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**CO2 reduction with
traffic signal control, toward JCM**

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General Manager

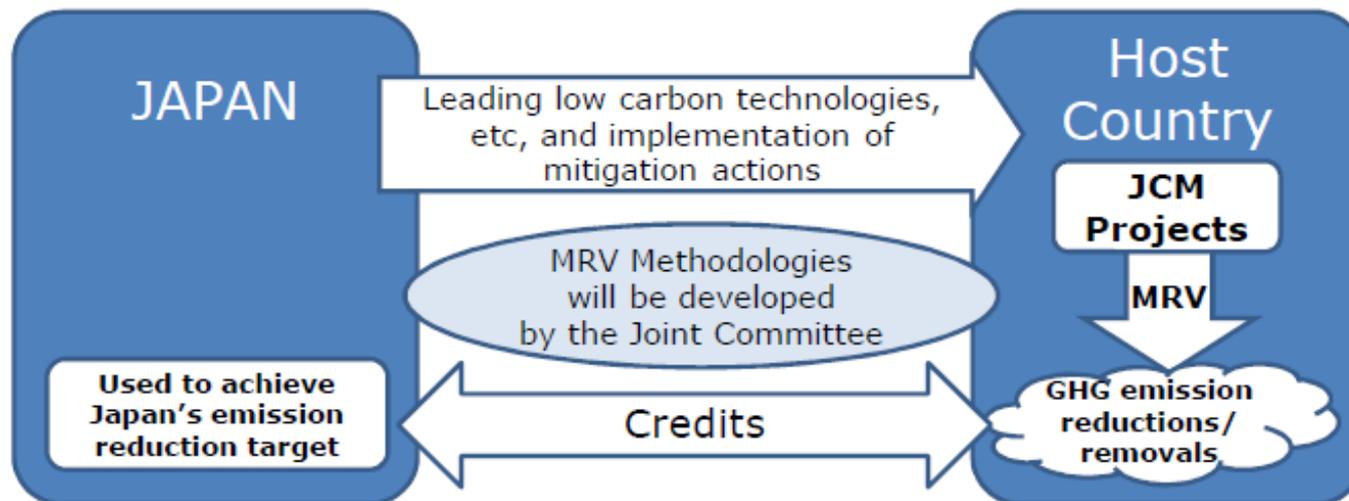
Global Networking

Japan Automobile Research Institute

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What is JCM?



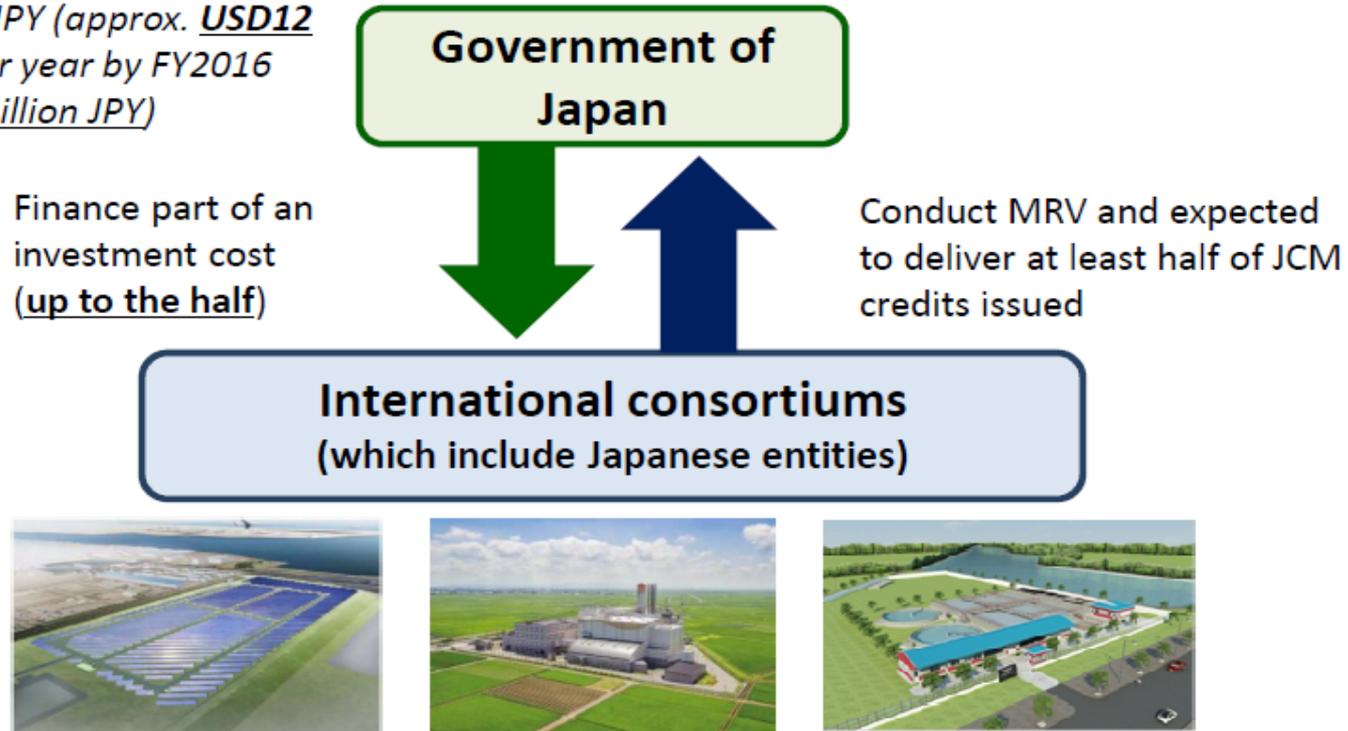
JCM: **‘Joint Crediting Mechanism’** is an initiative aimed at facilitating the diffusion of advanced low carbon technologies, products, systems, services and infrastructure, which was **developed by the Japanese government in August 2013**.

