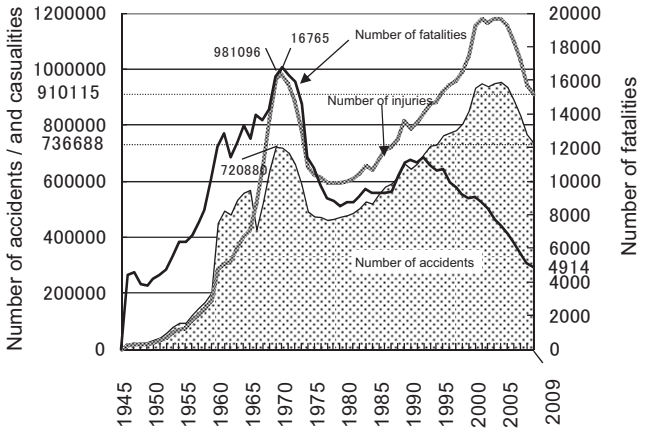
2-1 Trends and Present Situation of Road Traffic Accidents

Associate Professor, Graduate School of Environmental Science, Okayama University
Seiji Hashimoto

After the latest peak in 1992, the number of traffic fatalities has shown a downward trend; in 2009, it dropped to less than 5000 (4914 lives lost). There has also been a continuous reduction in recent years in the number of traffic accidents and the number of casualties; obviously, various efforts made in the past have started to pay off.
A look at the details of traffic accidents By age: accidents involving young people (age 20 to 29) have noticeably decreased, and are now less than those involving people 50 to 59 years old. By means of transportation: for bicycles, which are popular as eco-friendly transportation, the number of fatalities has leveled off; but the bicycle accidents involving pedestrians are increasing; there is a need for traffic safety education that aims at better cycling practices and the managing of space for safe cycling.

Fig. 1 Changes in the numbers of fatalities and injuries from traffic accidents, and changes in the number of accidents

■ The number of fatalities from traffic accidents decreased steadily, as did the number of accidents and the number of injuries.



Source: Traffic Statistics 2009 (Institute for Traffic Accident Research and Data Analysis)

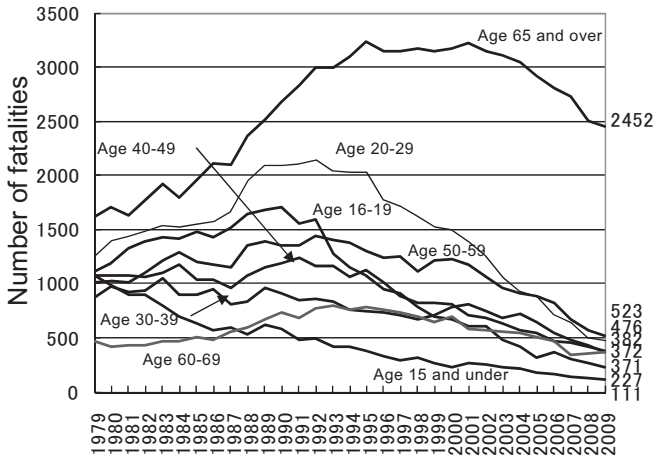
Table 1 The ten prefectures with the highest casualties: number of traffic casualties per 100,000 inhabitants and per 10,000 vehicles in 2009

Casualties per 100,000 people		Casualties per 10,000 vehicles	
Kagawa Prefecture	1461.4	Kagawa Prefecture	162.9
Saga Prefecture	1230.2	Fukuoka Prefecture	159.9
Shizuoka Prefecture	1226.5	Shizuoka Prefecture	145.6
Gunma Prefecture	1201.9	Saga Prefecture	141.5
Miyazaki Prefecture	1169.9	Osaka Prefecture	135.6
Fukuoka Prefecture	1140.8	Miyazaki Prefecture	128.0
Okayama Prefecture	1123.7	Okayama Prefecture	126.7
Yamanashi Prefecture	1000.9	Gunma Prefecture	126.6
Wakayama Prefecture	892.7	Hyogo Prefecture	125.5
Tokushima Prefecture	863.0	Tokyo Metropolis	121.9
Nationwide	717.7	Nationwide	101.1

Source: Traffic Statistics 2009 (Institute for Traffic Accident Research and Data Analysis)

Fig. 2 Changes in number of fatalities by age group

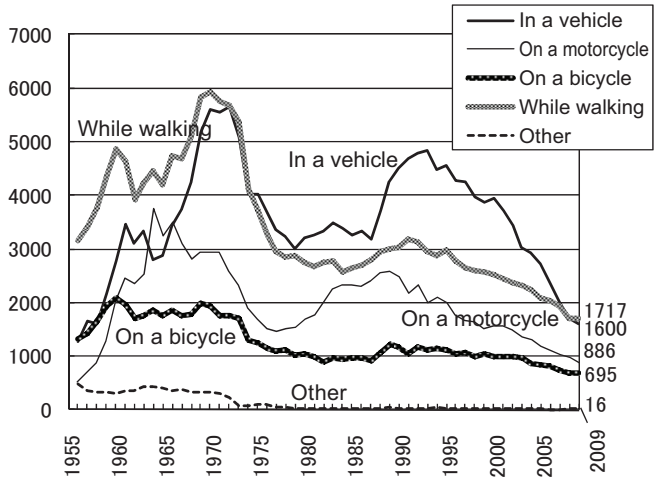
■ All in all, a downward trend is evident. The number of fatalities is high for the elderly (65 and over). It has sharply decreased for those aged 20 to 29 (which is less than that for age 50 to 59).



Source: Traffic Statistics 2009 (Institute for Traffic Accident Research and Data Analysis)

Fig. 3 Changes in number of fatalities by transport modes

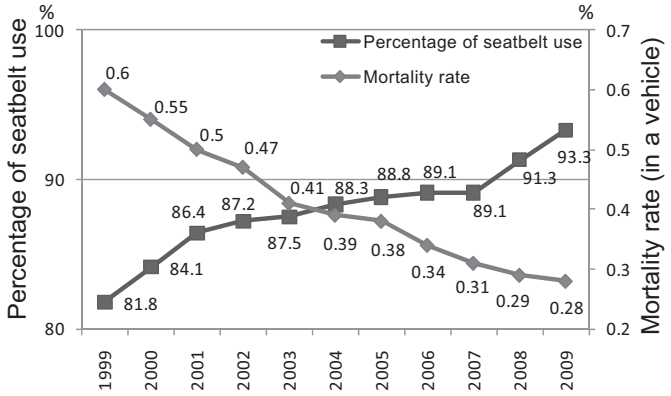
■ Fatalities “in a vehicle” decreased noticeably; and since 2008, “in a vehicle” fatalities have been less than “while walking” fatalities.



Source: Traffic Statistics 2009 (Institute for Traffic Accident Research and Data Analysis)

Fig. 4 Changes in the percentage of seatbelt use and mortality rate

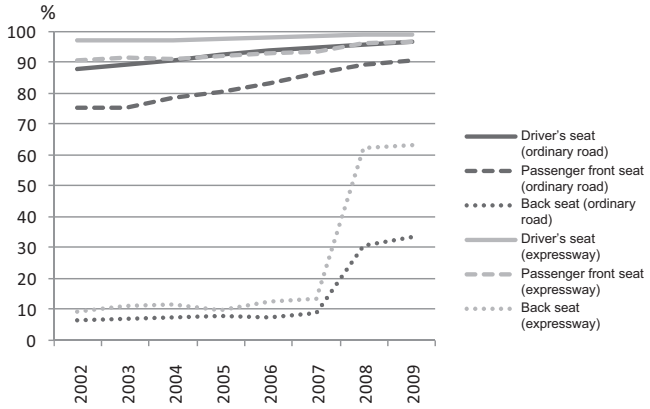
■ The more people wear seatbelts, the lower the mortality rate tends to be.



Source: White Paper on Traffic Safety in Japan 2010

Fig. 5 Changes in percentage of seatbelt use by position in vehicle

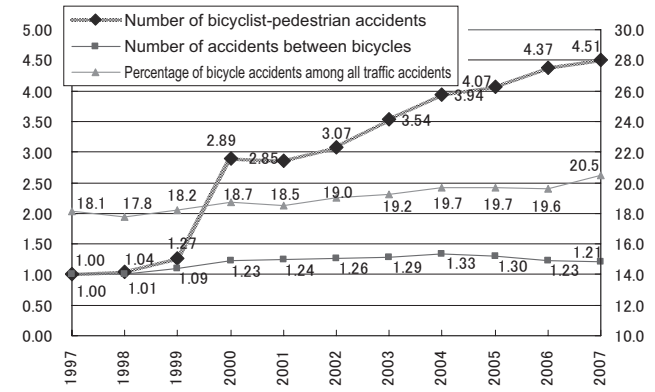
■ Thanks to revisions in the Road Traffic Law, the percentage of seatbelt use by back seat passengers is increasing both on ordinary roads and on expressways.



Source: Traffic Statistics 2009 (Institute for Traffic Accident Research and Data Analysis)

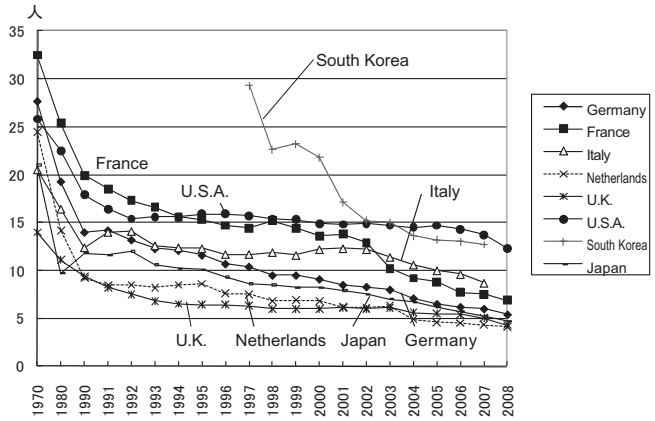
Fig. 6 Changes in incidence of bicycle accidents involving pedestrians

■ Accidents involving bicyclists and pedestrians are rapidly increasing.



Source: White Paper on Traffic Safety in Japan 2008

Fig. 7 Changes in traffic fatalities worldwide, by country (per 100,000 inhabitants)



Source: Traffic Statistics 2009 (Institute for Traffic Accident Research and Data Analysis)

Table 2 Traffic fatalities worldwide, by situation (2008)

Situation / Country	Number of fatalities	In a car	On a motorcycle	On a moped	On a bicycle	While walking	Other
Germany	4,477	2,368	656	110	456	653	234
	100.0	52.9	14.7	2.5	10.2	14.6	5.2
France	4,275	2,205	795	291	148	548	288
	100.0	51.6	18.6	6.8	3.5	12.8	6.7
Netherlands	677	330	67	43	145	56	36
	100.0	48.7	9.9	6.4	21.4	8.3	5.3
U.K.	2,645	1,323	488	21	117	591	105
	100.0	50.0	18.4	0.8	4.4	22.3	4.0
U.S.A.	37,261	14,587	5,200	90	716	4,378	12,279
	100.0	39.1	14.0	0.2	1.9	11.7	33.0
South Korea	5,870	1,342	740	490	310	2,137	851
	100.0	22.9	12.6	8.3	5.3	36.4	14.5
Japan	6,023	1,269	637	526	971	1,976	644
	100.0	21.1	10.6	8.7	16.1	32.8	10.7

Upper figure: number of fatalities; Lower figure: percentage of total (%)
For countries that used the coefficient to convert the number of fatalities into a 30-day figure, the total may not represent the sum of each figure.

