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CO_2 Emissions Reduction in Japan's Road Transport Sector

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Chairman, Climate Change Subcommittee,

Environment Committee

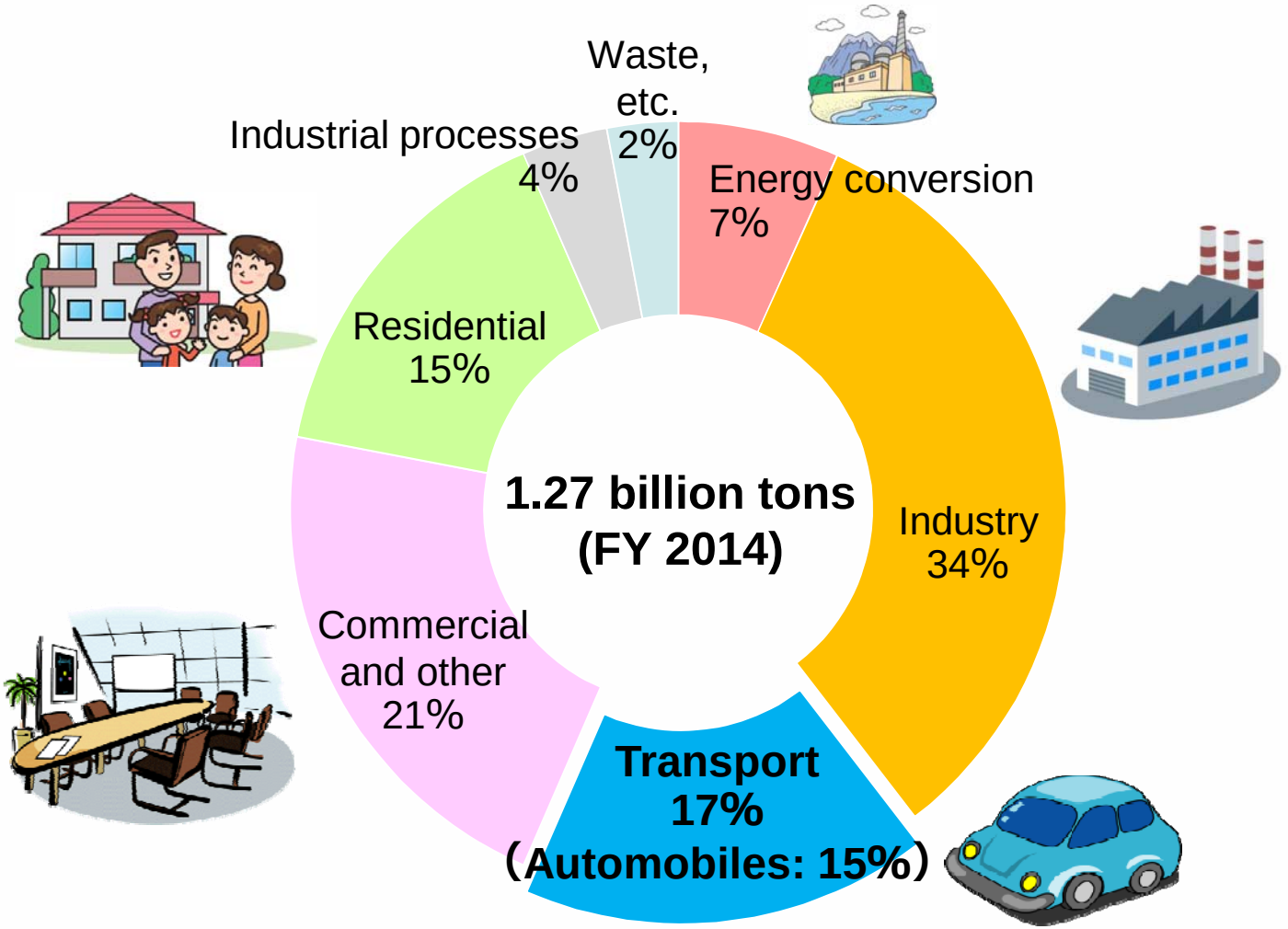
Japan Automobile Manufacturers Association, Inc.

COP22 Side Event "Measures in Response to Global Warming Problems of the Transport Sector in Japan"

17 November 2016

Contents

1 (1) CO_2 Emissions in Japan by Sector (2014)



Source: Ministry of the Environment

1 (2) Trends in Japan's Transport Sector CO_2

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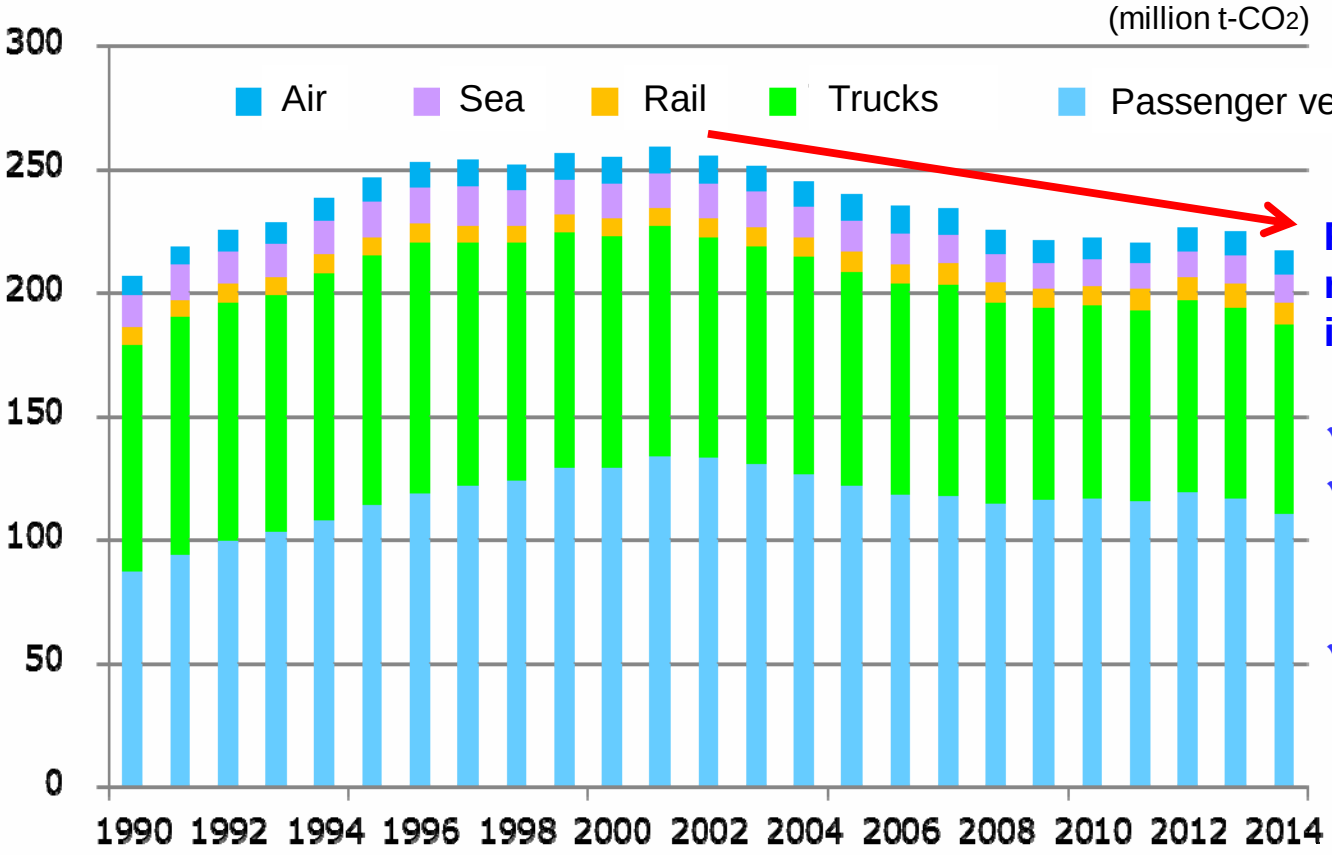
CO_2 emissions in Japan's transport sector have declined significantly since the early 2000s.



Factors contributing to reduced CO_2 emissions in road transport:

- ✓ Vehicle FE improvement
- ✓ Wider use of next-generation vehicles
- ✓ Greater efficiency in truck use

Source: Ministry of the Environment

2 (1) Japan's GHG INDC (Fiscal 2030)

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A 26.0% reduction by fiscal year 2030 compared to fiscal 2013 (or a 25.4% reduction compared to FY 2005).

(million t-CO_2/CO_2 eq.)

	Projected emissions in FY 2030	Actual emissions in FY 2013	Reduction (%)
Energy-originated CO_2	927	1,235	-25.0%
Industry	401	429	-6.5%
Commercial and other	168	279	-39.8%
Residential	122	201	-39.3%
Transport	**163**	**225**	**-27.6%**
Energy conversion	73	101	-27.7%
Non energy-originated CO_2	70.8	75.9	-6.7%
Methane (CH_4)	31.6	36.0	-12.3%
Nitrous oxide (N_2O)	21.1	22.5	-6.1%
Fluorinated gases	28.9	38.6	-25.1%
Carbon sink (LULUCF sector)	-37.0		
Total	**1042.4**	**1408.0**	**-26.0%**