12 partner countries: Mongolia, Bangladesh, Ethiopia, Kenya, Maldives, **Viet Nam**, Lao People's Democratic Republic, **Indonesia**, Costa Rica, Palau, Cambodia and Mexico.

Source: New Mechanisms Information Platform HP
<http://www.mmechanisms.org/e/index.html>

Financing Program for JCM Model Projects by MOE: Ministry of Environment

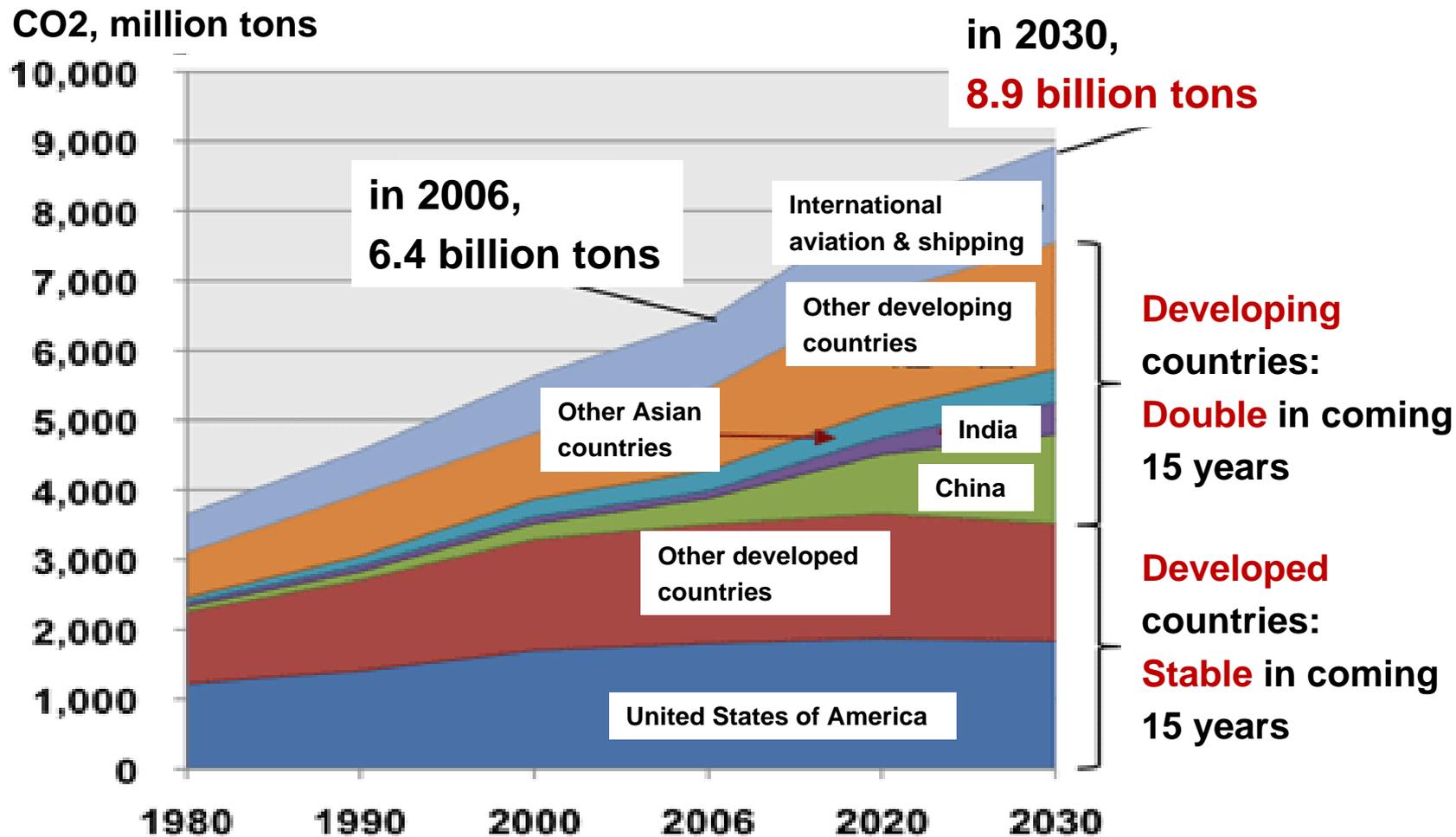
The budget for FY 2014
*1.2 billion JPY (approx. **USD12 million**) per year by FY2016*
*(total **3.6 billion JPY**)*