Source: Traffic Statistics 2009 (Institute for Traffic Accident Research and Data Analysis)

Table 3 Number of traffic fatalities worldwide by age group (2007)

Age / Country	Number of fatalities	5 and under	6-9	10-14	15-17	18-20	21-24	25-64	65 and over	Unknown
Germany	4,477	35	19	48	174	436	451	2,242	1,066	6
	100.0	0.8	0.4	1.1	3.9	9.7	10.1	50.1	23.8	0.1
France	4,275	42	25	58	172	424	534	2,209	811	0
	100.0	1.0	0.6	1.4	4.0	9.9	12.5	51.7	19.0	0.0
Netherlands	677	6	2	15	32	47	60	341	174	0
	100.0	0.9	0.3	2.2	4.7	6.9	8.9	50.4	25.7	0.0
U.K.	2,645	30	23	57	160	272	270	1,333	499.0	1
	100.0	1.1	0.9	2.2	6.0	10.3	10.2	50.4	18.9	0.0
U.S.A.	37,261	497	310	540	1,596	3,187	3,940	21,579	5,533	79
	100.0	1.3	0.8	1.4	4.3	8.6	10.6	57.9	14.8	0.2
South Korea	5,870	69	56	66	189	116	319	3,436	1,615	4
	100.0	1.2	1.0	1.1	3.2	2.0	5.4	58.5	27.5	0.1
Japan	6,023	55	45	45	134	274	247	2,273	2,950	0
	100.0	0.9	0.7	0.7	2.2	4.5	4.1	37.7	49.0	0.0

Upper figure: number of fatalities; Lower figure: percentage of total (%)
For countries that used the coefficient to convert the number of fatalities into a 30-day figure, the total may not represent the sum of each figure.

Source: Traffic Statistics 2009 (Institute for Traffic Accident Research and Data Analysis)

2-2 Motor Vehicle Insurance in Japan

Professor, College of Law, Nihon University
Yasuo Fukuda

A noteworthy characteristic of motor vehicle insurance in Japan is its two-tiered structure. The first tier is the compulsory liability insurance program in which all motor vehicles are required by law to be enrolled; The second is a voluntary program in which the motor vehicle owner may or may not choose to enroll. The compulsory liability insurance is tied to the automobile inspection program, and almost 100% of motor vehicles are found to be enrolled in it. Coverage to provide basic compensation to victims is limited to 30,000,000 yen for death, and 40,000,000 yen for the severe after-effects of disabling injuries. This compulsory liability insurance is managed according to the general rule of "No loss, no profit"; the premium is 22,470 yen for two years for an ordinary automobile, which provides a high level of compensation with quite a low premium. The percentage of motorists enrolled in the voluntary insurance program, which provides compensation that is not provided by the compulsory liability insurance, is about 72%. With the current trend toward higher amounts of compensation for losses and damages, more drivers ought to enroll in the voluntary program.

Table 1 Obligations of those responsible for a traffic accident

■ When a traffic accident occurs, the person who caused the accident has three types of legal obligations and one moral obligation; the civil obligation is to compensate the victim(s) for the loss.

Legal obligations	
	Administrative Obligation
	(Subject to administrative disposition:) To ensure safety on the road, the public safety commission in charge takes action such as revocation / suspension of the driver's license, deduction of points, and imposition of a fine.
	Criminal liability
	If the victim died or was injured through the driver's "professional negligence": The penalty is determined depending on the extent of the negligence, the consequences of the accident, and the appropriateness of the driver's action after the accident. Penalties are imprisonment with work, imprisonment without work, and a fine.
	Civil obligation
	If the driver caused losses/damages to others from the traffic accident, (s)he must compensate the victim(s) for the loss. Compensation is regulated in the civil law and in the Automobile Liability Security Act.
Moral obligation	
Besides legal obligations, there is a moral obligation for the person who caused the accident to visit the victim and apologize sincerely.	

Source: Insurance for Loss & Damage in Daily Life (The General Insurance Association of Japan)

Table 2 Outline of the compulsory motor vehicle liability insurance

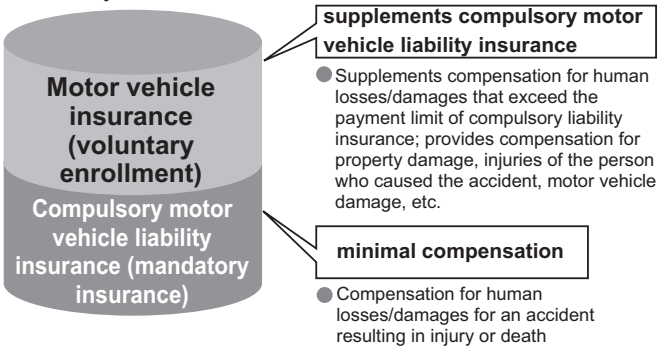
■ All motor vehicles are obliged to have compulsory liability insurance.

Outline of the compulsory motor vehicle liability insurance	
In accordance with the Automobile Liability Security Act, for the purpose of providing relief to victims of motor vehicle accidents, the compulsory motor vehicle liability insurance is designated "mandatory"; all motor vehicles are required to be enrolled. It follows that even such vehicles as mopeds must also be enrolled.	
Penalty for not having the compulsory motor vehicle liability insurance	
Imprisonment for less than one year or a fine of less than 500,000 yen	… (penalty in accordance with the Automobile Liability Security Act)
+	
Six points will be deducted; suspension of license, etc.	… (penalty in accordance with the Road Traffic Act)

Source: Fact Book 2010: Japan's Insurance against Loss (The General Insurance Association of Japan)

Fig. 1 Compulsory motor vehicle liability insurance and motor vehicle insurance

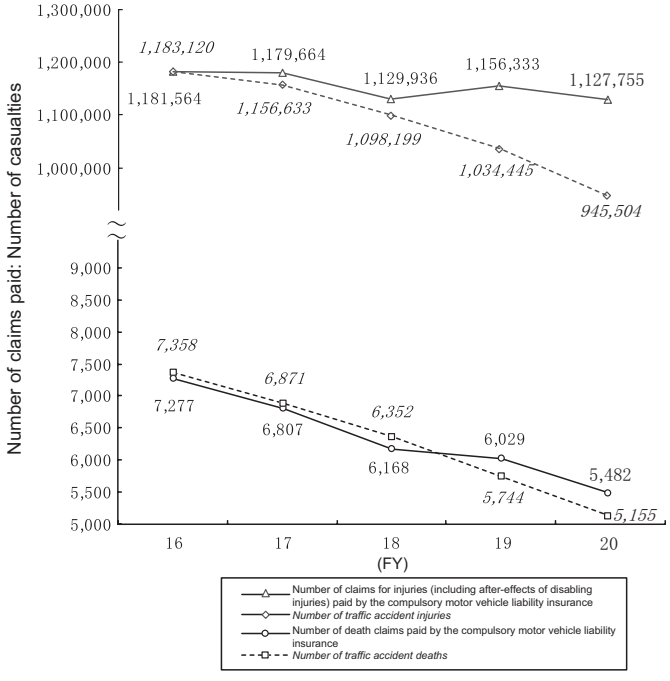
■ For traffic accidents, there are two types of insurance: (1) compulsory liability insurance (mandatory) to compensate death or injury of the accident victim(s); and (2) voluntary motor vehicle insurance that supplements the compulsory liability insurance.



Source: Fact Book 2010: Japan's Insurance against Loss (The General Insurance Association of Japan)

Fig. 2 Changes in the number of traffic accidents and the number of cases in which claims have been paid by the compulsory motor vehicle liability insurance

■ The number of traffic accident injuries is on a downward trend; but the number of claims paid by the compulsory motor vehicle liability insurance remains flat.



Source: Automobile Insurance in FY 2009 (Non-Life Insurance Rating Organization of Japan)

Table 3 Coverage and limits of the compulsory motor vehicle liability insurance

■ The compulsory motor vehicle liability insurance (mandatory insurance) covers only compensation for loss/damage to the body of the accident victim. It does not cover compensation for loss/damage to the body of the person who caused the accident or to motor vehicles of the victim or of the person who caused the accident. Also, the limits of the amount are set as follows:

Type of loss/damage	Scope of loss/damage	Limit of payment
Damage from injuries	Costs for medical treatment, costs for documentation, loss from closing a business, consolation money, etc.	1,200,000 yen
Damage from after-effects of disabling injuries	Lost profits, pain & suffering compensation, etc.	Depending on the grade of after effects from disabilities: 40,000,000 – 750,000 yen*
Loss from death	Funeral costs, lost profits, pain & suffering compensation	30,000,000 yen

*(1) When there is severe damage to the nervous system, brain, or organs of the chest and stomach and the person needs nursing care at all times or as needed: nursing care at all times: 40,000,000 yen(1st degree disability): nursing care as needed: 30,000,000 yen (2nd degree disability)

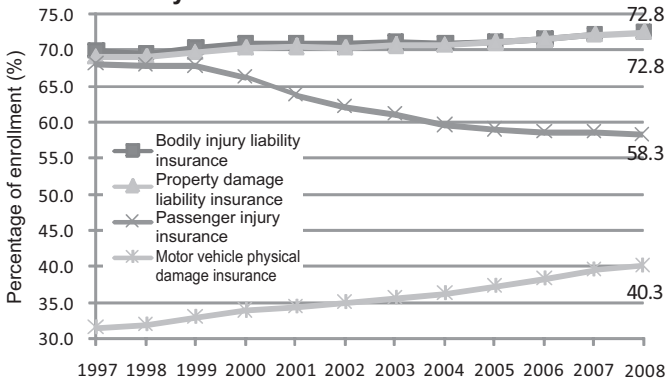
Source: Fact Book 2010: Japan's Insurance against Loss (The General Insurance Association of Japan)

Table 4 Coverage of compulsory (mandatory) vs. voluntary (supplementary) insurance

Type of damage/loss		Examples	Insurance that covers the case	
			Mandatory insurance	Supplementary insurance
Damage/loss to be compensated	Other person's body	Hit and killed a pedestrian	Compulsory motor vehicle liability insurance	Bodily injury liability insurance
		Bumped into other vehicle and caused injury to the driver.		
	Other person's property	Bumped into and damaged another vehicle.	—	Property damage liability insurance
		Bumped into someone's house gate and broke it.	—	
Injuries	Driver & passengers	Drove into a river and was injured	—	Own-fault Insurance / Passenger injury insurance / Bodily injury insurance
		Bumped into a utility pole, injuring a passenger in the driver's vehicle	—	
		After a collision with another vehicle, suffered after-effects of disabling injuries; but the driver of the other vehicle didn't have bodily injury liability insurance.	—	Uninsured motorist insurance / Bodily injury insurance
Property damage	Driver's vehicle	Drove over a cliff, totally wrecking the vehicle.	—	Motor vehicle physical damage insurance
		A signboard was blown into the vehicle, causing severe damages.		
		Vehicle stolen.		