Source: Government of Japan

2 (2) Transport Sector Measures to Meet Japan's 2030 GHG Reduction Target

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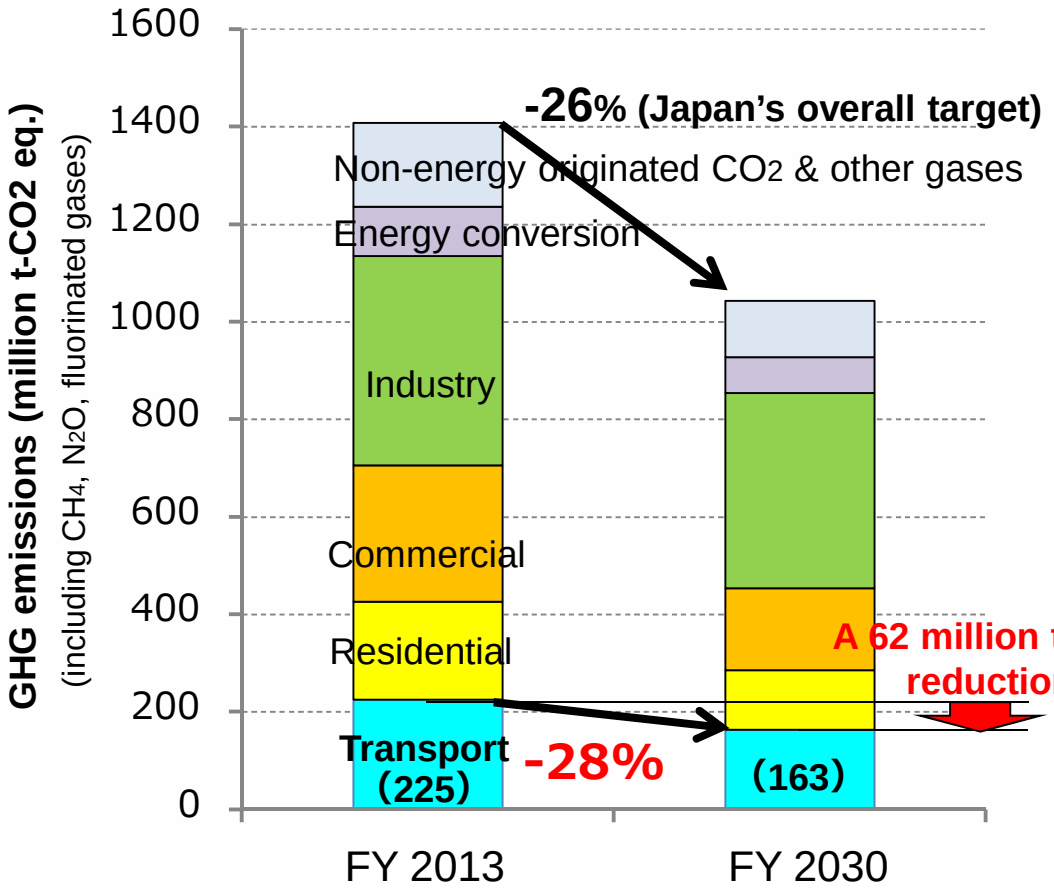
A 28% reduction by 2030 compared to FY 2013 FY is required.



Reductions will be achieved through:

1. **Vehicle FE improvement, wider use of next-generation vehicles**
2. **Ecodriving**
3. **Improved traffic flow**
4. **Fuel diversity**

Source: Government of Japan

3 The Integrated Approach to CO_2 Reduction in Road Transport

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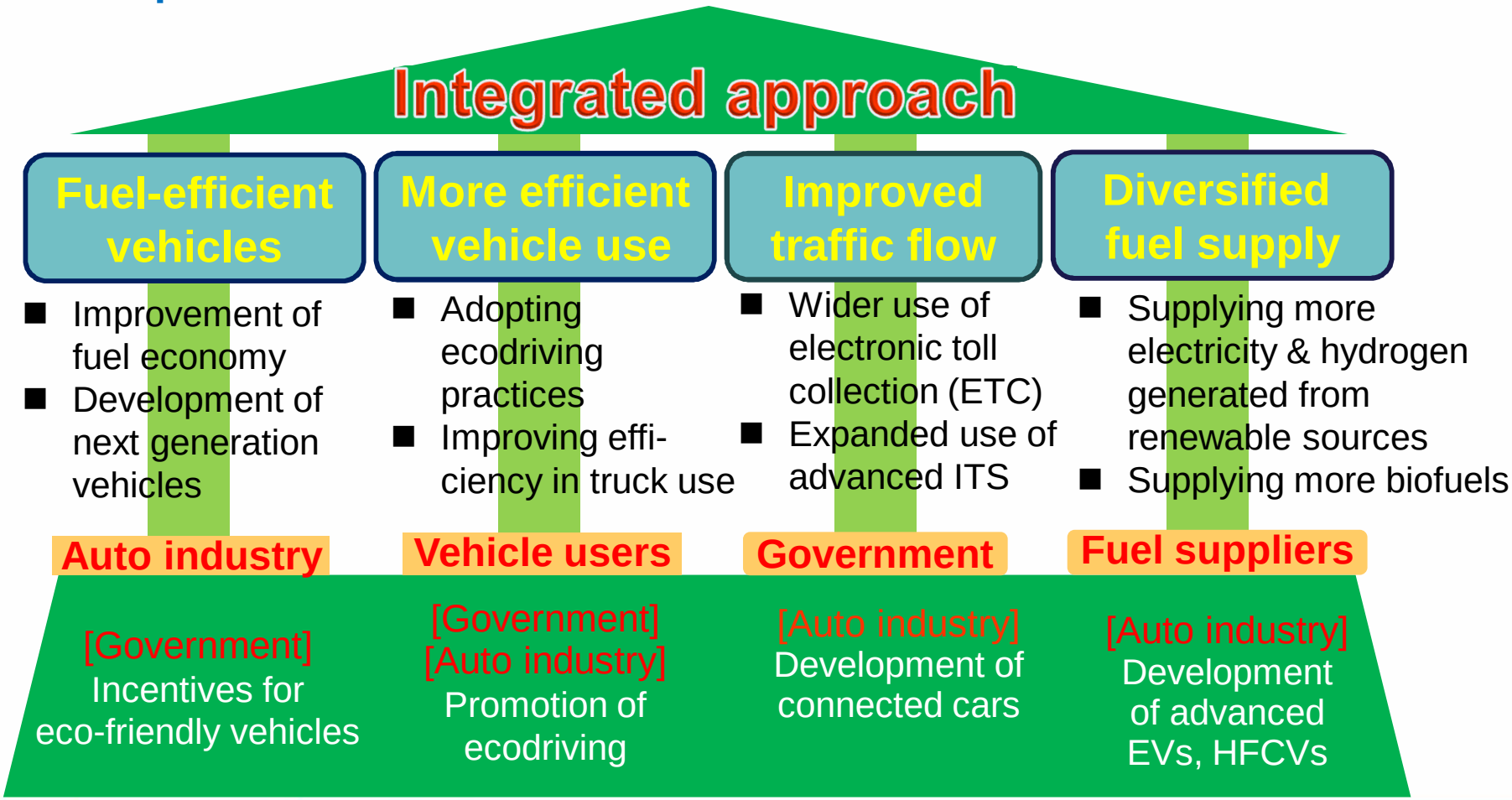
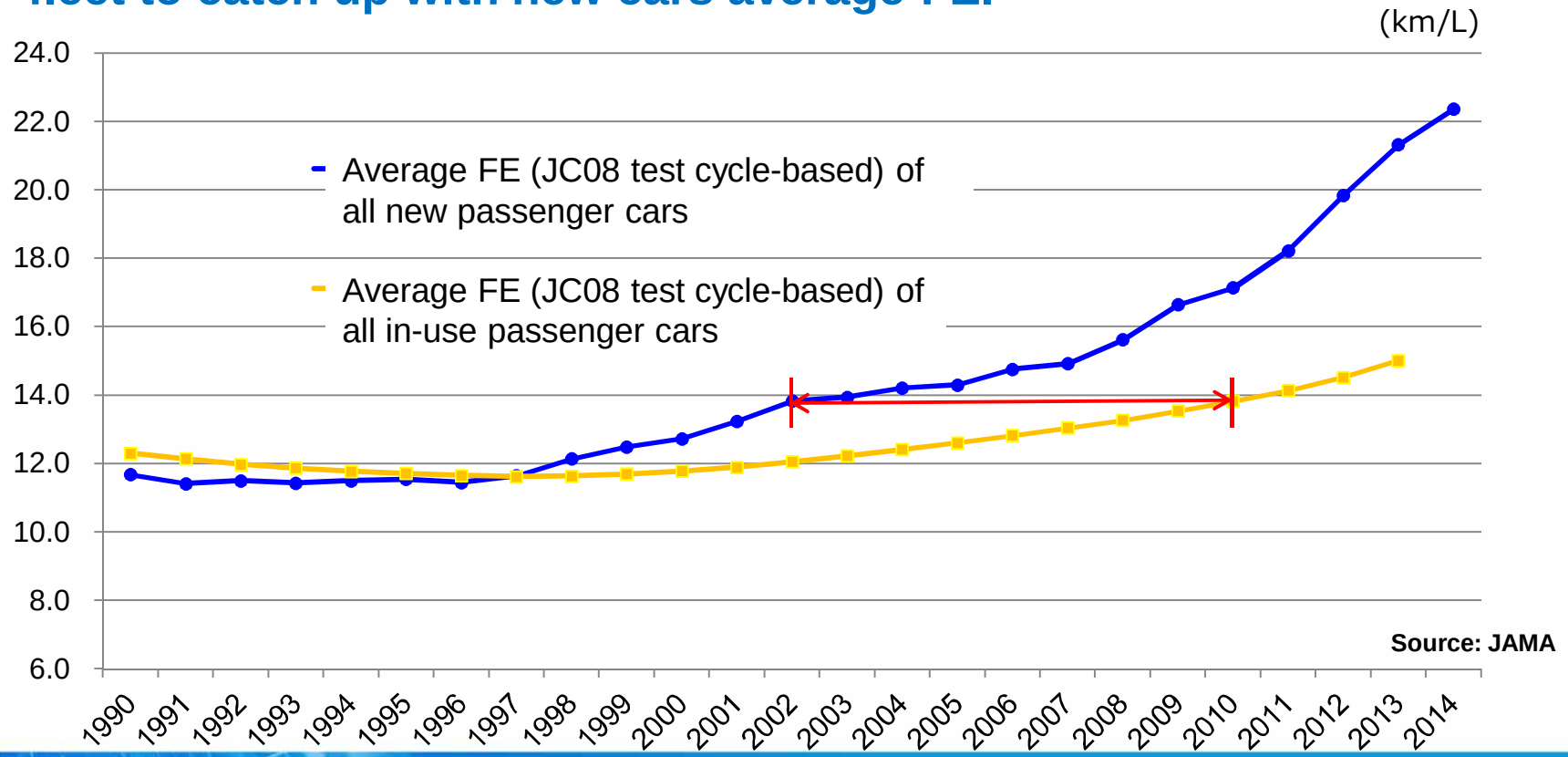
This approach requires the parallel implementation of measures in four “pillar” areas as shown here.