- Scope of the financing: facilities, equipment, vehicles, etc. which reduce CO₂ from fossil fuel combustion as well as construction cost for installing those facilities, etc.
- Eligible Projects : starting installation after the adoption of the financing and finishing installation within three years.

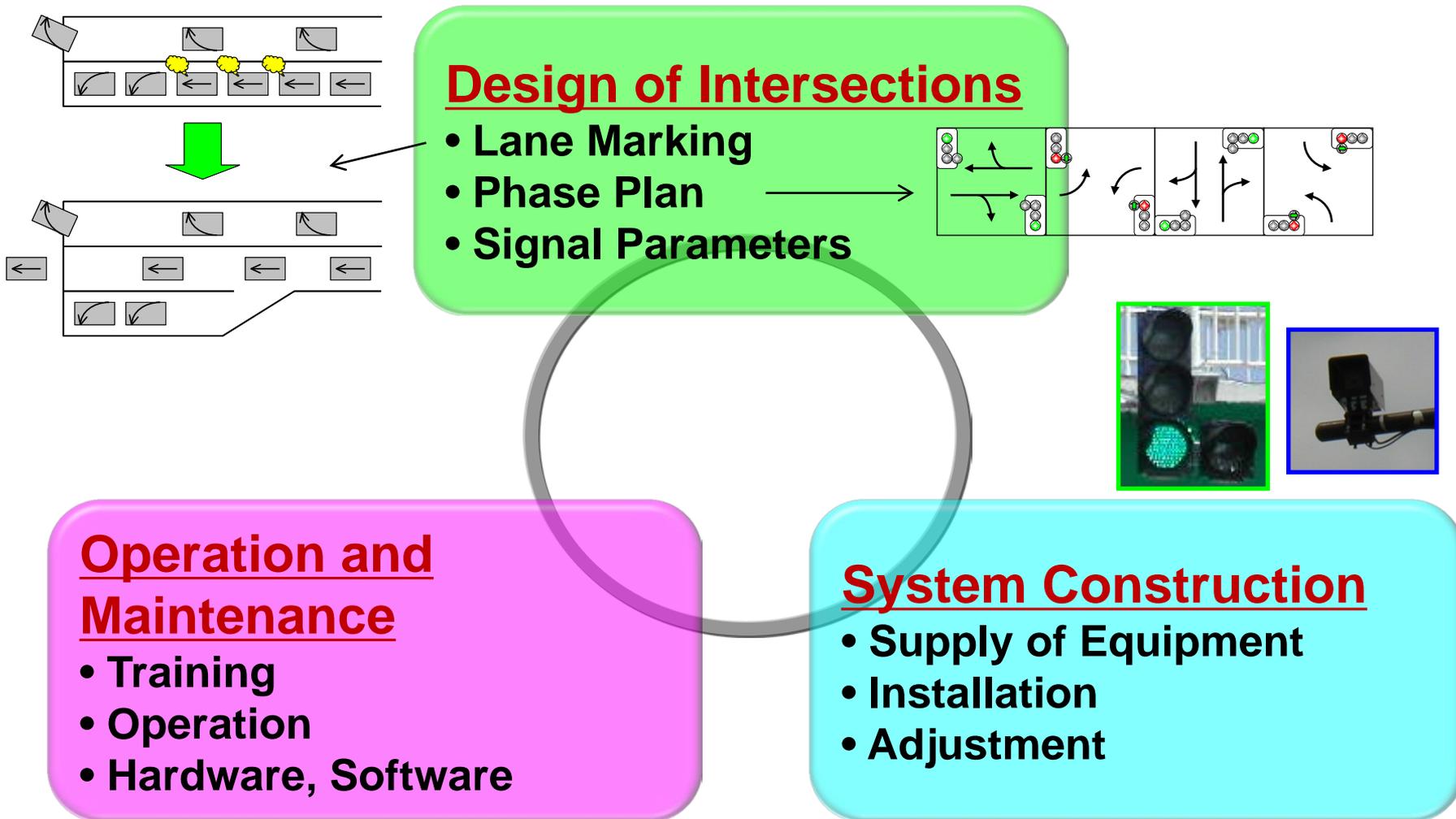
Source: New Mechanisms Information Platform HP
<http://www.mmechanisms.org/e/index.html>