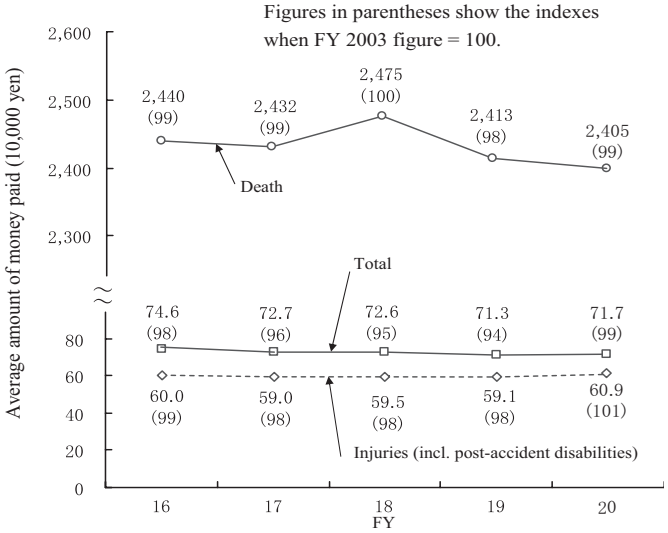
Source: Insurance for Loss & Damage in Daily Life (The General Insurance Association of Japan)

Fig. 3 Changes in the percentage of those enrolled in voluntary motor vehicle insurance



Source: Automobile Insurance in FY 2009 (Non-Life Insurance Rating Organization of Japan)

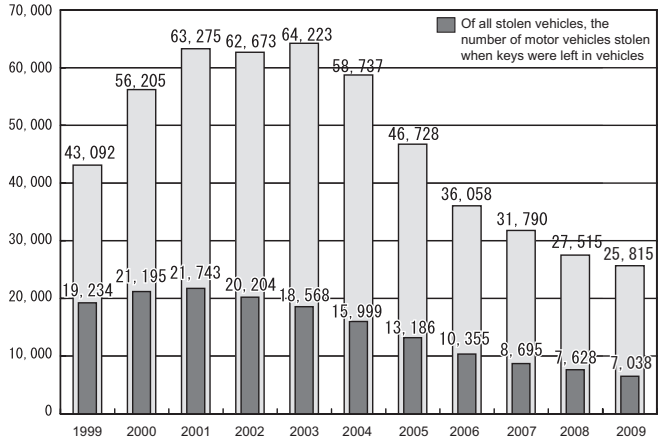
Fig. 4 Changes in the average claim paid by the compulsory liability insurance, by result of accidents (death / injuries)



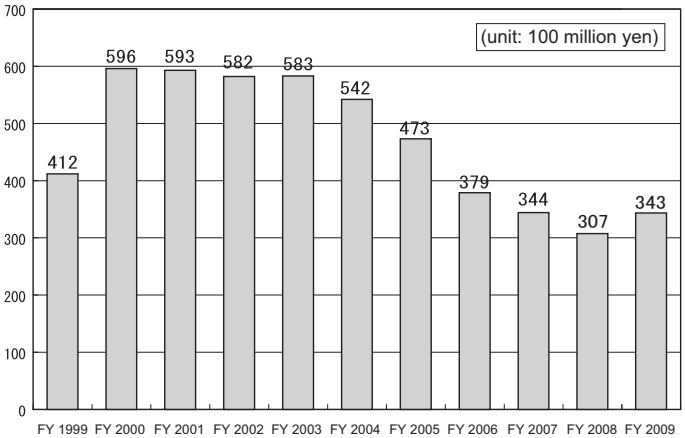
Source: Automobile Insurance in FY 2009 (Non-Life Insurance Rating Organization of Japan)

Fig. 5 Changes in the reported number of motor vehicle thefts and amounts of claims paid

■ The reported number of motor vehicle thefts is decreasing; however, the size of claims paid is not consistently decreasing.



Source: National Police Agency research on motor vehicle theft



Source: Fact Book 2010: Japan's Insurance against Loss (The General Insurance Association of Japan)

2-3 Traffic Safety Measures

Professor, Graduate School of Urban Environmental Sciences, Tokyo Metropolitan University
Takashi Oguchi

Monetary losses in Japan from traffic accidents were estimated to be 4.4 trillion yen in 2004. Furthermore, the estimated amount per person of non-monetary losses from fatal accidents (e.g., psychological loss from grieving, loss from lowered quality of life) is well over the amount of monetary losses (estimated by "WTP," Willingness to Pay approach). New safety measures being currently implemented include improving traffic safety facilities, employing better traffic control techniques, renovating road surfaces and related facilities, better control of traffic lanes, educational activities for traffic safety using the Internet, Road Traffic Act revisions (e.g., making seatbelts mandatory, strict penalties for driving under the influence), and so on. The policies presented in the Eighth Traffic Safety Basic Plan, which envisions a society where there are no traffic accidents and where people come first when it comes to traffic safety, are gradually reaching the public.

Fig. 1 Government efforts for traffic safety

■ Promotes comprehensive and meticulously planned safety measures in accordance with the Traffic Safety Measures Basic Law; promotes facilities improvements in accordance with the Social Infrastructure Improvement Priority Plan.

Traffic safety planning in accordance with the Traffic Safety Measures Basic Law

* The law is intended to promote comprehensive and carefully planned traffic safety measures (land, sea, and air).

Traffic Safety Basic Plan

- Drafted by the Central Traffic Safety Measures Council (headed by the Prime Minister)
- Provides an outline of traffic safety policies, and measures to implement them

Eighth Traffic Safety Basic Plan (approved by the Central Traffic Safety Measures Council on March 14, 2006) for FY 2006 to FY 2010

Basic policies:

1. **Steps toward a society without traffic accidents:** To build a truly fulfilling and energetic society, we need to achieve a society free of traffic accidents.
2. **A philosophy of traffic safety that puts people first:** In a civilized society whose priorities include consideration and concern for the weak, all traffic safety implementing measures need to be in harmony with the basic philosophy that gives priority to people — that enhances, in other words, the safety of the "traffic disadvantaged" (the elderly, the disabled, children, etc.).
3. **Basic implementation objectives:** To set measurable goals to be achieved in the designated period and to specify the actions that will achieve those goals. For road traffic, in particular, traffic safety measures that put people first are to be further reinforced (e.g., more sidewalk improvements on roads taken to schools, roads in residential areas, and arterial roads in city areas). To promote traffic safety activities where people come and work together.
4. **Dealing with human error in public transport:** In all public transport (land, sea, air), persons involved with transport administration and operation are to recognize once again that solving safety problems takes the highest priority; improvement is to be system-wide.

* The government's goal was set at the beginning of 2009: "In the next ten years, the number of traffic accident fatalities is to be 2500 or less." Toward that end, efforts are being made in fiscal 2010 for the next (ninth) Traffic Safety Basic Plan.

Traffic safety plans of prefectures → Traffic safety plans of municipalities

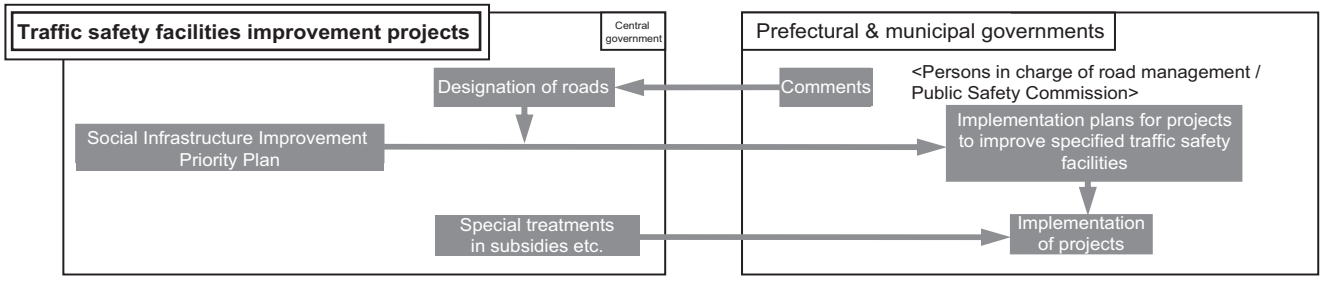


Table 1 Monetalized social losses from traffic accidents (items & amounts)

■ The monetary loss from a traffic accident is about 30 million yen per person. On the other hand, the estimated amount of loss from death as a non-monetary loss is about 230 million yen per person (estimated figure from the results of WTP analysis on reducing death risk).

Type of losses	Items of expense	Calculated amount (2004)
Human losses	Medical expenditure, loss from closing a business, consolation money, lost profits, etc.	1.5 trillion yen
Physical losses	Repair of vehicles and damaged structures, and payments for the damages	1.8 trillion yen
Losses of business operators	Loss from reduction in the amount of added value due to death, post-accident disabilities, closing business, etc.	0.1 trillion yen
Losses of public organizations	Costs for emergency transport, police reports, court, lawsuits, prosecutors, reform, insurance management, financial assistance to victims, welfare, emergency medical care system; losses from delays caused by congestion	1.0 trillion yen

Source: Research Report on Economic Analysis of Damage and Loss from Traffic Accidents (Mar., 2007, Cabinet Office Director-general for Policies on a Cohesive Society)

Fig. 2 Educational activities on the website, “Traffic Safety Map”

■ This website, created by the National Police Agency and the Ministry of Land, Infrastructure, Transport and Tourism, provides the general public with traffic accident data as well as analysis of the cause of the accidents. It has a search function for dangerous places where accidents can occur, as well as “safe walking areas” (see Fig. 4).

Data: website of the Ministry of Land, Infrastructure, Transport and Tourism; http://www.kotsu-anzen.jp/

Table 2 Safety measures introduced in the revised Road Traffic Act (Jun. 1, 2008)

■ Research in October 2008 showed that, after seatbelt use was made mandatory for backseat passengers (the driver is penalized one point for each violation), the percentage of backseat passengers using seatbelts showed a remarkable increase. However, in October 2009, a year later, there was not much improvement; the percentage of seatbelt use by backseat passengers is still low.

Seatbelt use (2008)

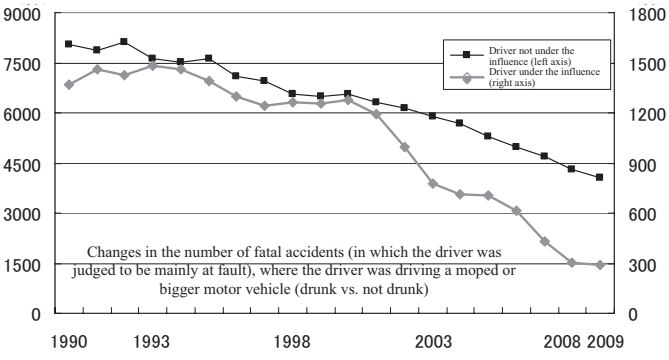
	Percentage in 2008		Percentage in 2009	
	Ordinary roads	Expressways, etc.	Ordinary roads	Expressways, etc.
Driver	95.9(+0.9)	99.0(+0.5)	96.6(+0.7)	99.2(+0.1)
Front seat passenger	89.2(+2.9)	96.4(+2.9)	90.8(+1.6)	96.9(+0.5)
Back seat passengers	30.8(+22.0)	62.5(+49.0)	33.5(+2.7)	63.4(+0.9)

Figures in parentheses show the change in percentage from the previous year.

Data: website of the National Police Agency; http://www.npa.go.jp/

Fig. 3 Effects of stricter penalties for driving under the influence

■ Stricter penalties were introduced in the 2002 and 2007 revisions to the Road Traffic Act. After each of those revisions, traffic accidents caused by driving under the influence decreased noticeably; in 2008, the figure was less than 25% of that of ten years ago.



Data: website of the National Police Agency; http://www.npa.go.jp/

Fig. 4 Maintaining "Safe Walking Areas"

■ Area-wide and comprehensive measures are now being taken that target city blocks of about one square kilometer, where there are many accidents due to motor vehicle traffic,.

Measures to improve the roads that run around the city blocks — **Intersection improvements, high-tech traffic signals**
A smooth flow of traffic on arterial roads that run around the city blocks will discourage vehicles from passing through the Safe Walking Areas.

Providing for pedestrians — **Sidewalk improvements, barrier-free pedestrian areas**
Improving pedestrian areas where people can move safely

Measures for speed zones — **Speed control in the zone, installation of speed bumps and chicane, etc.**
Creating zones that give priority to pedestrians or bicyclists.