3.1 (1) Increasing Vehicle Fuel Efficiency

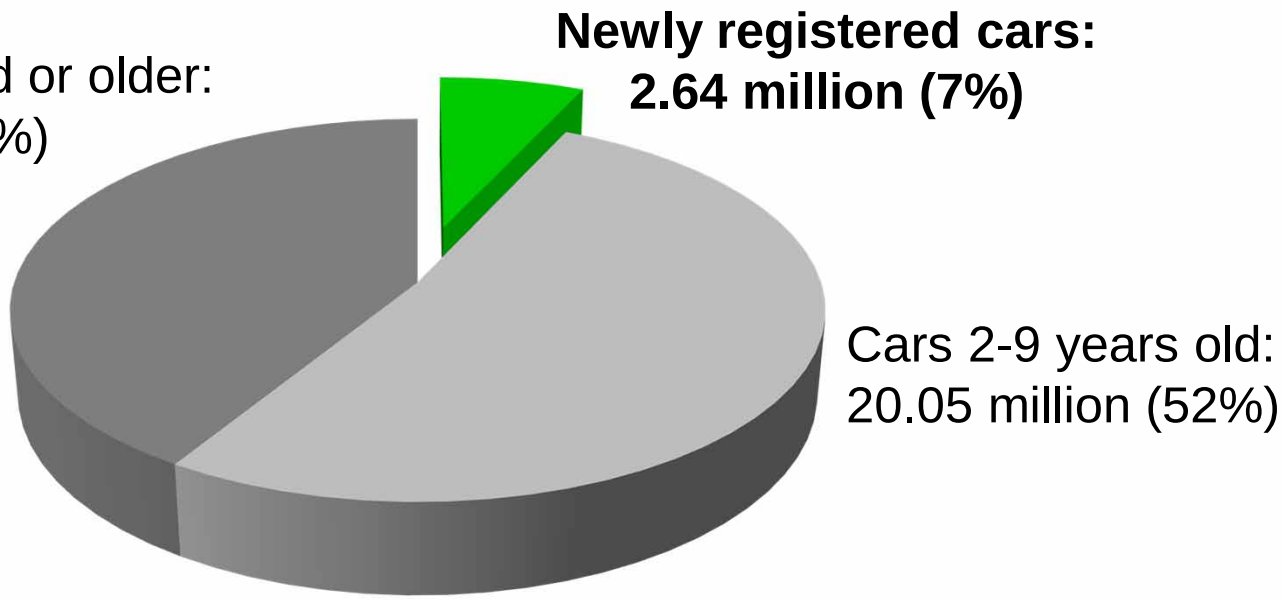
- **Average certified vehicle fuel efficiency is increasing yearly as a result of the efforts of the automobile manufacturers.**
- **However, it takes about 8 years for the average FE of the total in-use fleet to catch up with new cars average FE.**



Source: JAMA

3.1 (2) Fleet Renewal

- **The fleet turnover rate (i.e., replacement with new cars) stands at less than 10% of the total fleet.**
- **Government support (through tax incentives and vehicle purchasing subsidies) is necessary to promote, in particular, increased purchases of next- generation vehicles (EVs, PHVs, etc.).**



Total no. of in-use passenger cars in Japan: 38.57 million

Note: 2015 data; mini passenger cars not included.

Source:
Automobile Inspection & Registration Information Association, with data compiled by JAMA

3.1 (3) Promoting the Wider Use of Next-Generation Vehicles (Gov't Targets)

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- **The Japanese government has established the targets shown below for next-generation vehicles' shares in new car sales by 2030.**
- **Achieving the targets for EVs and PHVs is especially challenging.**

	2015 (Actual)	2030 (Target)
Conventional Vehicles (gasoline-powered vehicles)	73.5%	30-50%
Next-Generation Vehicles	26.5%	50-70%
Hybrid vehicles (HVs)	22.2%	30-40%
Electric vehicles (EVs) Plug-in hybrid vehicles (PHVs)	0.27% 0.34%	20-30%
Fuel cell vehicles (FCVs)	0.01%	3%
Clean diesel vehicles (CDVs)	3.6%	5-10%

Source: Ministry of Economy, Trade and Industry

3.1 (4) Trends in the Share of Next-Generation Vehicles in New Car Sales

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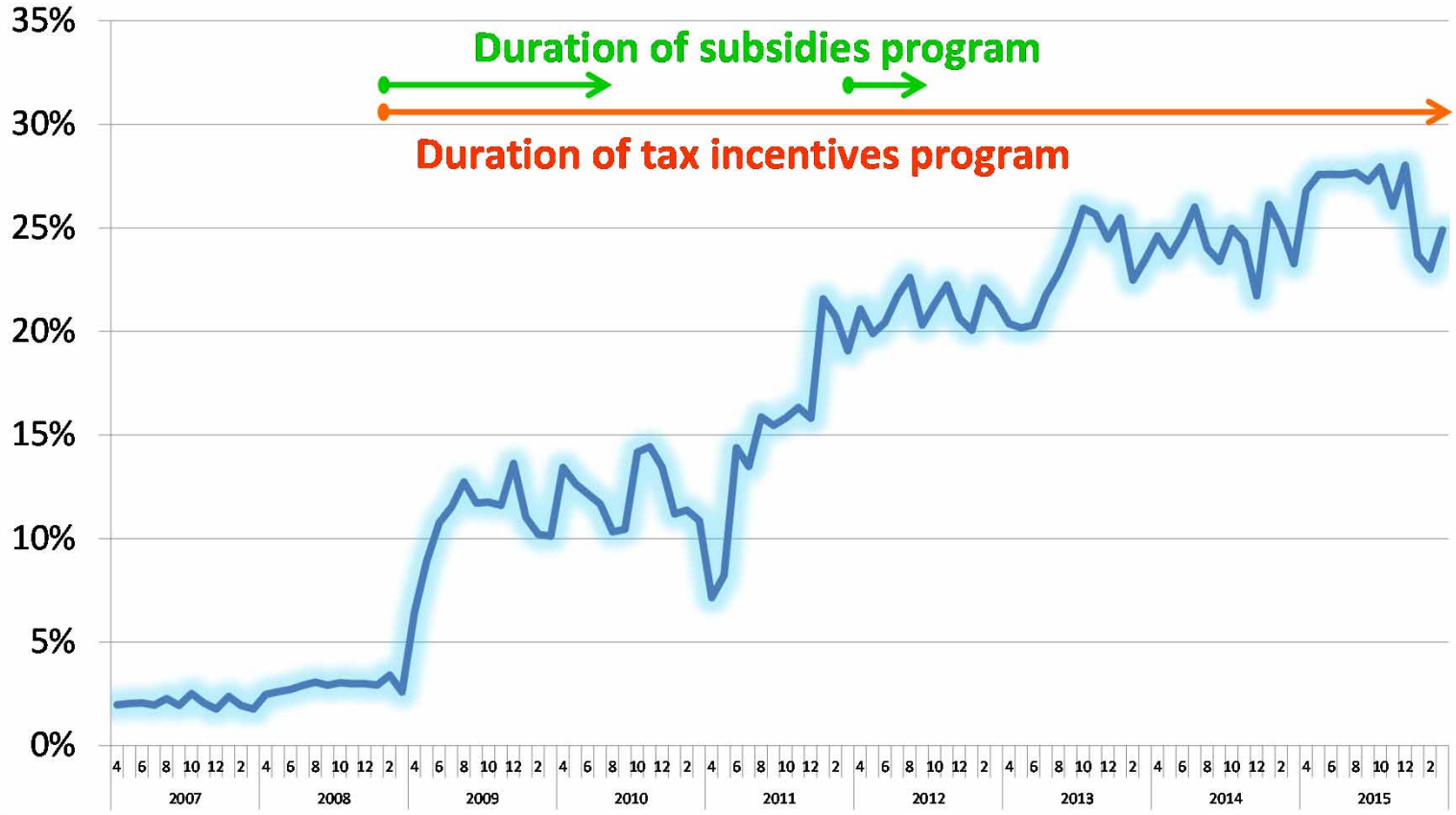
- **Thanks to the government's incentives and subsidies programs, next-generation vehicles have held a 25% share of the new car market in Japan in recent years. Almost all those vehicles are HEVs.**



Source: JAMA

3.1 (5) Japan's Target for EV & PHV Fleet Share (in Units)