CO2 emission volume from the transportation sector



Source: Ministry of Land, Infrastructure, Transport and Tourism in Japan

3 keywords of traffic management



Source: Sumitomo Electric Industries, Ltd.

Improvements of signalized intersections - 1/2

Before

After



**Traffic signals
introduction**



**Right-turn lane
addition**



**From one lane to
right-turn & left-turn
lanes**

Source: Sumitomo Electric Industries, Ltd.

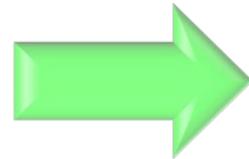
Improvements of signalized intersections - 2/2



Detector



Controller



**Green light
time adjustment**



Movie of double speed

Source: Sumitomo Electric Industries, Ltd.

Candidate cities for signal control introduction

These cities have a big opportunity to **reduce traffic jams** with signal control introduction.

<Ranking of cities with heavy traffic jams>

1: **Bangkok, Thailand**

Around 600 signals (1,000 signals in the future)

2: **Jakarta, Indonesia**

3: **Nairobi, Kenya**

4. **Manila, Philippines**

5. **Mumbai, India**

6. **Kampala, Uganda**

7. **Lexington, Kentucky, USA**

8. **Austin, Texas, USA**

9. **Seoul, Korea**

10. **Dhaka, Bangladesh**

Around 400 signals

Source: Ordering by BBC of England in 2012,
No. of signals by team estimation

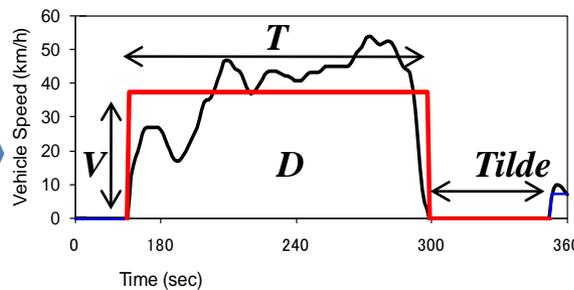
Concept of CO2 emission volume evaluation tool

ITS Measures

Traffic Simulation: TS



Driving data



Express driving pattern by SSF (Stepwise Speed Function)

Emission Model: EM

$$E = C_{dist} \cdot D_n + C_{V_n^2} \cdot V_n^2 + C_{V_n} \cdot V_n + \dots$$

CO₂ emission of target area

Estimate by Multiple regression from SSF data

Comprehensive evaluation of various scales (integrated approach)