(Speed bumps)

(Chicane)

Data: website of Ministry of Land, Infrastructure, Transport and Tourism; http://www.mlit.go.jp/road/road/traffic/sesaku/

Fig. 5 Traffic signal that separates pedestrians from motor vehicles

■ Secures the safety of pedestrians who are crossing the road by staggering the order of signals for motorists and pedestrians.

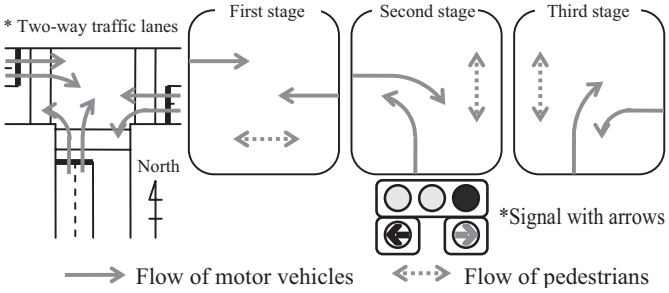
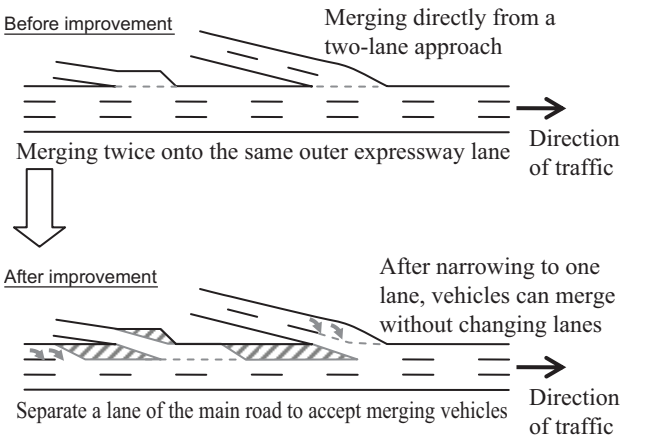


Fig. 6 Altering lane configurations for safety at traffic merging points

■ Encouraged as an effective measure against accidents at some merging points on urban expressways.



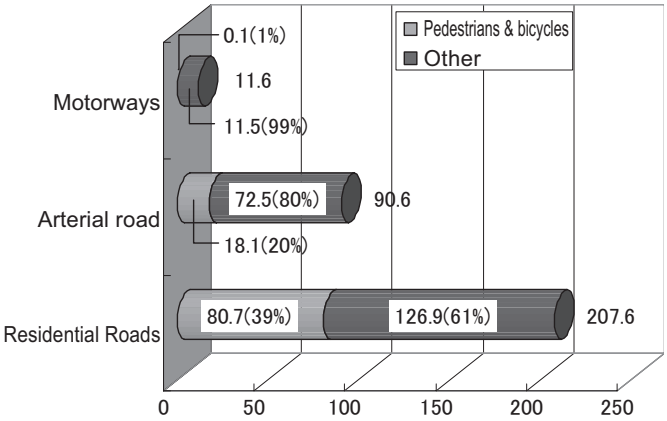
2-4 Efforts toward Traffic Calming

Associate Professor, Graduate School of Environmental Science, Okayama University
Seiji Hashimoto

The idea of promoting safety in residential areas by reducing vehicle speeds on minor roads — in other words, the idea of "Traffic Calming" — is now accepted as a matter of course. It is not easy, however, to put that idea into practice, as is apparent from the various traffic-calming methods that have been used in the past.
Along with conventional measures (e.g., speed humps, road narrowing), such new methods as ISA (Intelligent Speed Adaptation), Automatic Bollard, and Shared Space have been implemented overseas in recent years. In Japan, too, there is a need to review speed management in cities. In reviewing speed regulations,, the National Police Agency and the Ministry of Land, Infrastructure, Transport and Tourism clearly stated that the speed on residential roads should be set at 30 km per hour or less (see the box below). There is definitely a growing movement toward traffic calming.

Fig. 1 Percentage of accidents that caused casualties by type of road (2007)

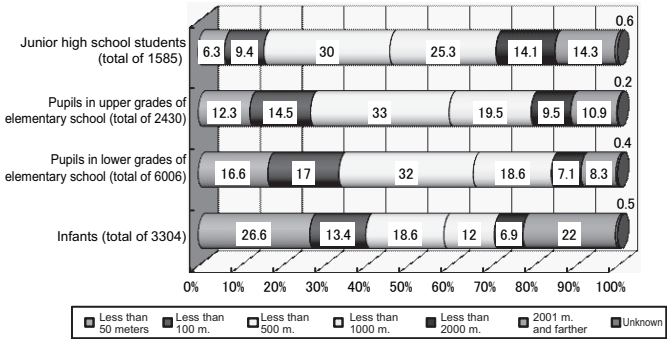
■ The number of traffic accidents (per vehicle-km) on roads in residential areas is high. The percentage of pedestrian and bicycle accidents is high, too.



Source: White Paper on Land, Infrastructure and Transport in Japan 2009

Fig. 2 Number of casualties among children pedestrians by distance from home (2009)

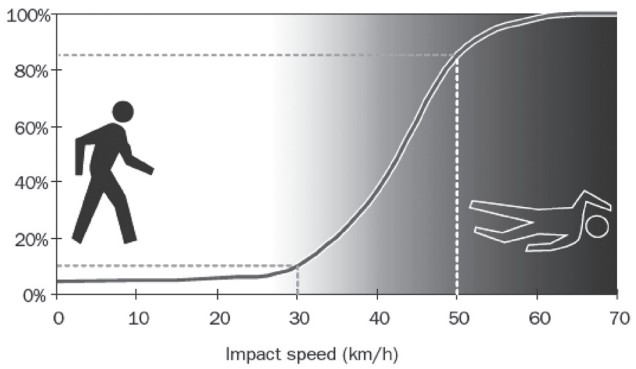
■ When children die in traffic accidents while walking, the scene of the accident is often rather close to home. Traffic safety measures need to be taken not only for highways, but also for residential roads.



Source: Traffic Statistics 2008 (Institute for Traffic Accident Research and Data Analysis)

Fig. 3 Efforts toward speed management

■ Recognizing the importance of managing speed to secure safety on roads, various countries are making efforts for speed management. For residential areas, 30 kilometers per hour is generally regarded as the optimal speed limit. In our country, too, the National Police Agency's "Report on Deciding Speed Limits" mentioned that a speed limit of 30 km per hour or less is desirable.



Source: Speed Management — A Road Safety Manual for Decision-makers and Practitioners (WHO,2008)

Report on Deciding Speed Limits (residential roads):
Targeting a speed that allows time for reaction to an unexpected incident, and that can avoid the occurrence of a serious accident, we set the speed limit at 30 km per hour or less. The extent of the regulation of this will be governed by attention to how the road is actually used in the area. At the same time, discussions are to be held with interested parties (e.g., residents, police, local governments, road authorities management) on just where the speed needs to be reduced and where the flow of traffic needs to be maintained. Also at the same time, in addition to speed control, the installation of devices (e.g., speed humps, protective barriers) should be considered.

Report on Deciding Speed Limits (National Police Agency, 2009)

■ In Germany, the speed limit is 30 kilometers per hour in cities. Separate speed limits are set for highways, where faster speeds are the rule. (Area-wide speed limit map: example from Kaiserslautern)

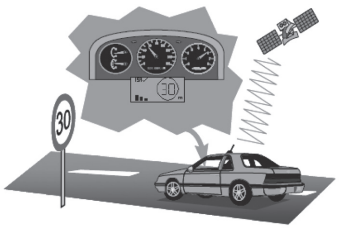
Fig. 4 Traffic calming methods

Movable rubber speed hump

- Instead of a conventional asphalt or concrete speed hump formed on site, factory-made rubber speed humps are also available. Because of their reliability and ease of installation or removal, they are often used in various places on a trial basis. Permanent use of them is also growing. (Photo: Pilot installation of two types of movable speed humps / Toyota City, Aichi Prefecture)

Intelligent Speed Adaptation (ISA)

- Use of the ISA, which automatically sets the upper speed limit of a vehicle by using ITS (Intelligent Transport Systems) technology, has been either contemplated or actually introduced, mostly in northern Europe. Methods under consideration are the satellite-linked GPS (Global Positioning System), or a speed-limit transmitter installed on a traffic sign. ISA is also being used experimentally on public roads in London.



Shared Space

- Regarding the road as a space shared among pedestrians, bicycles, motor vehicles, and so on will reduce traffic accidents, and will eliminate such devices as traffic lights, signs, and speed humps. The idea was first formed in the Netherlands and is spreading throughout the Western countries. In various places, its trial or permanent use is accelerating. (Photo: Stockholm)

Automatic Bollard

- In many cities in Europe, an automated ballard is used to restrict vehicle entry and exit to and from a residential or commercial area. It goes up and down automatically to permit only designated vehicles to proceed (e.g., public transportation, a resident's car). (Photo: Cambridge, U.K.)

Road Narrowing

- To restrict vehicle entry and exit to and from a residential or commercial area, and to reduce the speed of vehicles, part of a two-way road is intentionally narrowed to the point where vehicles need to yield to each other. An old practice in Western countries, it can also be seen in Japan. (Photo: Kamagaya City, Chiba Prefecture)

Roundabout

- A roundabout consists of an island inside an intersection, around which the traffic has to flow one way. There are many of them in Western countries. It is supposed to reduce the accidents that would otherwise occur if the intersection had traffic signals, provided that there is less than a certain amount of traffic. There is currently some movement toward shifting the regulation of traffic at intersections from signal lights to roundabouts with no signals. (Photo: Letchworth, U.K.)

2-5 The Reconsideration of Movement toward Acceptance of Bicycles

Associate Professor, Graduate School of Engineering, The University of Tokyo
Nobuaki Ohmori

People are once again looking favorably on bicycles as pollution-free and healthy vehicles. In other countries, progress has been seen in efforts to establish safe bicycle lanes, to provide bicyclists with access to public transportation, to take bicycles on public transportation vehicles, and to introduce advanced bicycle sharing systems. There are even cases in which bicycles play a significant role in building communities. The number of bicycles owned in our country is about 70 million. Following the revision of the Road Traffic Act in June, 2007, the way that bicycles run on roads is undergoing a noticeable change, with both small-scale and large-scale innovations being seen.

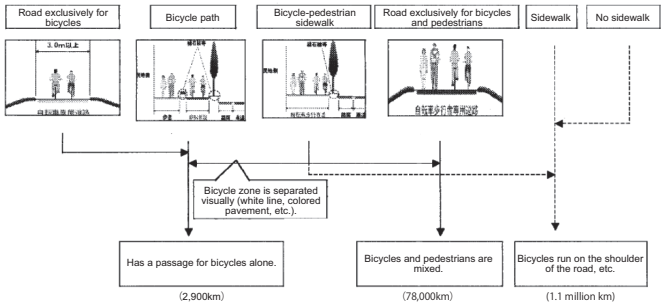
Table 1 Bicycle routes by country

Country	Year	Length of bicycle routes (km)	Percentage of total length of roads (%)	Length of bicycle routes per national land area (m/km²)	Length of bicycle routes per 1000 bicycles (m/1000 bicycles)	Length of bicycle routes per 1000 inhabitants (m/1000 inhabitants)
Netherlands	1985	14,500	8.6	349	1,317	900
Germany	1985	23,100	4.7	65	660	280
Japan	2006	7,301	**0.6**	**19**	**84**	**57**

Note: The length of bicycle routes in Japan is the total of (1) bicycle-pedestrian sidewalks (with bicycle lanes), (2) bicycle paths, (3) roads exclusively for bicycles, and (4) roads exclusively for bicycles and pedestrians.