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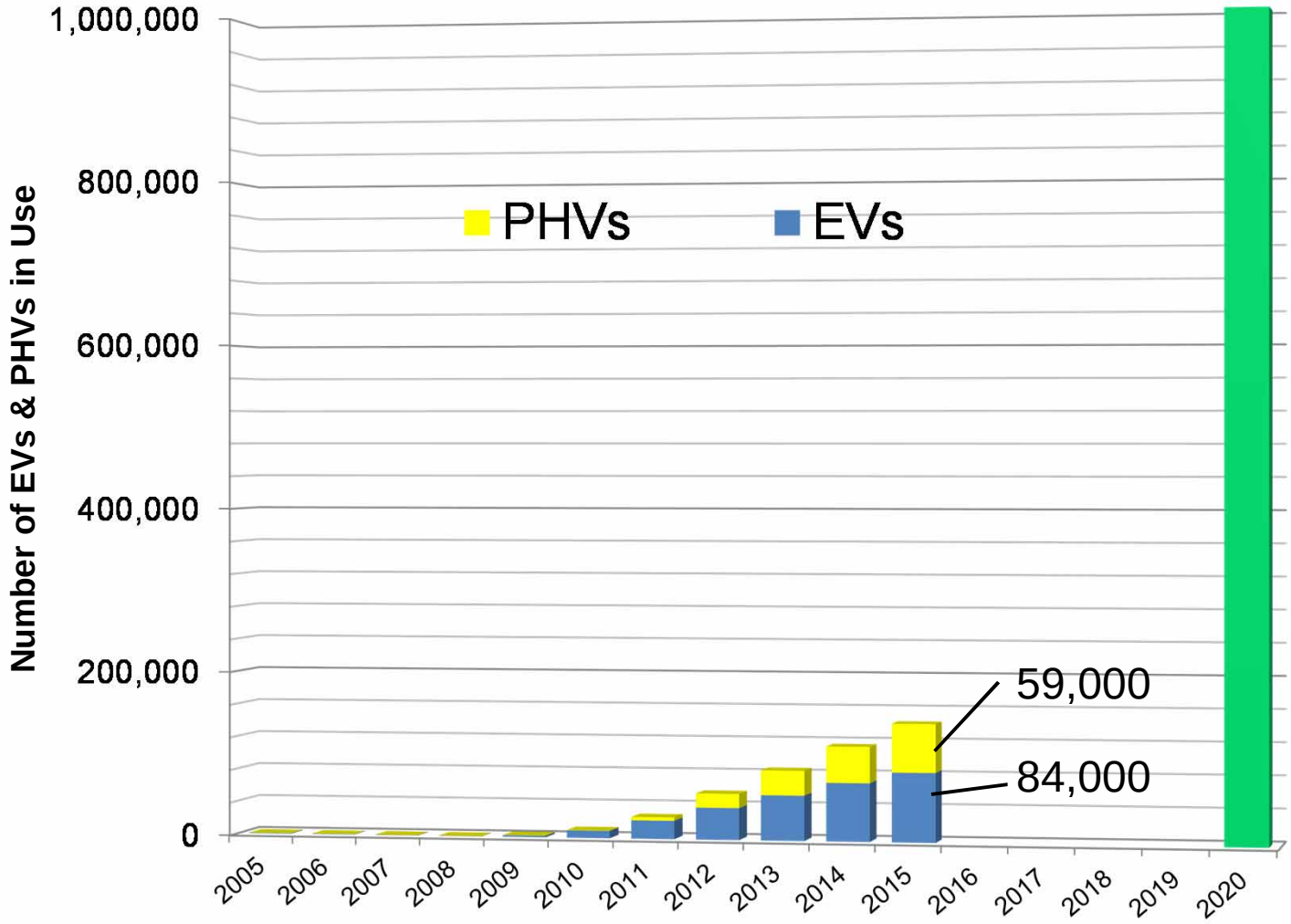

2020 target:
1 million
(EVs + PHVs)

Source: Ministry of Economy, Trade and Industry

3.1 (6) Current Status of Charging Access in Japan

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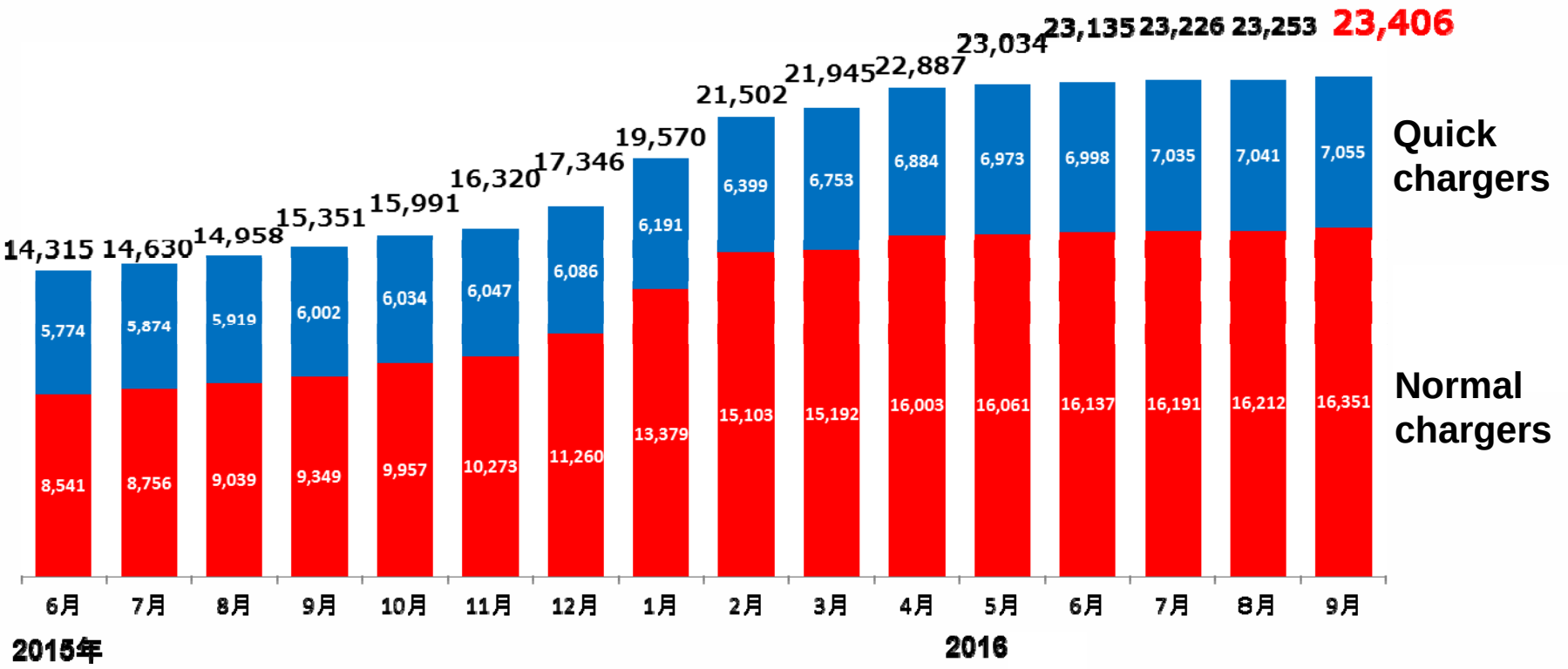
As of September this year, the total number of charging units (quick chargers and normal chargers) in Japan was 23,406.



Source for data on slides 13 and 14: ZENRIN

3.1 (6) Japan's Fast Charging Network

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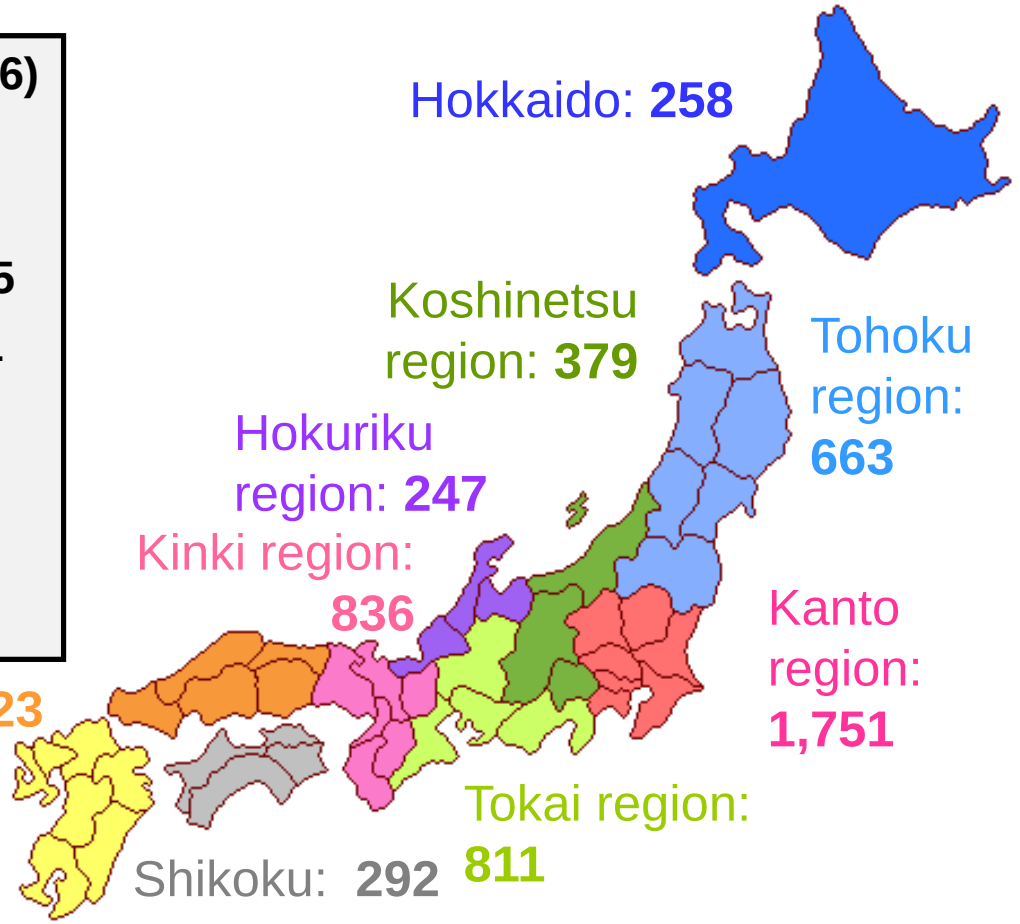
Fast charging stations in Japan (with 7,055 charging units deployed) currently total 6,809.

