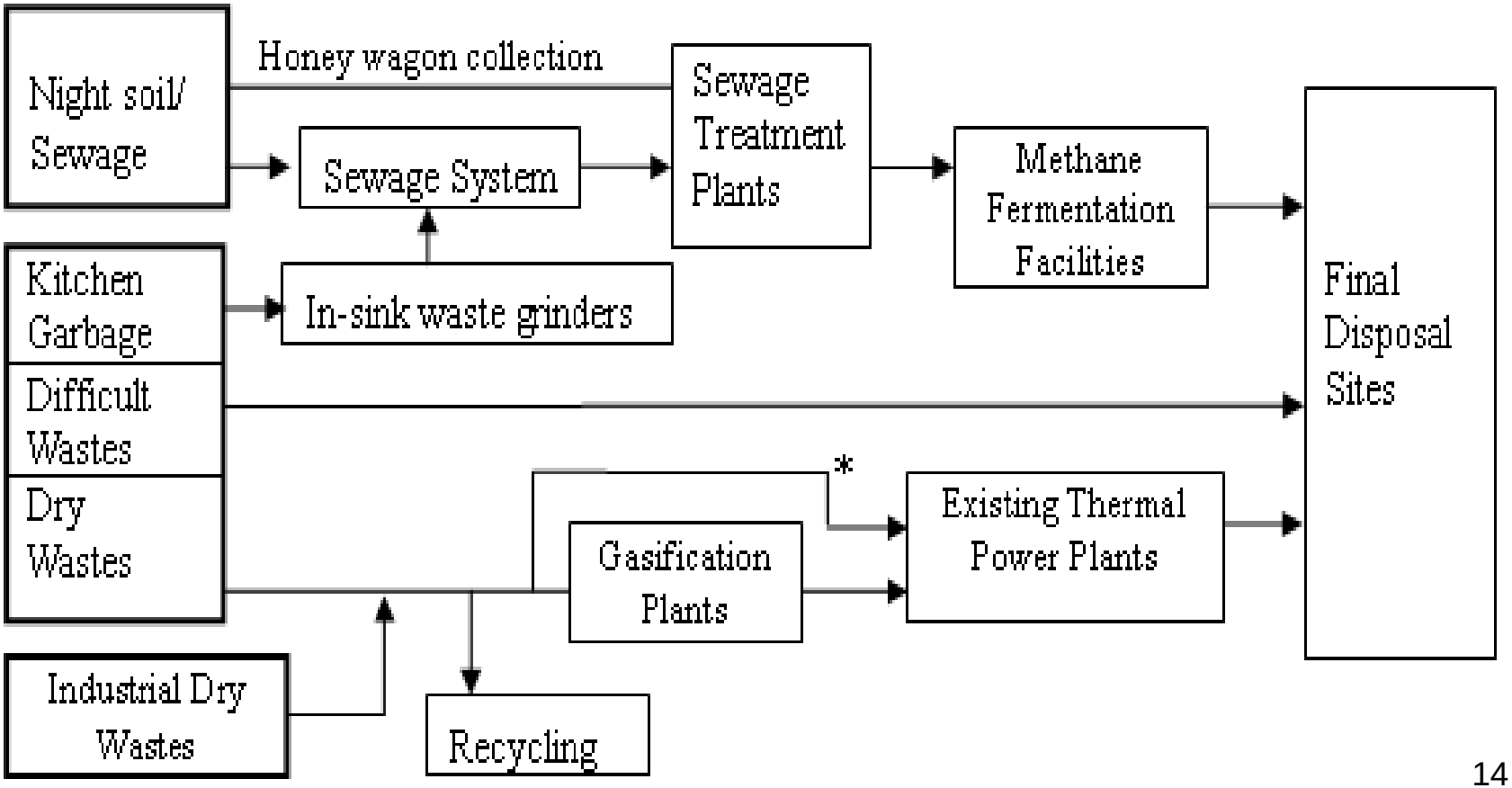
- Geothermal
- Biomass
- Solar heat
- Earth thermal

We assume;
◆Scenario (2)
◆50% CO_2 emission reduction from goods consumption

Source: Institute for Sustainable Energy Policies,
"The Year 2050 Renewable Energy Vision" 2008

(4)Efficient energy utilization of wastes

Applying integrated waste and utility management, we assume that the CO_2 emission from disposal Become nearly zero by 2050.



Source: Horio, Shigeto and Shiga, Waste Management (2009)

Result2: CO_2 emission reduction scenario application to household

Direct Energy Consumption

Emission groups	CO_2 emission in 2005 [kg-CO_2/year]	CO_2 emission under the scenario [kg-CO_2/year]	Reduction ratio [%]
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Indirect Energy Consumption

Result 2: 80% CO_2 emission reduction scenario

	CO_2 emission per person [kg-CO_2/year] <a>	Population <b>	Total CO_2 emission [t-CO_2/year] <a>*<b>	Reduction ratio to 2005 [%]
(a) In 2005	4,465	1.47million	6.6 million	-
(b) Under Scenarios (no population change)	1,489	1.47million	2.2million	67
(c) Under Scenarios (with population change)	1,489	0.8million	1.2 million	82
(d) With forest carbon uptake	1,489	0.8million	1.1million	83

Conclusions

◆We developed a novel approach of calculating the total CO_2 emission corresponding to the final consumption.