Source: data of Ministry of Land, Infrastructure, Transport and Tourism

Fig. 1 Types of bicycle routes

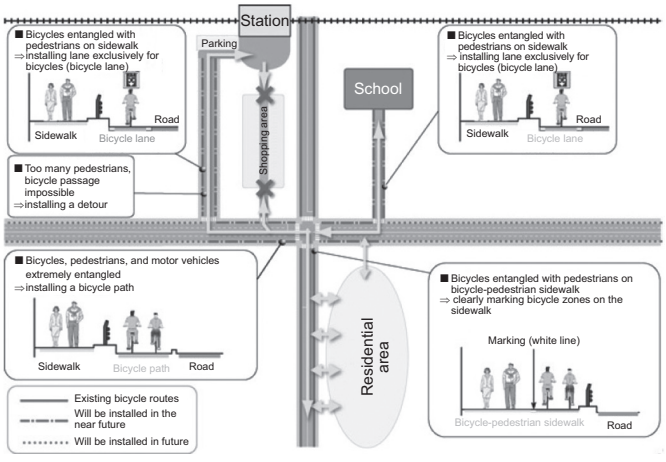


Note: Bicycle path: Path exclusively for bicycles installed adjacent to the motor vehicles road and sidewalk
Bicycle-pedestrian sidewalk: Sidewalk installed adjacent to the road, to be shared by bicycles and pedestrians
Road exclusively for bicycles, and road exclusively for bicycles and pedestrians: Separate roads for bicycle, and bicycle and pedestrian traffic
Other than the above, there are bicycle zones designated by pavement markings.

Source: data of Ministry of Land, Infrastructure, Transport and Tourism (figures for 2009)

Fig. 2 Areas to be a model in improving bicycle traffic

■ In January, 2008, ninety-eight places nationwide were designated as areas to be a model of future improvement of bicycle traffic. In each model area, "separated" spaces are installed strategically for bicycles to travel through.



Source: data of Ministry of Land, Infrastructure, Transport and Tourism

Table 2 Five rules for safe use of bicycles

(1) Travel on the carriageway as a general rule. Travel on sidewalk is a permitted exception when, • a traffic sign, etc., indicates that sidewalk use is permitted, or • bicyclists are children younger than 13, elderly aged 70 and over, or physically disabled, or • it is impossible to do otherwise considering the road traffic situation.
(2) Travel on the left side.
(3) On the sidewalk, give priority to pedestrians and ride slowly on the side next to the road.
(4) Observe safety rules. • It is not permitted to ride a bicycle when you are drunk, to have two people on one bicycle, and to ride parallel to another bicycle. Use lights at night. Observe traffic signals. Stop at the intersection, look all ways, and proceed with caution.
(5) Children are to wear helmets.

Source: data from Japan Traffic Safety Association and the National Police Agency

Fig. 3 Chigasaki City Rainwear Project

■ To keep middle school and high school students from not-using umbrellas while riding on bicycles, this citizens' project is developing attractive rainwear.

Source: Rainwear Project, official website of Chigasaki City

Fig. 4 Roads exclusively for bicycles

■ In Narita New Town, a series of bicycle roads have been installed, completely separated from pedestrians.

■ In the center of Paris, more bicycle roads are being installed.

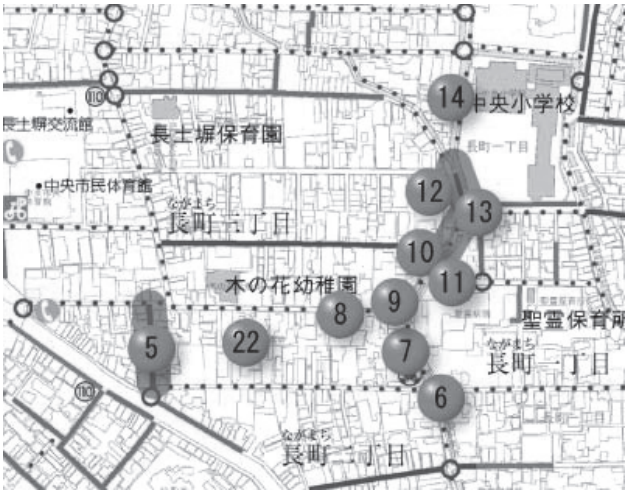
Fig. 5 Developing bicycles for three people

- For households with children, bicycles are indispensable for going out with the children. From July 1, 2009, the Road Traffic Act permits two infants to be carried on one bicycle only if the bicycle satisfies the new safety standard. (The Act also changed the standard for the human-to-motor assist ratio to 1 : 2 for electric motor assisted bicycles.)

Photographed by author

Fig. 6 Safety map for bicycles and pedestrians (Kanazawa City)

- The map was created by local residents; it shows dangerous spots.



Source: website of Kanazawa River and National Road Office

Table 3 Maintaining safety of bicycles

Place / targets	Possible measures to take
Intersections	Installing colored pavement
	Widening bicycle crossing lanes
	Ensuring space for bicycles to wait for the signal
	Improving visibility
	Installing street lights
Bus stops	Improving visibility
	Installing street lights
	Installing protective barriers
Sidewalks	Improving bicycle-pedestrian sidewalks
	Widening sidewalks
	Introducing roads exclusively for bicycles
	Installing protective barriers
	Making regulations for ordinary bicycle travel on permitted sidewalks
Parking areas	Reviewing the parking fee system
	Installing new bicycle parking areas
	Introducing legislation to make it mandatory for facilities to install bicycle parking areas
	Keeping bicycles from parking in improper areas
Road shoulders	Introducing roads exclusively for bicycles
	More enforcing of rules (e.g. stopping, obeying traffic signals) for motorists
	Installing street lights
The "transport disadvantaged" (the elderly, etc.)	Keeping bicycles from parking in improper areas
	Improving bicycle-pedestrian sidewalks
	More education for bicyclists
Comprehensive measures	Putting more emphasis on education and public relations
	More enforcing of rules (e.g. stopping, obeying traffic signals) for motorists
	More education for bicyclists

Source: data from website of Urban Economic Research Institute

Fig. 7 New developments in bicycle parking areas

- The first mechanized bicycle parking units in Mitaka City. It accommodates 180 bicycles per unit.
- On road bicycle parking areas are now possible by a new rule.

Photographed by Transportation and Urban Engineering Research Group, Yokohama National University

Source: data of Ministry of Land, Infrastructure, Transport and Tourism

Table 4 The European trend toward community bikes

- Bicycle-sharing (the "community bikes" system), which basically uses cell phones or integrated-circuit cards for renting and managing bicycles, and is good for theft prevention, efficient management, and convenience to users, has been introduced in over 100 cities, mainly in Europe (including Paris, where the system is called "Vélib'"); there are a number of operators in the business. In our country, too, since its introduction in Toyama City in March 2010, many other cities (Nagoya, Sapporo, Kitakyushu, etc.) are conducting pilot tests and are considering introducing the system. (Data from Aoki et al. (2008), Mr. Takahito Suwa, http;//bike-sharing.blogspot.com/, Urban Community Cycle Research Group (2010), and Ministry of Land, Infrastructure, Transport and Tourism.)

Business operator	Name of city (system)
JC Decaux	Over 15 cities including Paris (Vélib'), Lyon (Vélo'v), and Toyama (Cyclocity)
Clear Channel	Over 10 cities including Oslo (Oslo Bysykkel) and Barcelona (Bicing)
DB	Over 6 cities such as Berlin and Frankfurt (Call-a- bike)
Nextbike	Over 20 cities, e.g. Leipzig and Frankfurt (Nextbike)
Bicincittà	Over 20 cities including Parma (Bicincittà) and Rome (Roma'n'Bike)
Other	Copenhagen (Bycyklen), Orléans (Véló+), Taipei (YouBike), London (Barclays Cycle Hire), etc.

Fig. 8 Community bike project in Toyama City (Cyclocity)

- The service started in March, 2010. The system is the same as Vélib' in Paris. It has 15 stations and 150 bicycles. The photo was taken near the Centrum station.

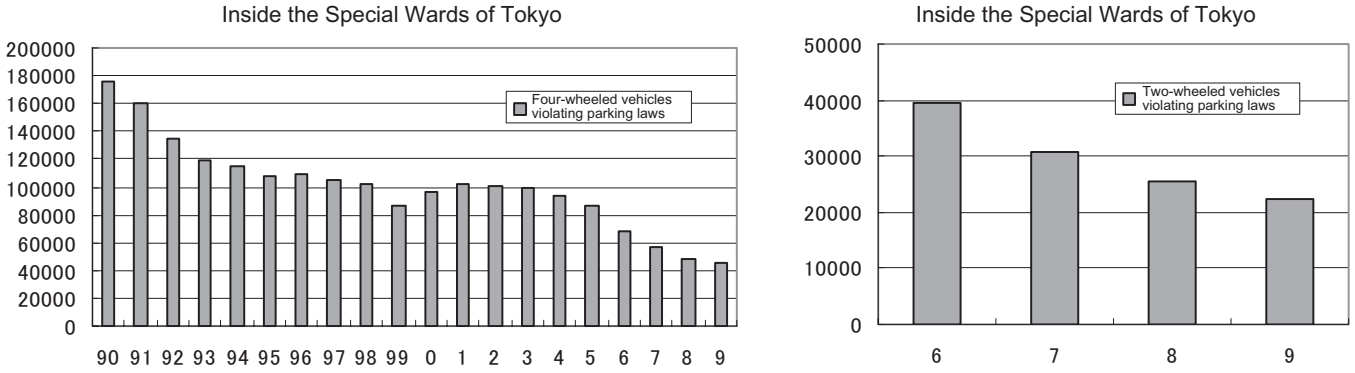
Photographed by Mauricio Matsumoto

2-6 Solving Parking Problems

Associate Professor, Interdisciplinary Graduate School of Science and Engineering, Tokyo Institute of Technology
Yasunori Muromachi

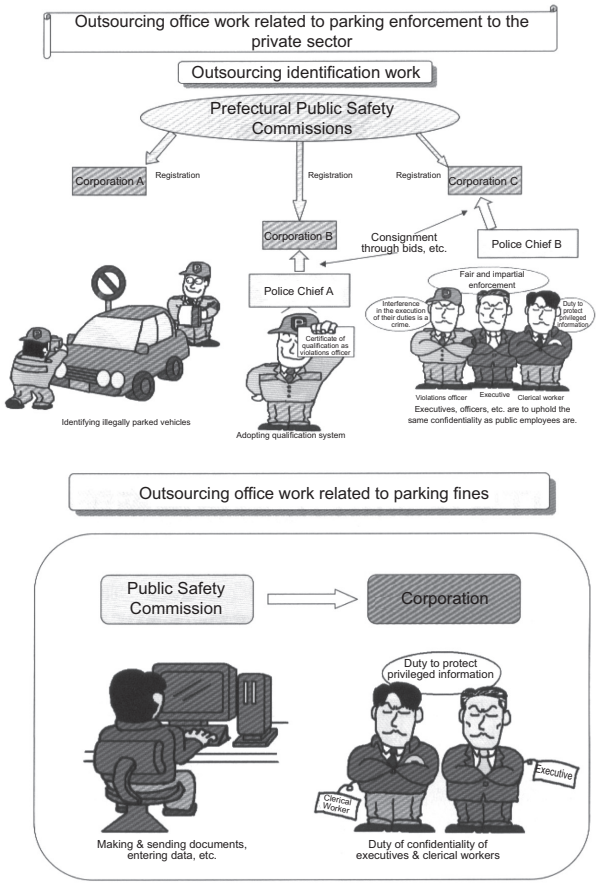
There is now better enforcement of laws against illegal parking; the number of drivers parking illegally on the street in the Special Wards of Tokyo continues to decrease. The same trend applies to motorcyclists. Steps are being taken to cope with the insufficiency of motorcycle parking areas. To assist elderly people driving around looking for parking spaces, a parking policy has been introduced that aims at creating a traffic environment friendly to elderly drivers.