Principal Locations (as of Sept. 2016)

1. Car dealerships: **2,233**
2. Municipal office buildings: **304**
3. "Roadside stations" (michi-no-eki): **575**
4. Parking areas off expressways: **351**
5. Commercial facilities: **381**
6. Accommodation facilities: **162**
7. Gas stations: **85**
8. Convenience stores: **1,041**



3.1 (6) Japan's Target for Hydrogen-Powered Fuel Cell Vehicle Fleet Share (in Units)

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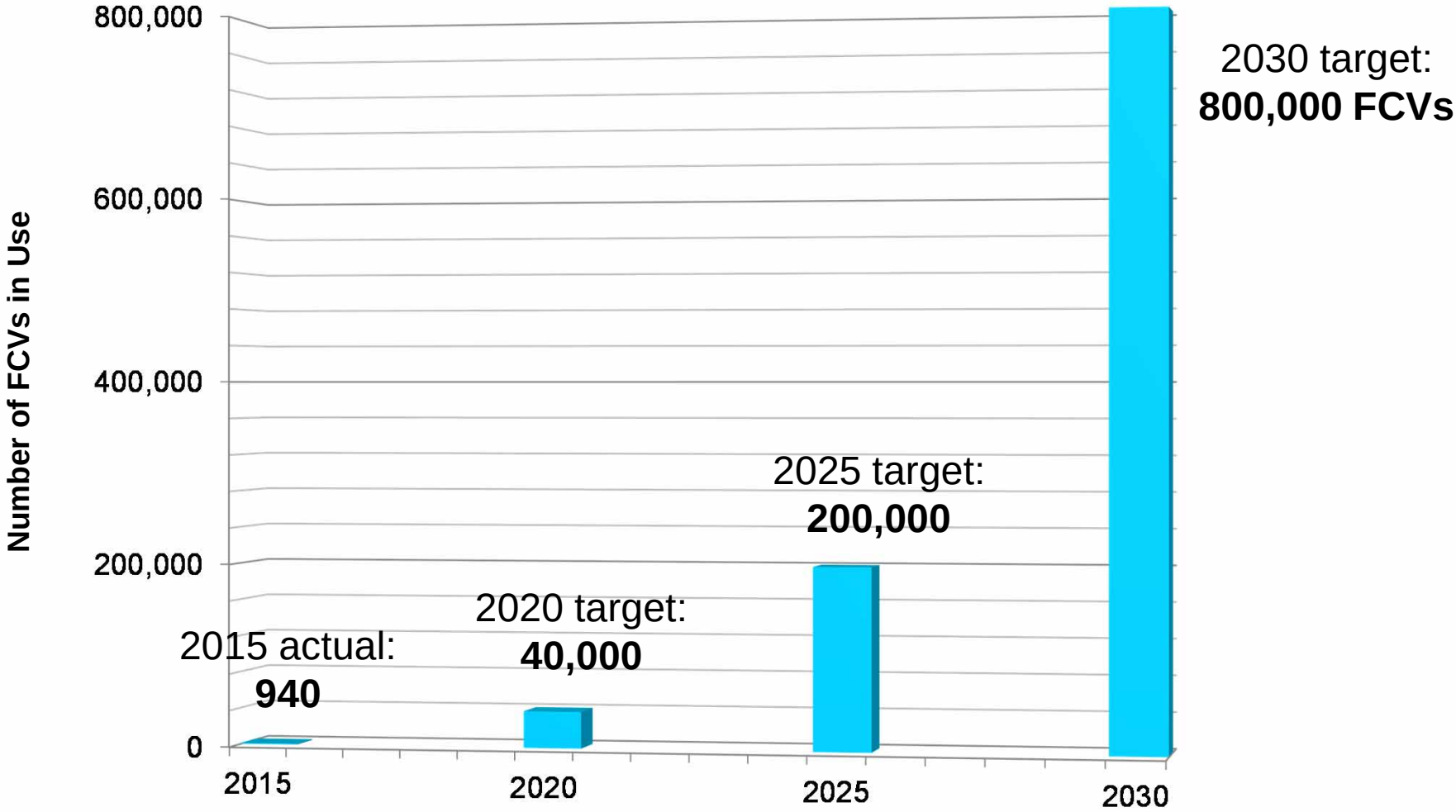
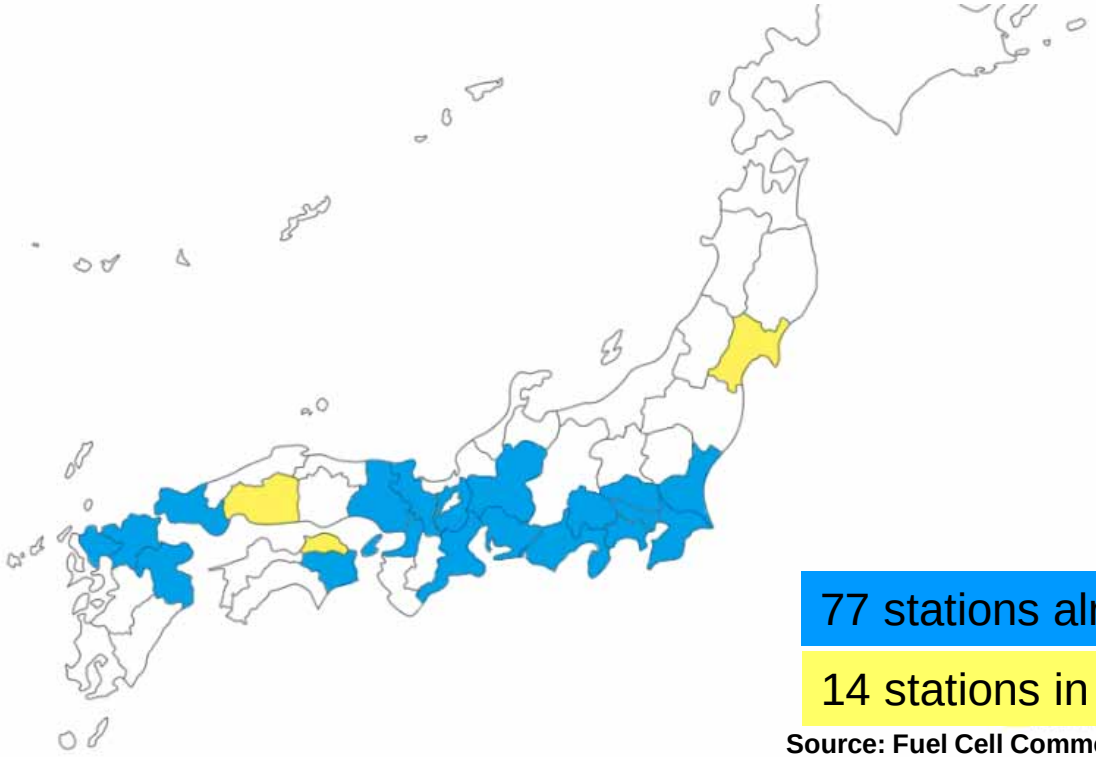


Source: Ministry of Economy, Trade and Industry

3.1 (6) Timeline for Expansion of Japan's FCV-Refuelling Hydrogen Station Network



77 stations already in operation

14 stations in development

Source: Fuel Cell Commercialization Conference of Japan

Current No. of Stations in Operation	Targeted Total No. of Stations in Operation
77 stations	By 2020: About 160 stations By 2025: About 320 stations

Source: Ministry of Economy, Trade and Industry

3.2 (1) Adopting Ecodriving: Japan's Green Eco Project (for Trucks)

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Managing Better through Environmental CSR

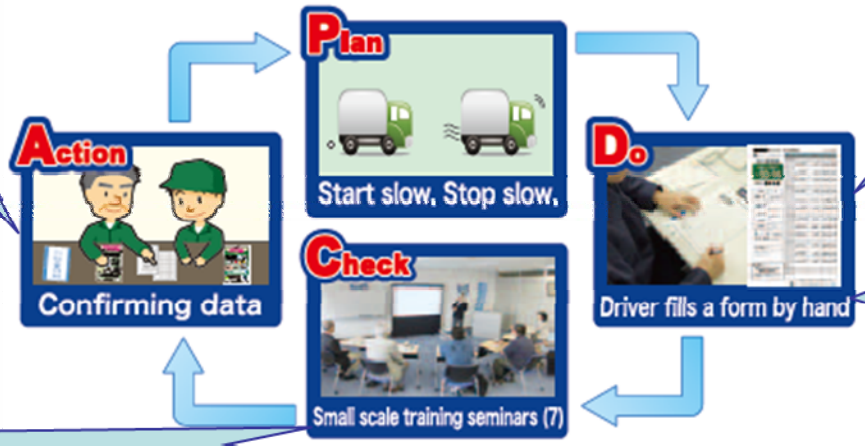
Green Eco Project

~What we can do for our future ~

paper-and-pencil project

Drivers go through training to improve their ecodriving skills.

Drivers record daily travel distances and refueling amounts in their monthly reports.



Drivers submit their monthly reports with their comments to an ecodriving manager.

The ecodriving manager checks and comments on all drivers' reports.

3,500 Companies are members of TTA

Source: Tokyo Trucking Association

Currently 639 companies with 18,971 trucks

3.2 (2) Benefits of Implementing (Truck) Ecodriving Management Systems

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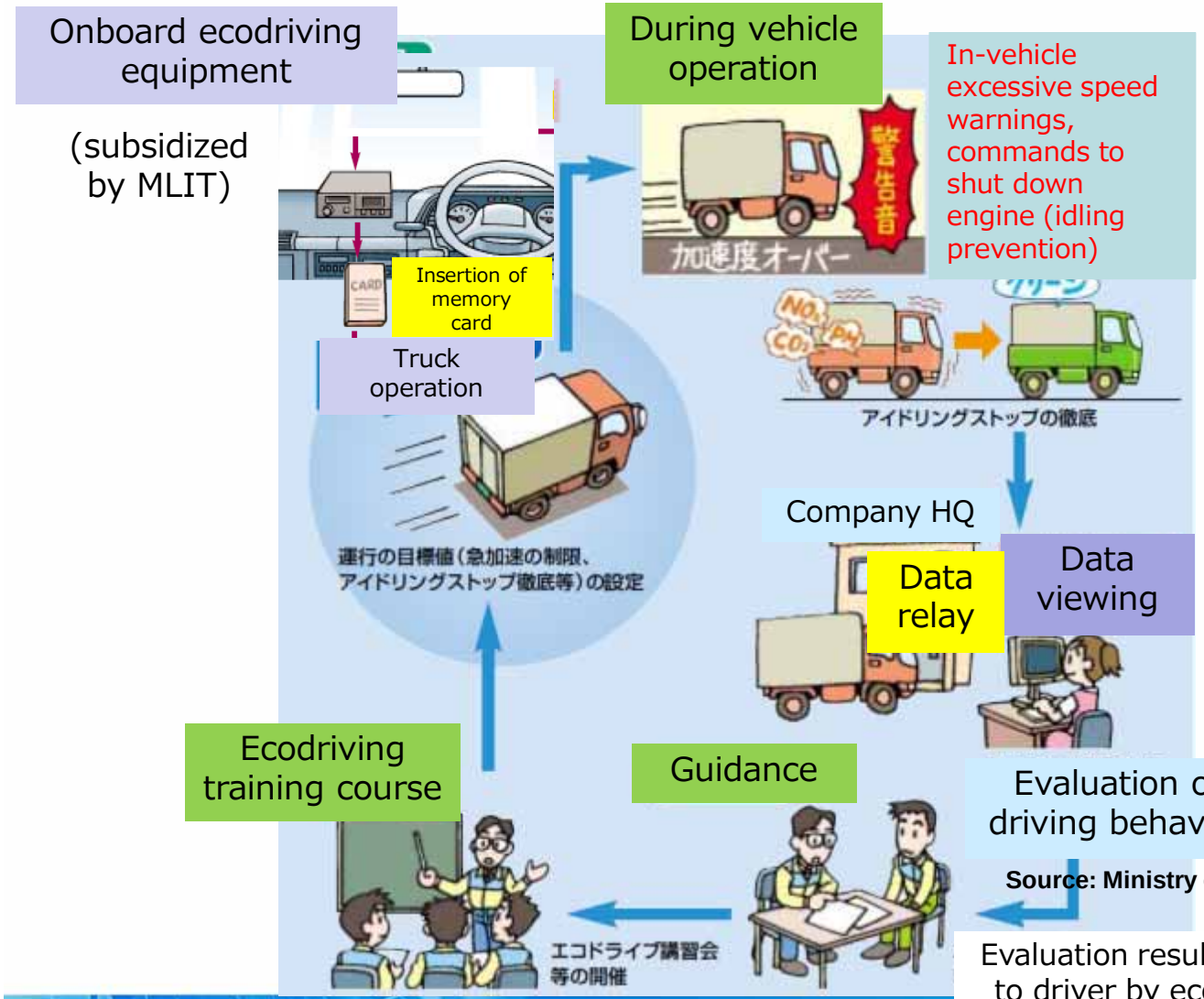