Hybrid simulation

Evaluation of the ITS in a large area

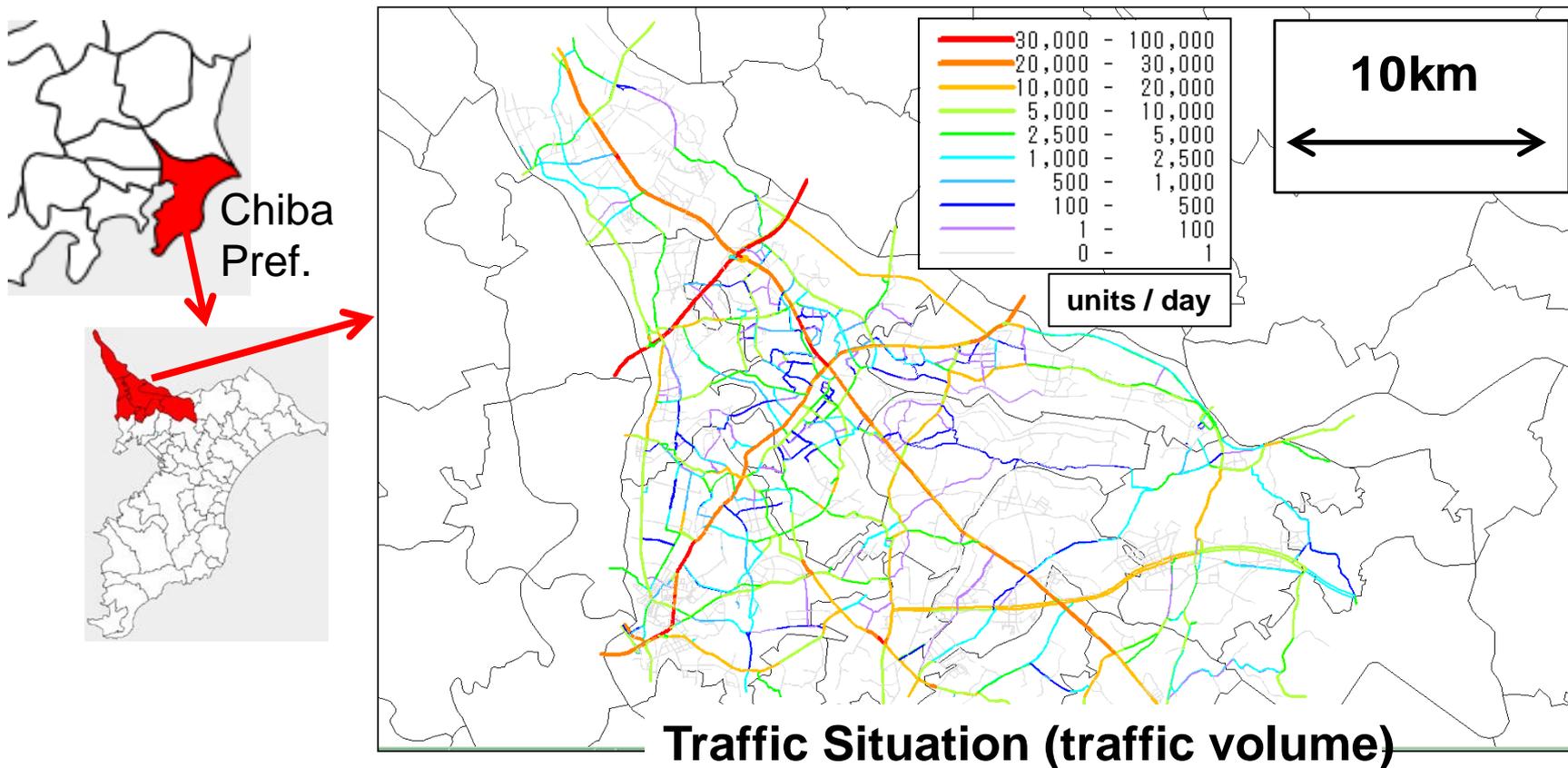
Mesoscopic Harmonization

Driving dynamics is considered statistically

Mesoscopic EM

Source: Energy-ITS Project, 2008-2013

CO2 Evaluation, Kashiwa City in Japan



Roads: more than **5.5m width** in Kashiwa City and surrounding area.
 (total road length: **2,399 km**)
 Period: **24 hours** of working day

Source: Energy-ITS Project, 2008-2013

CO2 evaluation results, Kashiwa City in Japan

		A	B	C	D	E	F
Eco-driving Ratio	0%	★					
	30%		★	★			
	70%				★	★	★
Eco-routing Ratio	0%	☆	☆		☆		
	30%			☆			
	70%					☆	☆
Idling Stop							◎
CO₂ Emission		-	-2.2%	-2.7%	-6.6%	-7.3%	-8.8%