Fig. 1 Changes in the number of vehicles illegally parked for a period of time on the street in the 23 Special Wards of Tokyo



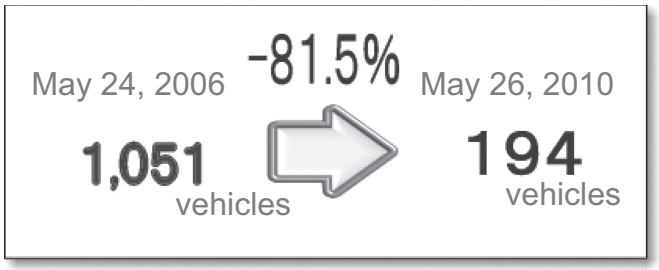
Source: National Police Agency; http://www.keishicho.metro.tokyo.jp/kotu/chusya/chusya.htm#1_4rin, 2010

Fig. 2 Outsourcing office work related to parking enforcement to the private sector, with results (Tokyo)



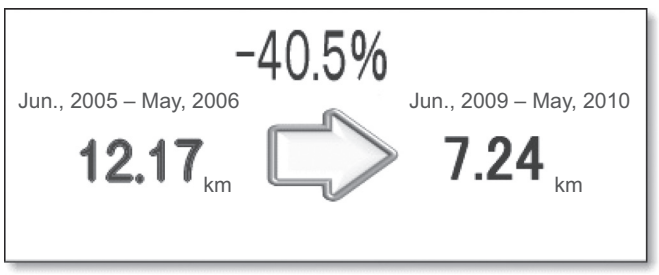
Source: JPO News Vol. 47, 2005 (Japan Parking Facilities Promotion Organization)

■ The number of vehicles illegally parked for a time on the ten major streets has decreased.



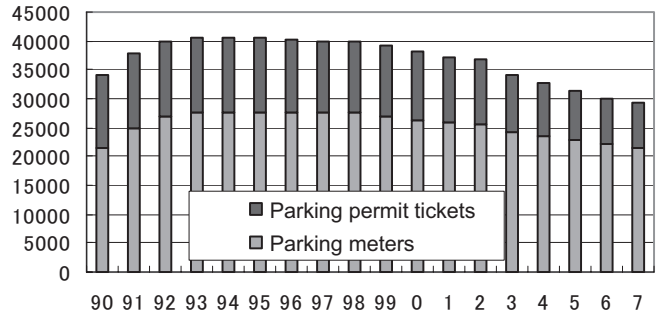
Note: The ten major streets include Harumi St., Shinjuku St., Meiji St., etc. (ca. 33 km of streets): Survey time of day: 2 p.m. to 4 p.m.

■ On the ten major streets , the length of traffic congestion within one hour has become shorter.



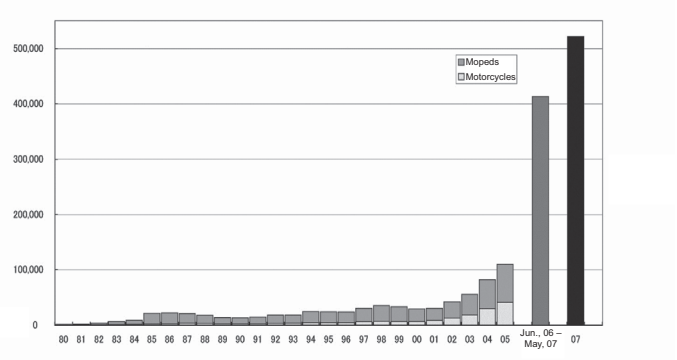
Source: National Police Agency; http://www.keishicho.metro.tokyo.jp/kotu/chusya/koka.htm, 2010

Fig. 3 Changes in the number of parking spaces (meters & permit tickets)



Source: JPO News Vol. 57, 2008 (Japan Parking Facilities Promotion Organization)

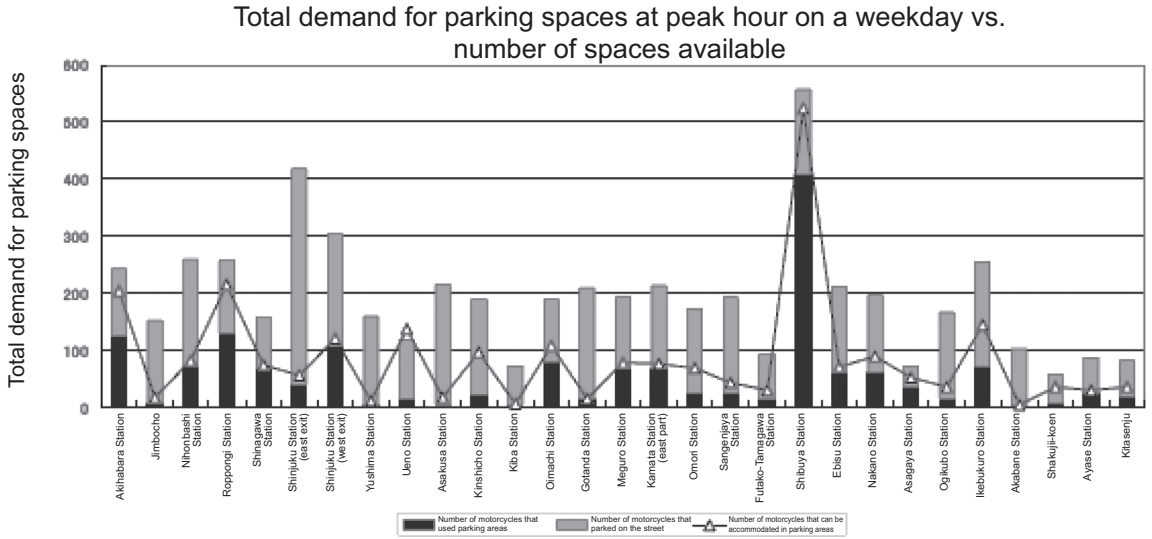
Fig. 4 Changes in the number of parking enforcement actions for mopeds and motorcycles



Source: JPO News Vol. 57, 2008 (Japan Parking Facilities Promotion Organization)

Fig. 5 Total demand for motorcycle parking spaces at peak hour on a weekday vs. number of spaces available

■ In many areas, parking spaces are insufficient to accommodate motorcycles informally parked on the street.



Source: 2008 Survey on the Realities of On-street Parking (2009, Tokyo Metropolitan Public Corporation for Road Improvement and Management)

Fig. 6 Introducing parking exclusively for senior or other special drivers.

How the system works. When facilities often used by senior or other special citizens in their daily lives (e.g., governmental facilities, welfare facilities for senior citizens, facilities for the disabled, hospitals) do not have a large enough parking area, exclusive parking spaces can be set up on the road near those facilities (designated as "Parking space for senior or other special drivers"). Seniors who display a special label are entitled to use those spaces. "Senior or other special drivers" means those who have a license to drive ordinary cars and who

- are 70 years old or older, or
- have been issued that license with the qualification that they have a hearing problem, or
- have been issued that license with the qualification that they are physically handicapped, or
- are pregnant or have given birth within the last eight weeks.

Source: National Police Agency; http://www.keishicho.metro.tokyo.jp/kotu/kourei_chusya/kourei_chusya.htm, 2010

2-7 The Second-Stage ITS — Intelligent Transport Systems

Manager in charge, ITS Japan Planning Group
Masahiro Sakakibara

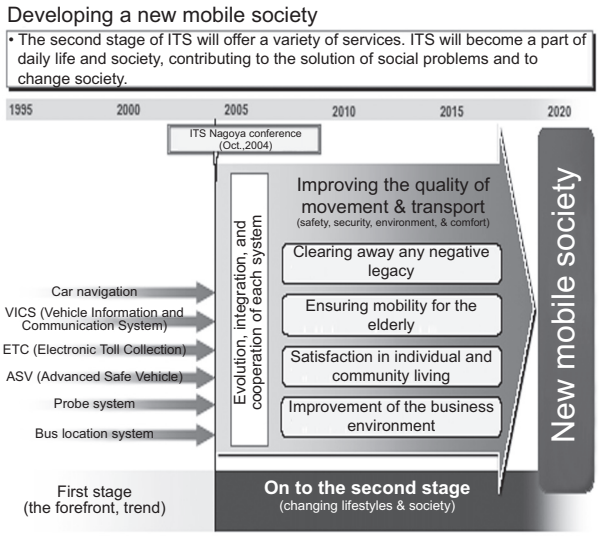
ITS (Intelligent Transport Systems) closely coordinate people, vehicles, and roads, using the latest information communications technology. The systems are designed to improve safety, efficiency, and comfort, and to preserve the environment. In Japan, first-stage practical use of the ITS came with such systems as the VICS (Vehicle Information and Communication System) and the ETC (Electronic Toll Collection). In cities, the use of more services from the latter is being promoted through the installation of an ETC device in the vehicle itself. In September, 2004, the Japan ITS Promotion Council was established by users from industrial, governmental, and academic sectors, and promotion policies for the ITS, which had entered its second stage, were announced. In January, 2006, the IT (Information Technology) Strategies Headquarters made public its New Reform Strategies, announcing among its goals the realization of a society that would rank first worldwide in road traffic safety. To achieve the goal of reducing the number of traffic fatalities to less than 5000, the "driving safety support system" (to be implemented nationwide beginning in 2010) will be installed, mainly in places where accidents occur frequently. In May 2010, in the wake of the IT New Reform Strategies, the New Information Telecommunications Technology Strategies were made public, and the Green (energy conserving) ITS was promoted. This system collects a broad range of traffic information, including "probe" information (real-time motor vehicle movements), and disseminates it. Also, as one of the "Accerelated restoration of the benefits to society" projects under Japan's long-range strategic policies (Innovation 25, adopted by the Cabinet meeting of June 1, 2007), the achievement of safe and efficient road traffic systems using information communications technology (ITS) was promoted; the project is being expedited.