- ✓ **Fuel consumption down by** an average of **26.3%**
- ✓ Rapid adoption of ecodriving practices by drivers
- ✓ Reduced fuel costs
- ✓ Greater safety in truck operation, reduced accident occurrence
- ✓ Reduced maintenance costs

Source: Ministry of Land, Infrastructure, Transport and Tourism

3.2 (3) Main Benefits of Ecodriving

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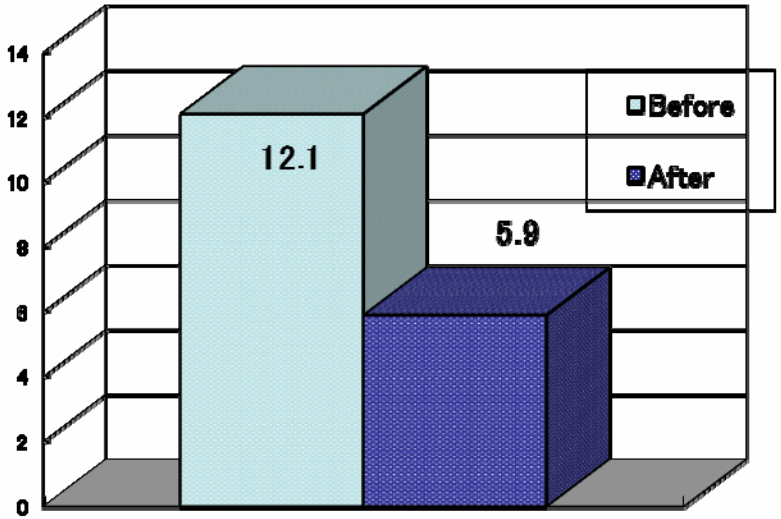
Ecodriving contributes not only to increased fuel efficiency but also to reduced accident occurrence in road transport.

Accident occurrence (over 12-month period)
at 11 transport companies deploying 1,310 trucks:
Before/After Comparisons Following the Implementation of an Ecodriving Program

No. of accidents **49%** reduction



Accidents comparison before/after

Sources: Asua Corporation, Japan Society of Automotive Engineers Annual Congress 2006

3.2 (4) Ten Tips for Fuel-Conserving Ecodriving (as promoted in Japan)

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Measure Taken		Impact on Fuel Efficiency
	**1. Accelerate gently.**	Increasing your speed to 20 km/h in 5 seconds **boosts fuel efficiency by 10%**.
	**2. Maintain a steady speed and keep your distance.**	Tailgating leads to unnecessary acceleration/ deceleration, resulting in **2% (urban traffic) and 6% (suburban traffic) lower fuel efficiency**.
	**3. Slow down by releasing the accelerator.**	Releasing the accelerator when recognizing the need to slow down stops the fuel supply, resulting in **a 2% gain in fuel efficiency.**
	**4. Make appropriate use of your air conditioner.**	For example, continuous use of the AC functioning at 25ºC when the outdoor temperature is 25ºC results in **a fuel efficiency loss of 12%**.
	**5. Don’t warm up or idle your engine.**	Ten minutes of engine idling (with the AC off) **wastes 130 cc of fuel**.

3.2 (4) Ten Tips for Ecodriving (cnt'd)

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Measure Taken		Impact on Fuel Efficiency
	**6. Plan your itinerary to avoid congested routes.**	Ten minutes of unnecessary driving in a one-hour trip results in **a 17% drop in fuel efficiency.**
	**7. Check your tire pressure regularly.**	Driving on tires whose air pressure is 50 kPa lower than it should be **decreases fuel efficiency by 2% (urban traffic) and 4% (suburban traffic)**.
	**8. Reduce your load.**	Driving with 100 kg of unnecessary onboard weight causes **a 3% loss in fuel efficiency**.
	**9. Respect parking rules and regulations.**	Illegal or imprudent on-street parking causes traffic congestion which leads to increased emissions.
	**10. Check the readings on your FE-monitoring equipment.**	Be aware of the impacts of the ecodriving practices you've adopted by regularly consulting onboard equipment that monitors fuel efficiency.

3.2 (5) Promoting Global Ecodriving

in New York

The International Conference on Sustainable Environment, Clean Energy and Safe Mobility:

Multifaceted Dimensions of EcoDrive in Promoting Sustainability

Date: 29 November 2016
Location: Conference Room 6
United Nations Headquarters
New York City
Organizer: WAFUNIF
Co-Organizer: Asua Corporation

3.2 (6) JAMA Activities Promoting Ecodriving

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- The “Ten Tips” were formulated in cooperation with relevant authorities and automotive organizations including JAMA. JAMA promotes them on a continuing basis.

- JAMA is working with dealer and user organizations in the conduct of ecodriving seminars.

- JAMA is also now creating an animation video promoting ecodriving awareness among the youth population.

3.3 (1) Improving Traffic Flow

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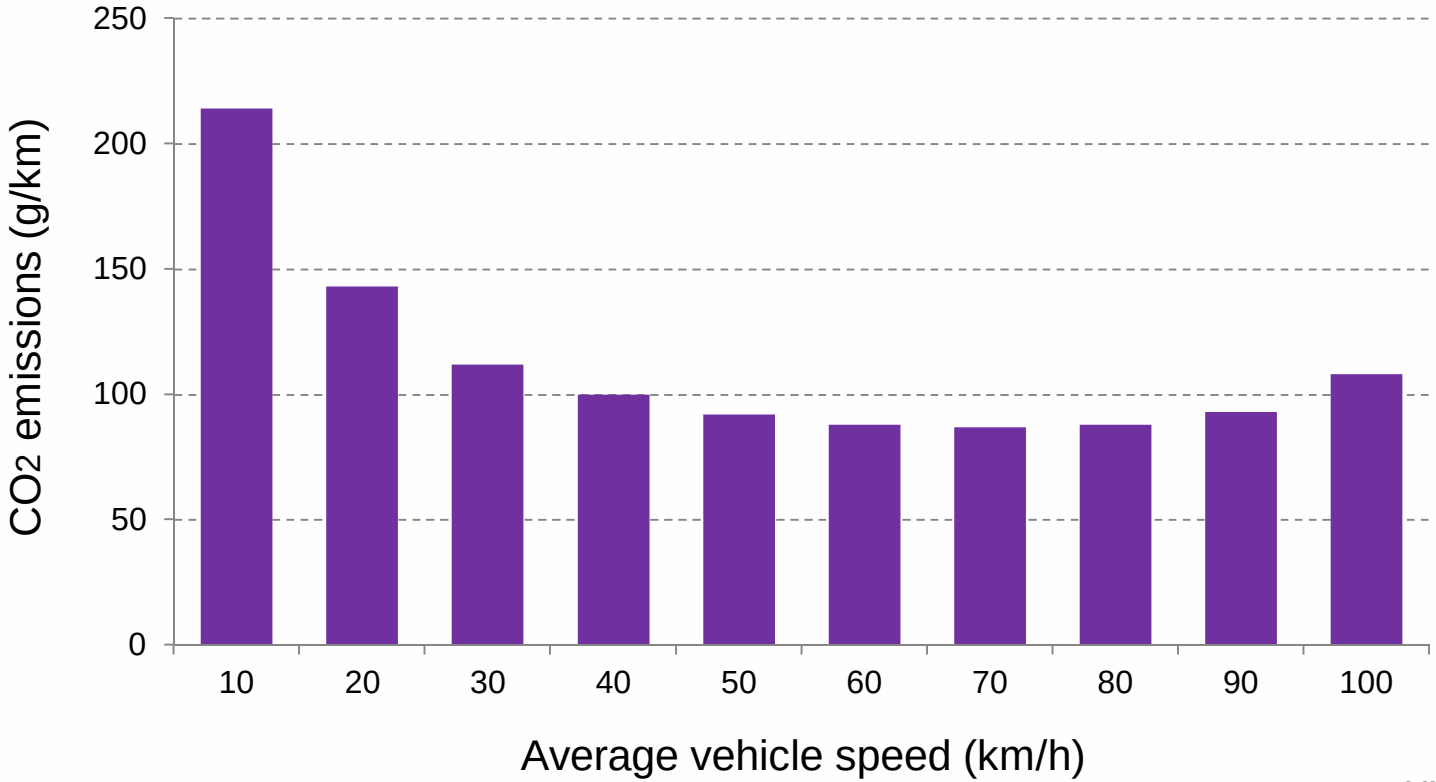
Increased vehicle speed, as shown in the graph below, reduces vehicle CO_2 emissions. Measures to improve traffic flow are needed in order to curb CO_2 emissions in road transport.