Measures for evaluation

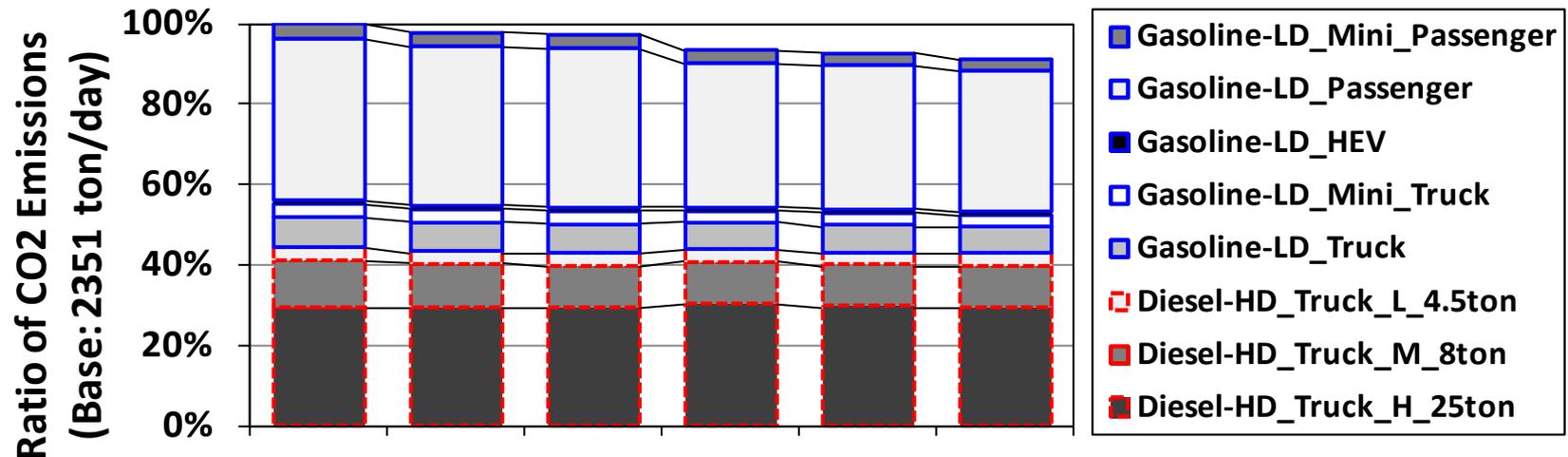
Eco-driving :

- Moderate start
- Constant speed cruising
- Early deceleration

Eco-routing :

- Route of the shortest time

Idling Stop



Source: Energy-ITS Project, 2008-2013

Collaboration points with you

MRV: Measure Report and Validation process creation

We'd like to **research and develop the MRV points** together with you for the scoped area with signal intersections:

- ✓ **M**onitoring processes with reasonable cost
- ✓ **R**eporting method with reasonable human resources
- ✓ **V**alidation method with variability over time against an unspecified number of vehicles in the scoped area

Relationship building with supervisory authorities

We'd like to **build relationships** with supervisory authorities for intersections and signals together with you, because their understanding and cooperation is crucial.

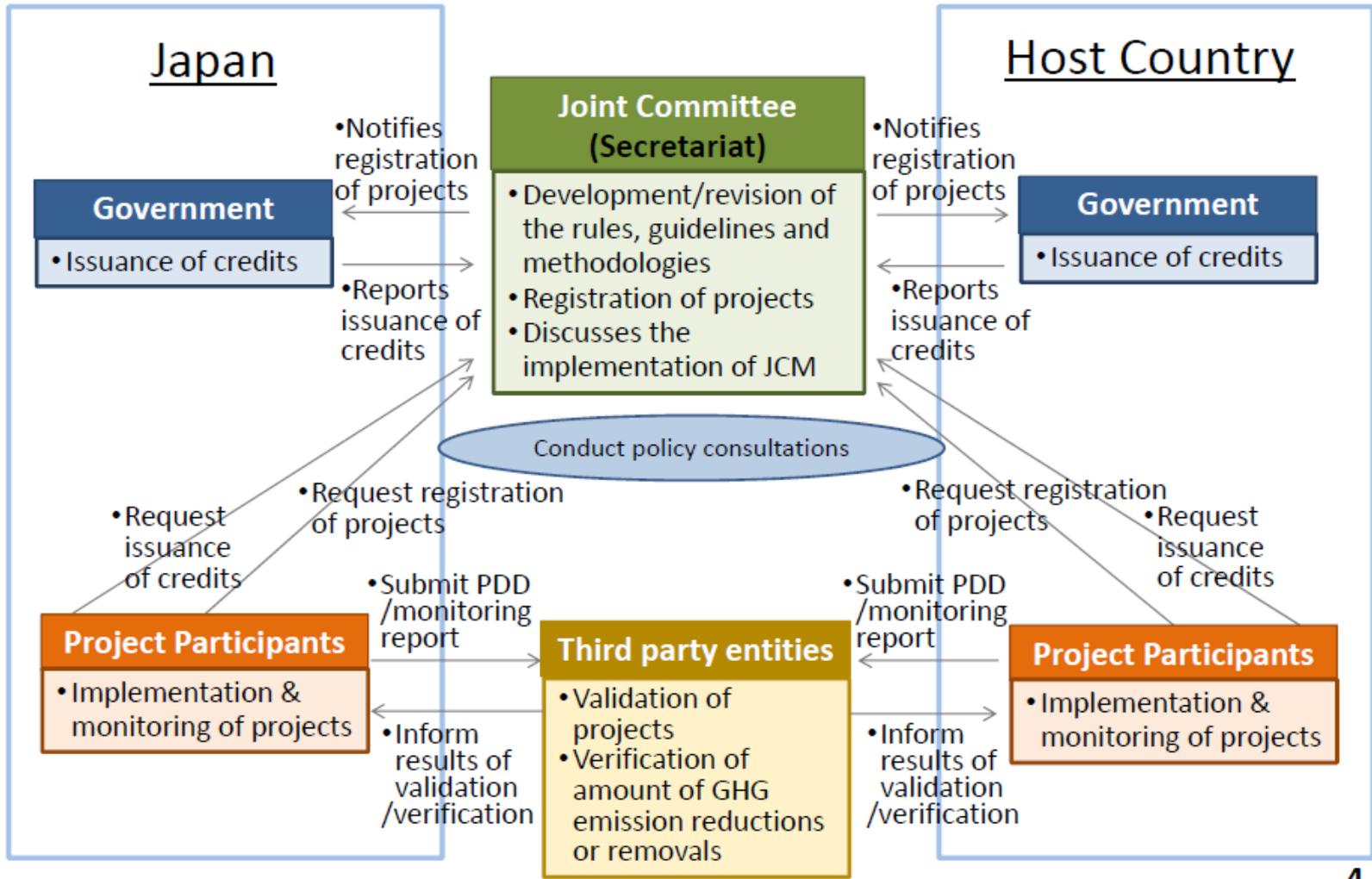
Thank you for your attention.