Table 1 ITS promotion policies announced by Japan ITS Promotion Council

Targeted field	Overall theme	Individual theme
Safety and security	(1) Improving traffic safety	• More intelligent motor vehicles • Enhancing infrastructure • Interactions between vehicles and between vehicles and infrastructure • Supporting safety of pedestrians, bicycles, and other two-wheeled vehicles • Advanced system for rescue and emergency medical care of the injured from traffic accidents
Environment & efficiency	(2) Smoother traffic Reducing environmental impact	• Moderating traffic demand • Advanced traffic management systems • Advanced parking systems • Efficient freight transport
Comfort & convenience	(3) Increasing personal convenience	• Providing more advanced traffic information and encouraging its use • Skillfully utilizing ITS capabilities • Increasing conveniences for the elderly and disabled
	(4) Stimulating an area's economic activities	• Improving access from the area to expressways • Increasing convenience of intermodal movement in public transport
General	(5) Improving transport infrastructure Promoting international standards	• Building the ITS platform • Promoting ITS international standards

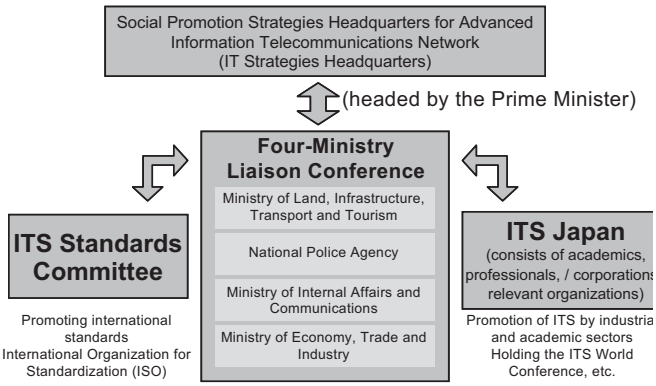
Source: Japan ITS Promotion Council (website of ITS Japan)

Fig. 2 Direction of the second stage



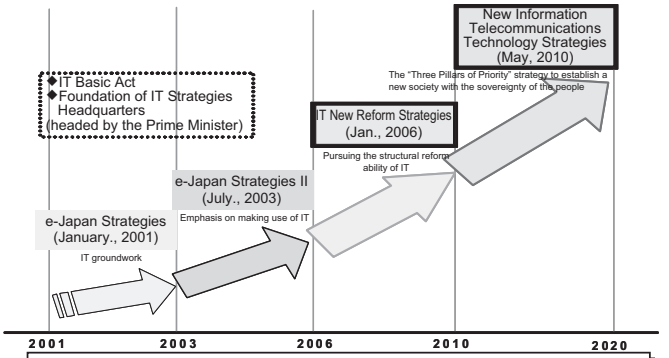
Source: Smartway Project Advisory Committee, Ministry of Land, Infrastructure, Transport and Tourism

Fig. 1 The system for promoting ITS in Japan



Source: website of Ministry of Land, Infrastructure, Transport and Tourism

Fig. 3 IT strategies of Japan: steps taken, goals, and policies



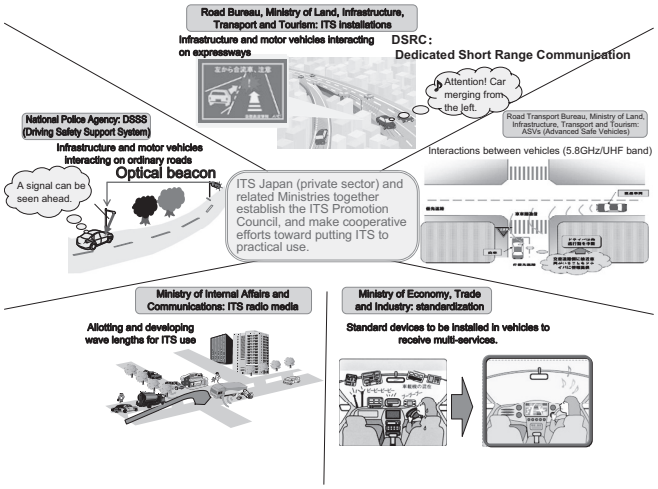
[IT New Reform Strategies]
A society that ranks the first worldwide in traffic safety — less than 5000 traffic fatalities is the goal.
1. Making practical use of a driving safety support system that interacts with infrastructure (FY2010-)
2. Promoting and spreading the FAST system that shortens the time of getting the injured from a traffic accident spot to a medical institution, etc.
3. Developing technology to prevent pedestrian accidents

[New Information Telecommunications Technology Strategies]

1. **The "Three Pillars of Priority" strategy:** (1) Achieving electronic administrative services that put people first, (2) Strengthening community bonds, and (3) Creating new markets and development worldwide
2. **Promoting "greening" (energy conservation) where people and things move:** Promoting Green ITS that collect a broad range of traffic information, including "probe" information (real-time motor vehicle movements), and disseminates it; the system can also be used to control traffic.
3. **Promoting smart grids; low carbon housing and offices:** Combining smart grid techniques with heat exchange systems, traffic systems, etc., to achieve optimal energy management in the area.

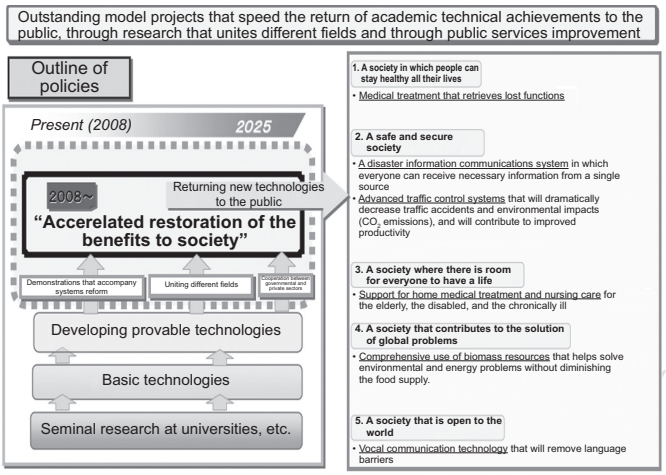
Source: website of the IT Strategies Headquarters, Prime Minister of Japan and His Cabinet

Fig. 4 Driving Safety Support System



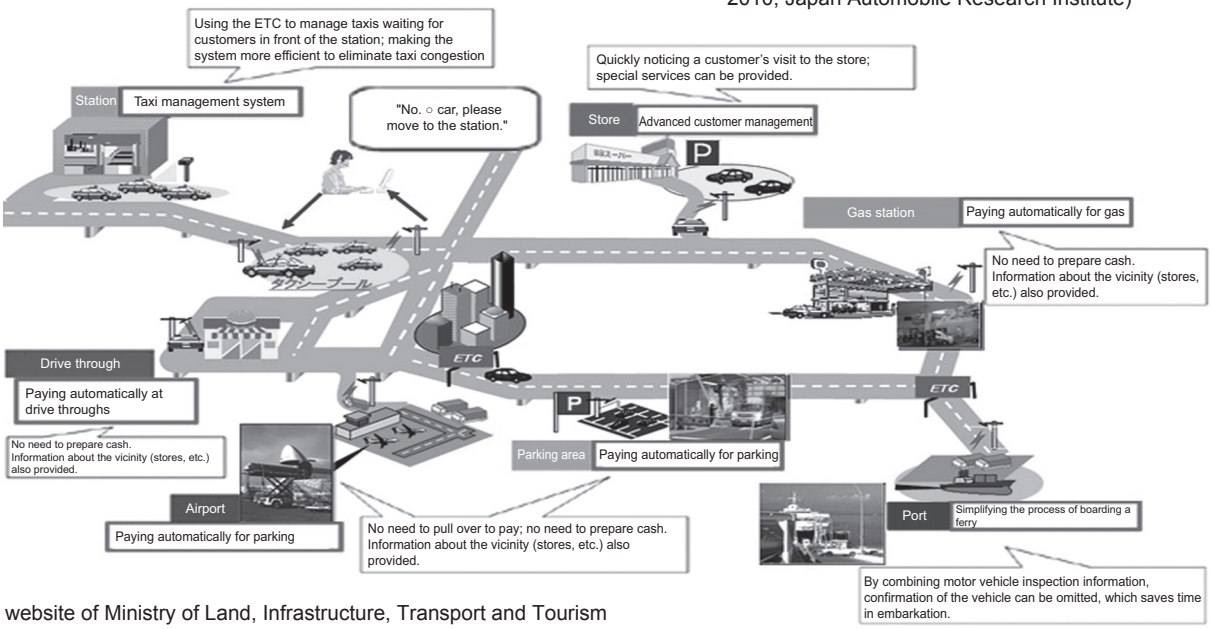
Source: Made by ITS Japan from data of the Cabinet Secretariat

Fig. 5 Innovation 25 — "Bring home the benefits" projects



Source: data of the Seventh Conference to Promote Industrial, Academic, and Governmental Cooperation (data from Mr. Okumura, member of the Council for Science and Technology Policy)

Fig. 8 Services available in town through the ETC device installed in the motor vehicle (examples)



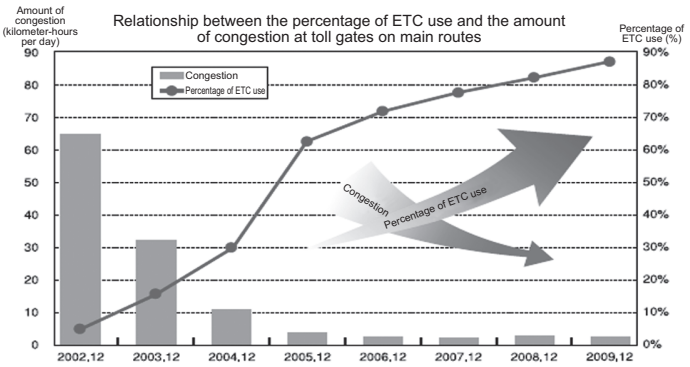
Source: website of Ministry of Land, Infrastructure, Transport and Tourism

Table 2 Number of car navigation devices, VICS units, and ETC devices installed

Item	Cumulative number	Date of calculation
Car navigation devices	41,299,000	June, 2010
VICS units	27,642,878	June, 2010
ETC devices	39,485,661	August, 2010
Percentage of vehicles using the ETC system (nationwide average)	80.9%	Aug. 27, 2010 to Sep. 2, 2010

Source: website of Vehicle Information and Communication System Center (VICS Center) and Organization for Road System Enhancement (ORSE)

Fig. 6 Relationship between the percentage of ETC use and the amount of congestion at toll gates on main routes (Metropolitan Expressway)



Source: website of Metropolitan Expressway Co., Ltd.

Fig. 7 "Bring home the benefits" projects — Model cities for ITS demonstration projects

Model cities	Outline of measures to be implemented
Toyota City	• Providing real-time road traffic information using "probe" information • Making systems for on-demand buses; introducing bus location systems for all routes; introducing a multi-purpose IC card • Introducing less polluting vehicles; introducing personal mobility
Yokohama City	• Demonstration of navigation systems; supporting eco-driving by controlling traffic signals • Introducing bus location systems, bicycle share systems, and Park & Ride • Introducing less polluting and high fuel efficiency vehicles; encouraging new personal choices among modes of transport
Aomori City	• Sharing information about current status of snow removal • Introducing bus location systems; resolving traffic bottlenecks; introducing a multi-purpose IC card • Introducing next-generation motor vehicles (official cars, city buses, rent-a-cars)
Kashiwa City	• Dynamic Park & Ride; next-generation ITS parking areas; on-demand transport; car sharing • Bicycle share systems; introducing personal mobility systems; eco-driving

Source: data from Research Report on Trends of ITS Industries (Mar., 2010, Japan Automobile Research Institute)

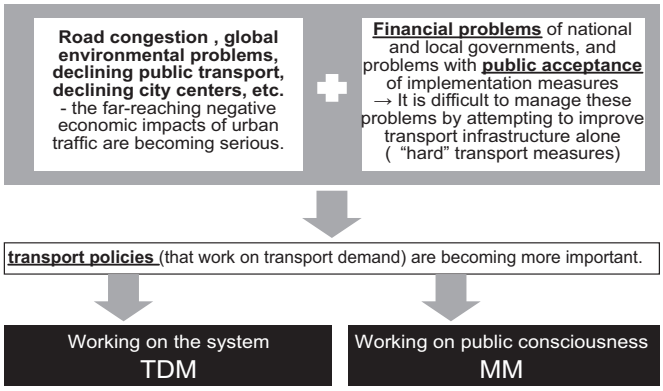
2-8 The Importance and the Developments of "Soft" Measure: TDM (Transportation Demand Management) and MM (Mobility Management)

Full-time Lecturer, Graduate School of Systems and Information Engineering, University of Tsukuba
Ayako Taniguchi

Motorization has caused many problems in our society. For such problems, TDM/MM is getting more and more important. These measures attempt an appropriate balance between transport demand (individual trips) and supply (transport facilities /services) by adjusting the demand. In our country, TDM have been implemented since the '90s in various areas, and tried to improve transport services by improving transport facilities and vehicles, operating practices, fee policies,and so on. In recent years, MM is being implemented. along with various TDM measures worldwide. MM emphasizes creating a responsible awareness among each person. Such measures are becoming more important than ever as a means of easing problems involving the global environment and declining city centers.