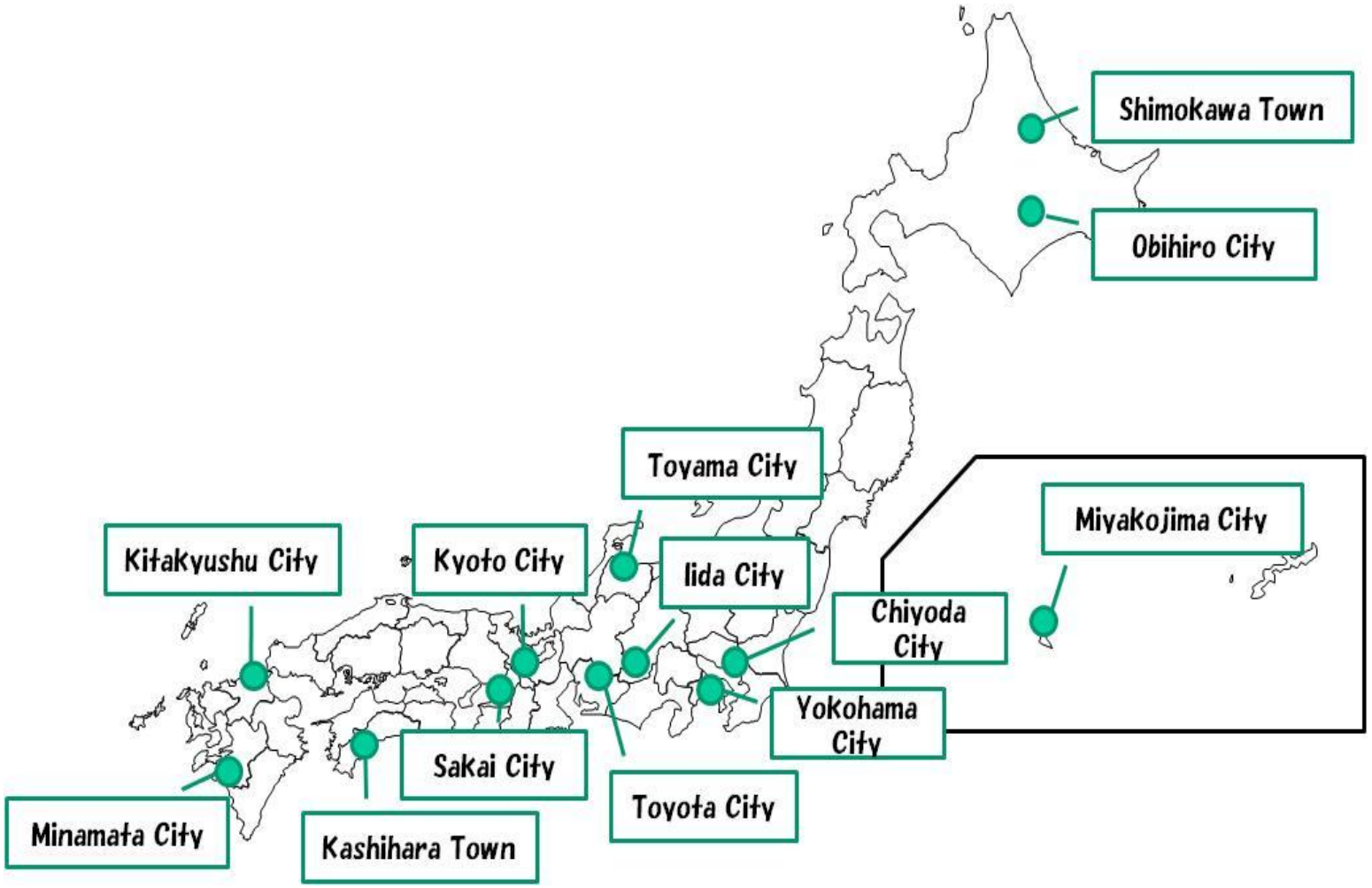
◆Applying appropriate technology scenarios to Kyoto, we found that about a 80% CO_2 emission reduction is possible with the potential emission reduction from construction of private and public infrastructures.

◆Shifting our final consumption mode into low CO_2 emission mode has a significant impact.

◆Particularly reduction of direct energy consumption (Fuel & Lights/Transportation & Communications) is the key for local energy strategy.

Thank you!

Eco-Model Cities for the Low Carbon Societies（2008-2009）



A Challenge in Research and Development (R&D)

"Community Based Actions against Global Warming and Environmental Degradation" R&D Area by JST-RISTEX

(Japan Science and Technology Agency/ Research Institute of Science and Technology for Society)

YOKOVISION
for Collaborative −80% Actions

(FY2008-2013)

P.O.: Prof. Masayuki HORIO

◆Call for R&D proposals(up to 0.3million $/year)

This study: One of outcomes of this R&D area