**If you have any comments and questions,
please feel free to contact Mr. Mitsuo Yonezawa.**

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Scheme of the JCM



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Source: New Mechanisms Information Platform HP
<http://www.mmechanisms.org/e/index.html>

JCM Model Projects in 2014 by MOEJ

Viet Nam:

◆Anaerobic Digestion of Organic Waste for Biogas Utilization at Market

Organic waste discharged from a market is used to generate biogas in a methane fermentation system. The biogas is then supplied to a seafood processing factory.

◆Eco-driving by Utilizing Digital Tachograph System

Trucks are fitted with eco-drive improving system using digital tachographs, realizing CO₂ emission reduction and safe-driving.

Indonesia:

◆Power Generation by Waste Heat Recovery in Cement Industry

Waste heat recovery system with suspension preheater boiler and air quenching cooler boiler is installed in cement production process and generates electricity (28 MW) to be used in the cement plant.

◆Palm Waste Biomass Power Generation Project

Fluidized bed furnace is installed in a biomass power generation plant (6.2 MW) utilizing EFB (Empty Fruit Bunch) as a fuel.

◆Solar Power Hybrid System Installation to Existing Base Transceiver Stations in Off-grid Area

Solar power (900 kW) and lithium ion batteries are installed to replace inefficient diesel generators at mobile base stations.

◆Energy Saving through Introduction of Regenerative Burners to the Aluminum Holding Furnace of the Automotive Components Manufacturer

Regenerative burners which recover heat from exhaust gas efficiently are installed in a casting process.

◆Energy Saving for Textile Factory Facility Cooling by High Efficiency Centrifugal Chiller