Source: Japan Automobile Research Institute

3.3 (2) Traffic Signal Measures

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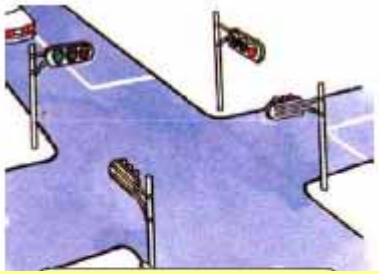
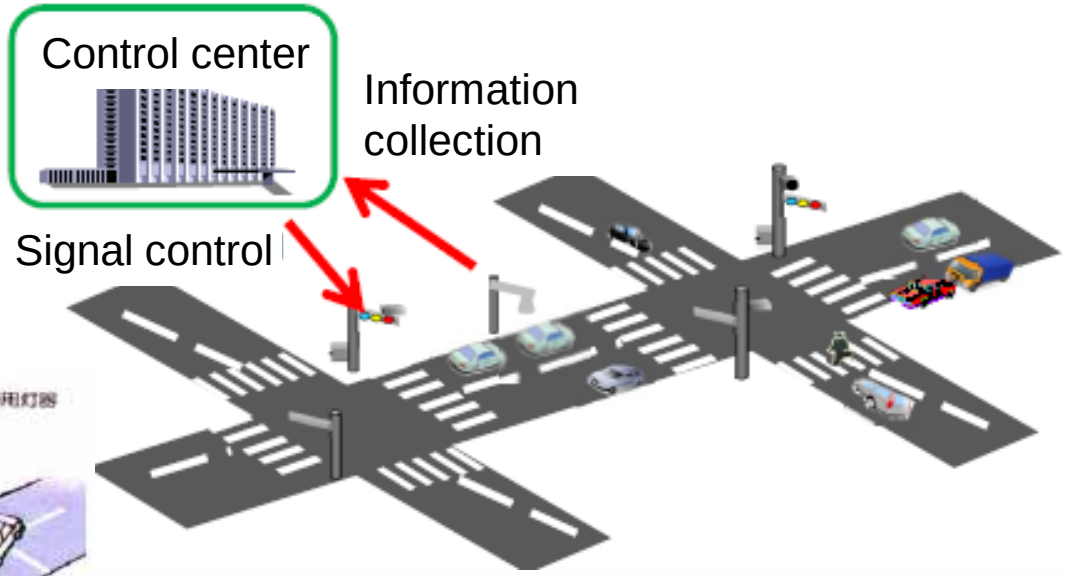
More efficient traffic signal operation and centralized signal control contribute to smoother traffic flow.



Time duration of color signals varies by time of day and day of week.

Pretimed multiprogram control



Time duration of “right turn only” signal varies according to sensor-obtained number of right-turning vehicles.

Sensor-based right turn control

Source: Ministry of Land, Infrastructure, Transport and Tourism

3.3 (3) Electronic Toll Collection in Japan

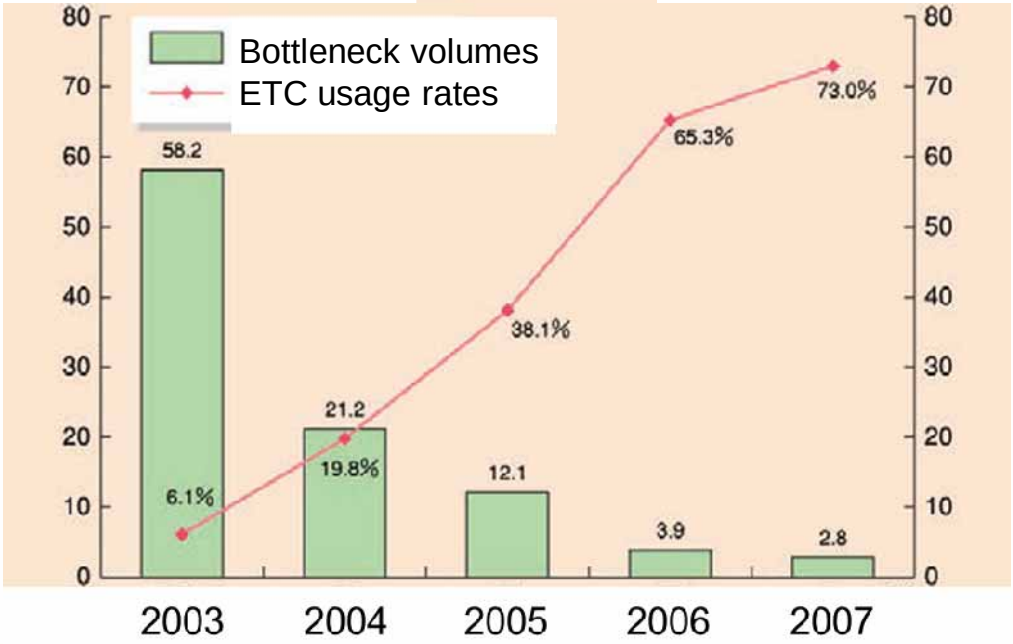
Electronic Toll Collection (ETC)

ETC gates:
Approx. 1,000 sites

Tollgate bottleneck volumes

km・h/day

ETC usage rate %

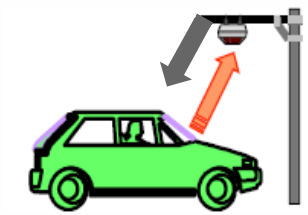


Source: Ministry Land, Infrastructure, Transport and Tourism

Before ETC installation

After ETC installation

3.3 (4) Intelligent Transport Systems (ITS)



Vehicle sensors, infrared beacons: Approx. 34,000 sites

Roads equipped with beacons

Real-time traffic information communi-cation to drivers helps reduce road congestion.

ITS provide route guidance and real-time road traffic information.

Optimal route guidance to drivers via in-vehicle screen displays

Starting point

Congestion

Accident

Destination

Alternate route

Source: Ministry of Land, Infrastructure, Transport and Tourism

4 Long-Term Measures

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- Implementation of **the integrated approach is the most effective way to reduce CO_2 emissions** in road transport because of its adaptability to all countries/regions.
- From a long-term perspective, **diversified energy supply**—in particular, a stable and affordable supply of electricity/hydrogen generated from renewable energy—**is necessary** for the wider use of EVs, PHVs and FCVs.
- The Japanese automobile industry will contribute towards achievement of the Paris Agreement target through its continuous efforts to supply fuel-efficient conventional and next-generation vehicles worldwide.

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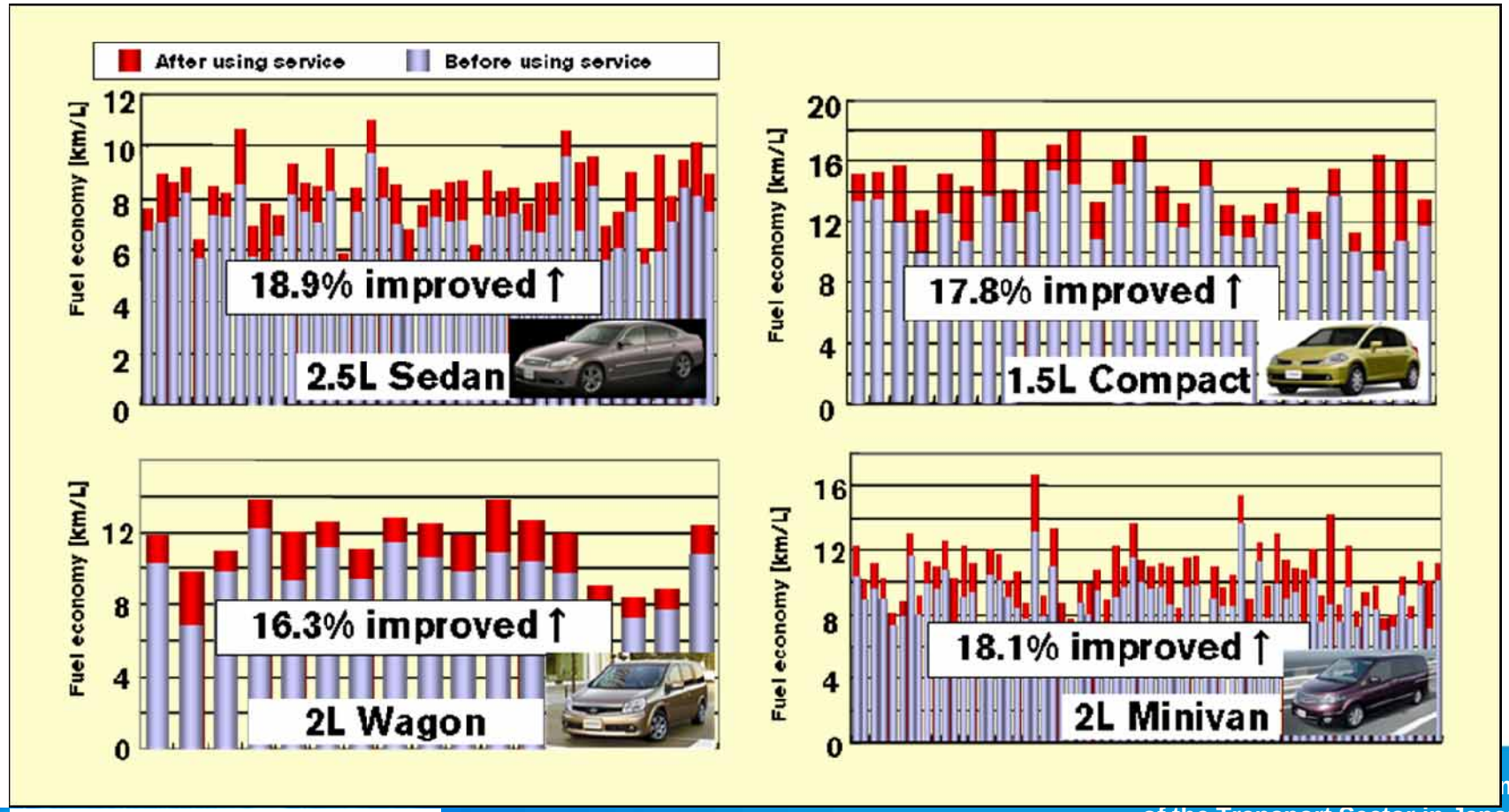
Appendix