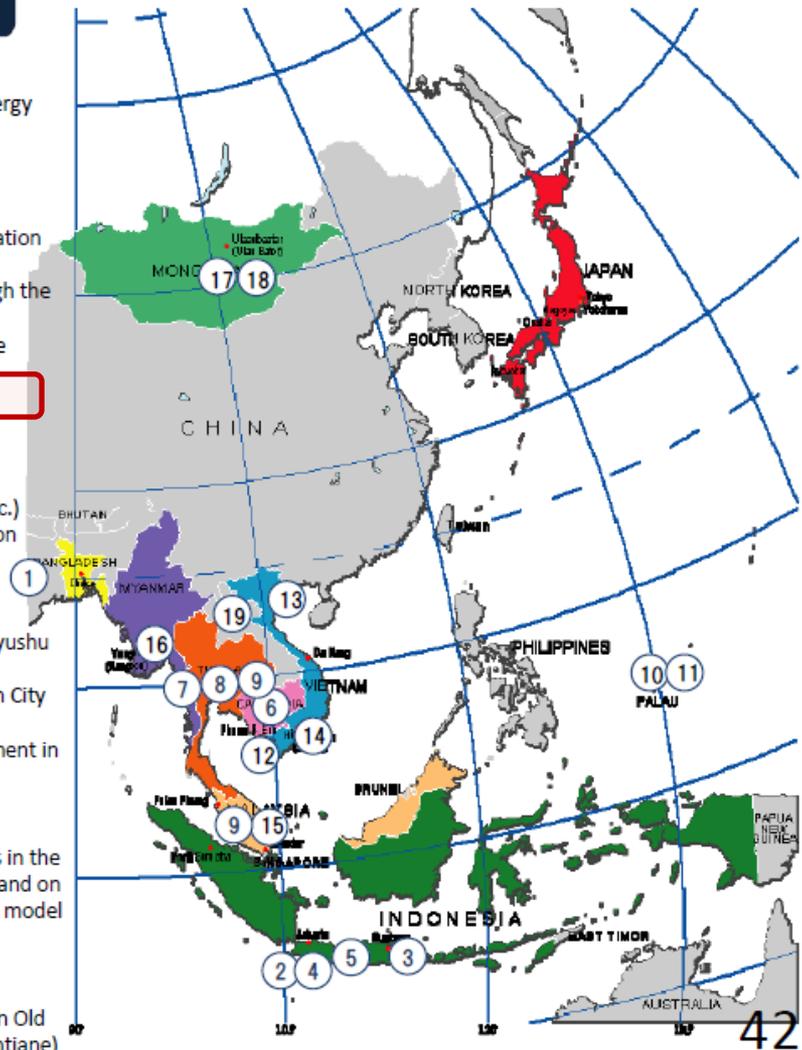
Chiller with a high efficiency compressor and economizer cycle are installed.

Source: New Mechanisms Information Platform HP
<http://www.mmechanisms.org/e/index.html>

Large Scale JCM Feasibility Study in 2014 by MOEJ

Selected Studies

1. The feasibility study to promote Low Carbon Technology application in India(Gujarat , Maharashtra ,Punjab)
2. Feasibility study on financing scheme development project for promoting energy efficiency equipment installation in Indonesia(Jakarta, Bali etc.)
3. Low Carbon City Planning Project in Surabaya, Indonesia(Surabaya City)
4. Feasibility Study on Eco-Lease Scheme for Low Carbon Vehicle towards Joint Crediting Mechanism Projects Expansion (Indonesia National Level)
5. Collaboration on Project for Developing a Low Carbon Society under collaboration between Bandung city and Kawasaki city in Bandung, Indonesia(Bandung)
6. Study for Developing Environmentally and Culturally Sustainable Cities through the Joint Crediting Mechanism in Siem Reap(Angkor Park and Siem Reap city)
7. Study on the Accelerating Implementation of Bangkok Master Plan on Climate Change through the JCM(Bangkok)
8. Introduction of a recycling system for cars and parts in Thailand(Bangkok)
9. Strategic Promotion of Recovery and Destruction of Fluorocarbons (Bangkok/Johor Bahru)
10. Demonstration Project on Installing an Evacuation Shelter with Renewable Energy as a "Low-Carbon/Resilient Model for Small Island Countries"(Palau etc.)
11. Feasibility study on comprehensive resource circulation system for low carbon society in Republic of Palau(Palau)
12. The feasibility study toward eco-island in cooperation between Kien Giang Province and Kobe City(Kien Giang Province)
13. Hai Phong Green Growth Action Plan Development in Association with Kitakyushu City (Hai Phong City)
14. Ho Chi Minh City – Osaka City Cooperation Project for Developing Low Carbon City (Ho Chi Minh City)
15. Feasibility Study on a Large-Scale GHG Emissions-Reduction Project Development in the Iskandar Development Region, Malaysia(Iskandar Development Region)
16. Feasibility Study on Rice Husk Power Generation System for Low-carbon Communities in Ayeyarwady Region, Myanmar(Ayeyarwady)
17. Study for the development of JCM projects for comprehensive improvements in the power generation, transmission and distribution systems in Ulaanbaatar City and on the possibility of nationwide horizontal application of the same improvement model in Mongolia(Ulaanbaatar)
18. Feasibility study on a programme-type finance scheme for the JCM in Mongolia(Ulaanbaatar)
19. JCM Feasibility Studies of GHG Mitigation Projects Contributing to Low Carbon Old Capital based on City-to-City Cooperation between Vientiane and Kyoto("Vientiane")



Source: New Mechanisms Information Platform HP
<http://www.mmechanisms.org/e/index.html>