Effect of Eco-driving Support (case of JPN)

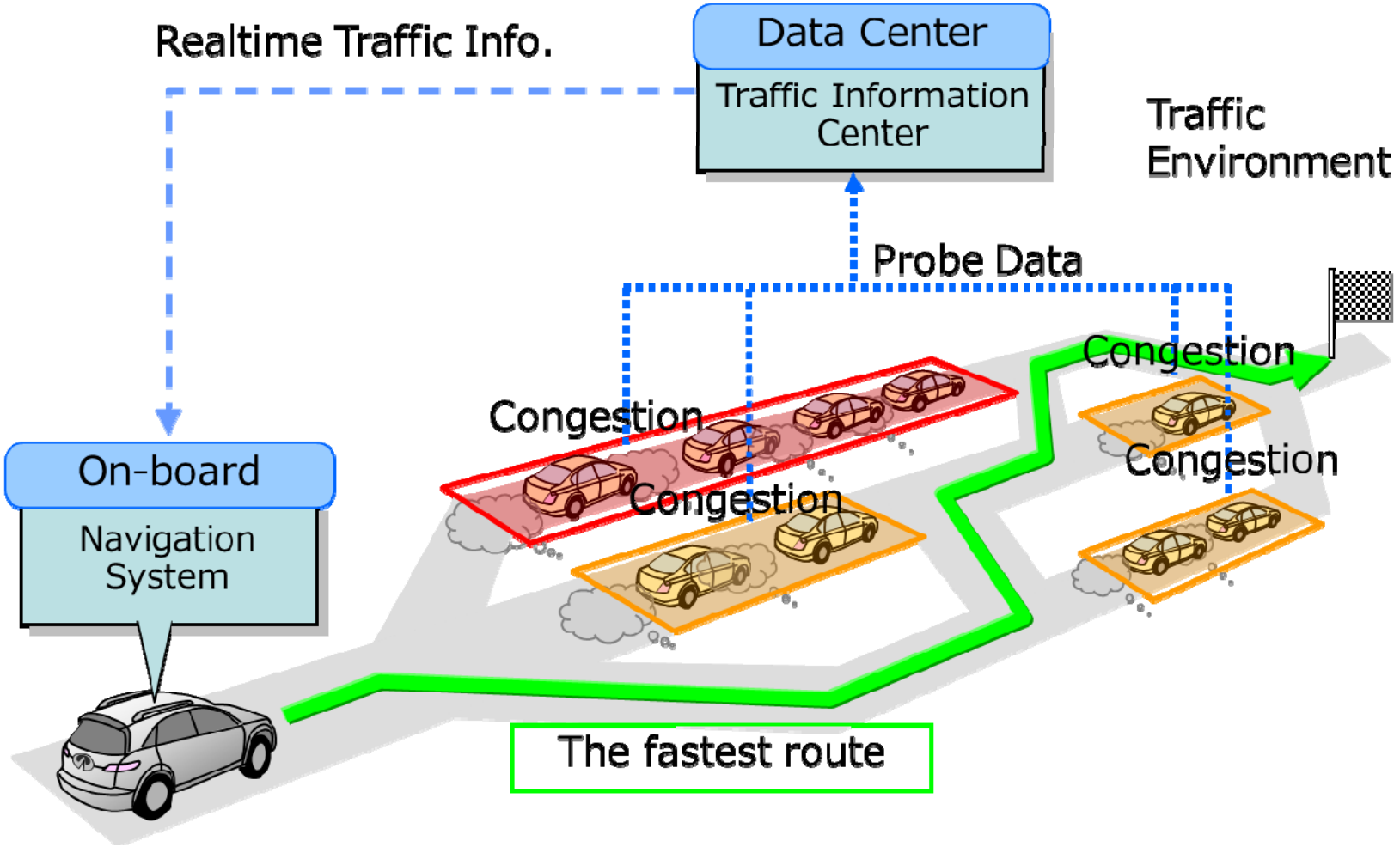
- 18% improved on an average.
- 153L of fuel can be saved annually. (In case of compact-class car)
- Equal to 1kg CO_2 reduction per day per vehicle.



Source: NISSAN MOTOR CO., LTD.

DRGS (Dynamic Route Guidance System)

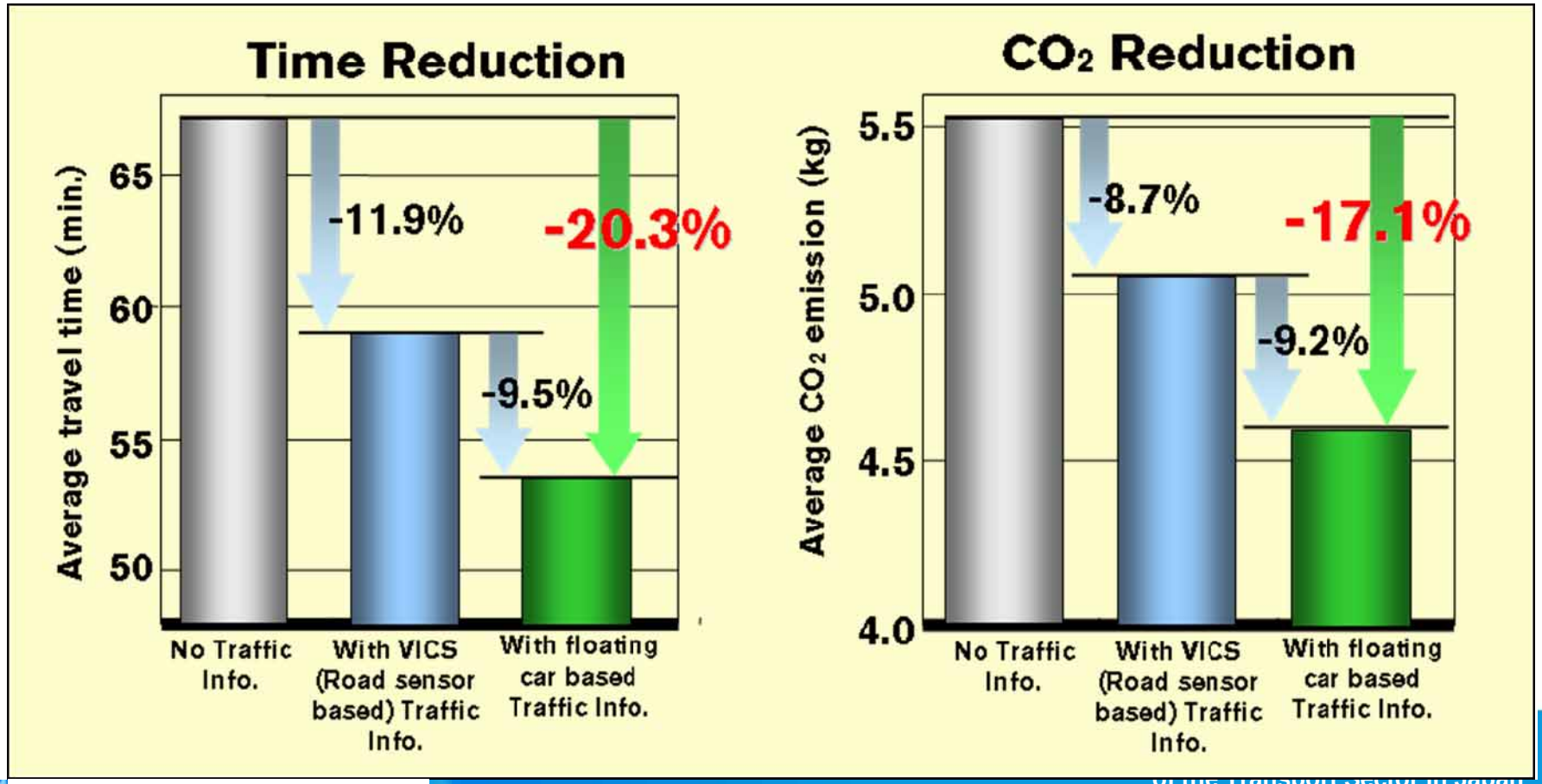
- Provide drivers the fastest route with detailed realtime traffic information.



Source: NISSAN MOTOR CO., LTD.

Effect of DRGS (case of JPN)

- DRGS with traffic information contributes 20% time reduction, and 17% CO_2 reduction.
  (compared with NAVI without traffic information)



Source: NISSAN MOTOR CO., LTD.

E1 Grand Prix

Eco-Driving Check

Mr. Sato

UFACTURERS ASSOCIATION, INC.

Day: 2010 .08 . 03 . Vehicle:NOTE

Eco-Driving 3 Tips

The following 3 tips are useful for fuel saving drive at each driving scene:

Smooth Acceleration

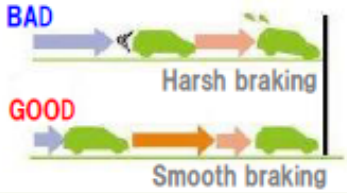
Accelerate gradually and drive smoothly. Changing your driving style is not only safer but it can also have a great impact on your fuel economy.

Maintain a steady speed

Maintain a steady speed as soon as possible. A constant speed saves fuel. Keep a safe distance between cars around you and drive at a moderate speed.

Brake at an early stage

Release your foot from the accelerator at an early stage when slowing down the vehicle. Engine braking helps to improve fuel economy since fuel supply to the engine will be cut off.



Eco-Driving Check Result

Your eco-driving level at each driving scene are evaluated as below:

Smooth Acceleration	Maintain a steady speed	Brake at an early stage
Master Level	Intermediate Level	Advanced Level
97 /100 point	54 /100 point	79 /100 point
You have very good technique.	Your level was slightly below.	You have good technique.

You have good technique of eco-driving.

Overall 76 /100 point

Your Drive Data

Fuel Economy	9.3	km/L
Average Speed	18.0	km/h
Travel	1.4	km
Travel Time	4.7	min

Evaluation Standards

Smooth Acceleration	The percentage of smooth acceleration at your
Maintain a steady speed	The percentage of a steady speed at your drive
Brake at an early	The percentage of braking at an early stage at

Eco-Driving Level

0 – 49 point	50 – 69 point	70 – 89 point	90 – 100 point
Beginner Level	Intermediate Level	Advanced Level	Master Level