1. Importance of TDM/MM

Fig. 1 Importance of TDM/MM



■ Definitions of terms

TDM (Transportation Demand Management): A method of solving transport problems (including traffic congestion) by adjusting the demand side, i.e., the attitude of the motor vehicle user, rather than the supply side (road improvements and so on).

MM (Mobility Management): Measures focusing on communication that encourages each person voluntarily to change his/her mobility (movement) patterns in a direction that is desirable for both the society and the person*.

* For example, changing from excess use of cars to appropriate use of public transport and bicycles.

TFP (Travel Feedback Program):One of the MM measures to encourage voluntary changes in people's consciousness and behavior toward transport through broad-based personal communication. Communication is with each person or each household, and basically involves multiple times.

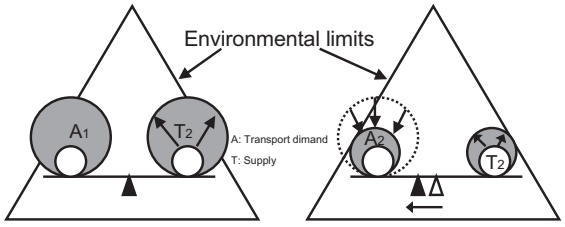
Table 1 Major events related to MM policies in Japan and changes in the number* of those events

	before 1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Events related to MM		MM-style policies introduced in magazines	Sapporo TFP pilot test Ministry of Land, Infrastructure, Transport and Tourism (former Ministry of Construction): started pilot test project	Sapporo TFP real implementation (first time in Japan) MM test on Bay Route of Hanshin Expressway	Research assistance of IATSS (International Association of Traffic and Safety Sciences) for studies on changes in attitudes and behavior		Gaining backlog of test experience Japan Society of Civil Engineers: started workshop for studies on changes in attitudes and behavior	Initial involvement of Ministry of Land, Infrastructure, Transport and Tourism (central) Kyoto Prefecture: MM promotion was included in transport demand management plan	Japan Society of Civil Engineers: workshop enhanded to become a sub- committee Guidelines of MM (Japan Society of Civil Engineers) was published	1st JCOMM (Tokyo	2nd JCOMM (Sapporo) first JCOMM Awards	3rd JCOMM (Kyoto) MM manual for offices was adopted Ministry of Land, Infrastructure, Transport and Tourism: started eco-commuting project Manual to measure the effects of MM was adopted	4th JCOMM (Oita) JCOMM incorporated	5th JCOMM (Fukuyama)
Number of events			1	2	3	6	10	14	35	66	118			

Note 1: JCOMM is the Japanese Conference of Mobility Management
2 Number of events that were reported to the office of the JOMM

Fig. 2 Paradigm shift in urban policies and the concept of TDM

■ Traditionally, increased demand for transport was managed from the supply side, that is, through facilities improvement (demand-following approach). It has shifted to an integrated package-type approach from three sides — demand (TDM), supply, and institutional framework. That approach provides attractive alternative methods of movement by taking account of environmental limits, and by changing the institutional arrangements (e.g., revised financial assistance). It also restrains demands for motor vehicle transport.



a. Traditional approach (demand-following approach)
b. New approach (intergrated package approach)

Source: Policies And Strategies Toward Sustainable Transport, International Environmental And Symbiotic Sciences (Katsutoshi Ohta, Chapter 3, 2005, Asakura Publishing)

Fig. 3 Envisioning the integrated package approach

Improving facilities (building P & R parking area)
+
Encouraging use (TFP communication)

■ The integrated package approach to achieving the goals of urban transport strategies is the appropriate combination and implementation of multiple transport measures that mutually reinforce each other — the "carrot and stick" approach. For example, the technique of building a parking area for Park & Ride (P & R): TFP communication urges people to change their consciousness, and at the same time promotes the use of P & R.

Table 2 Examples of funds that can be used for TDM and MM

Purpose	Examples of major funds
Ease congestion	• Road Bureau, Ministry of Land, Infrastructure, Transport and Tourism: Pilot tests
Encourage the use of more public transport	• Comprehensive program to revitalize public transport • Comprehensive project for vitalization/revival of local public transport
Environment	• Road management action program for CO_2 reduction • Model area, area-wide management promotion project to create low carbon areas • EST (Environmentally Sustainable Transport) model project
Other	• Comprehensive support project for Model City Environmental Cleanup • Community-building grant • Vitality revival projects for localities, etc.

2. Examples of MM

1) Workplace transport management that targets commuters: Uji City, Kyoto Prefecture

<Outline>
- Purpose: Alleviate traffic congestion at commuting times in areas where offices are clustered
- Year of implementation: 2005-2006
- Number of targeted persons: 4400 employees of 150 companies and administrative agencies
- Implemented by national government, Kyoto Prefecture, Uji City, Chamber of Commerce, local corporations, transport businesses, non-profit organizations, etc.
- Implementation media: (1) lectures (for administrative sector and for corporations), (2) one-time use of TFP, and (3) TFP through website

Fig. 4 Public transport map for commuting: displays company names

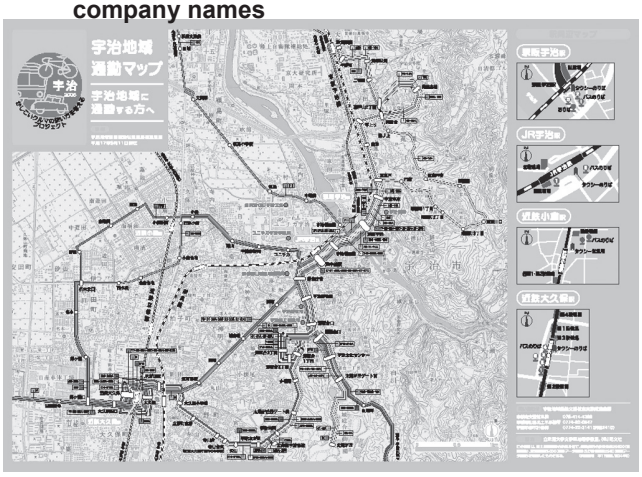
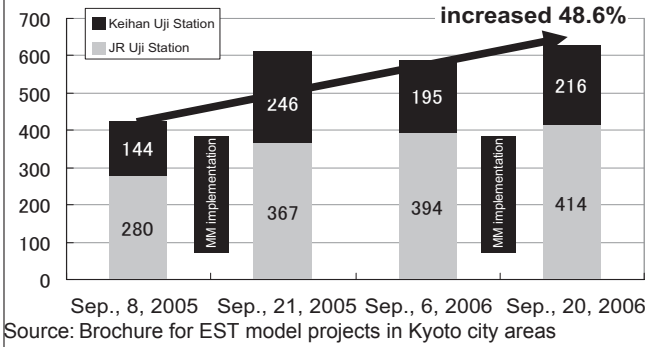


Fig. 5 Changes in the number of passengers who get off the train (those without a computer pass)



Source: Brochure for EST model projects in Kyoto city areas

3) Promotion campaign urging high school students to use more public transport

Fig. 8 Leaflet for promotion campaign urging high school students to use more public transport: Ibaraki Prefecture

- The leaflet was distributed at the freshman orientation. The percentage of sophomores using public transport was about 10% higher compared to those who had not received it (freshmen: 41.8%, sophomores: 31.6%).

2) MM to encourage students to make residential moves in such a way as to create a "compact city:" Tsukuba University

To systematically organize the traffic environment for people involved with the university, Tsukuba University began to charge its parking areas in 2003, and introduced a bus system inside the campus in 2005. Since 2006, it has continued to encourage people to use the university bus. The MM regarding residential moves was part of a promotion of the inter-school bus, and it started as a test project.

<Outline>
- Purpose: Giving incentives to choose an apartment near the bus stop
- Year of implementation: 2007 to present
- Targets: Freshmen who plan to move from Tsukuba University's student dormitory to an apartment
- Number of targets: FY 2007: about 300; FY 2008: about 600
- Implementation cost: about 1200 yen per person for the "incentive booklet" group
- Procedures: Targets were randomly divided into four groups: (1) a "control" group that was given no contact; (2) a "housing information" group to which an ordinary housing magazine was distributed; (3) a "bus focused" group to which a housing magazine was distributed in which apartments within 200 meters from a bus stop were marked with a red "convenient for bus" mark; and (4) an "incentive booklet" group that was given the same magazine as the "bus focused" group and an additional incentive booklet. The effects of the communication provided could be seen in those who ended up living near the bus stop: compared to the "control" group, the "bus focused" group had twice as many people living near the bus stop, and the "incentive booklets" group had 2.7 times as many.

Fig. 6 Distributed booklets to give incentives

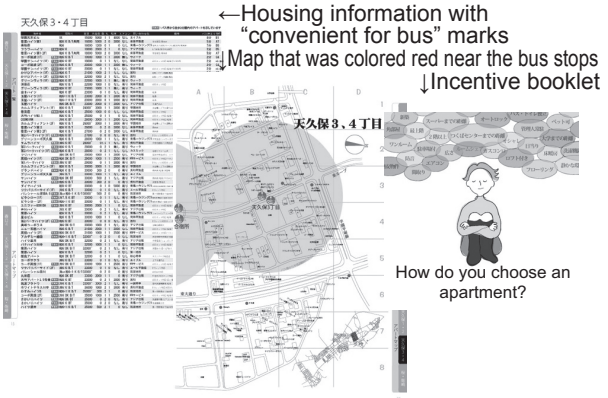
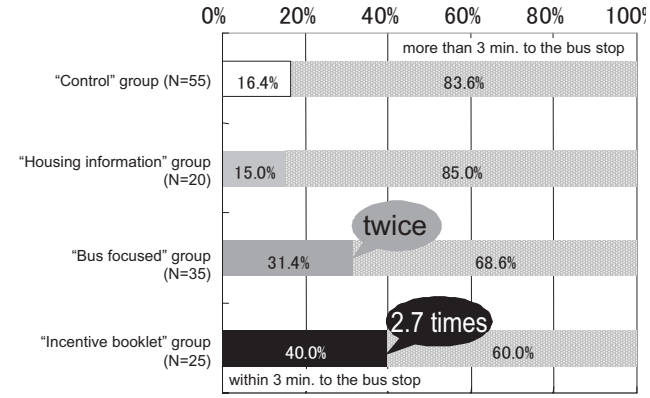
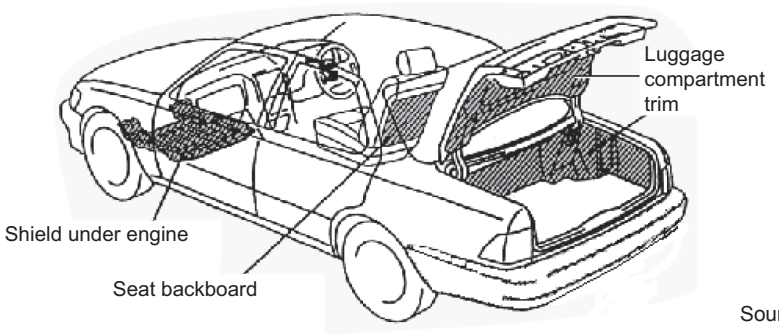


Fig. 7 Effects of MM: changes of motor vehicles share



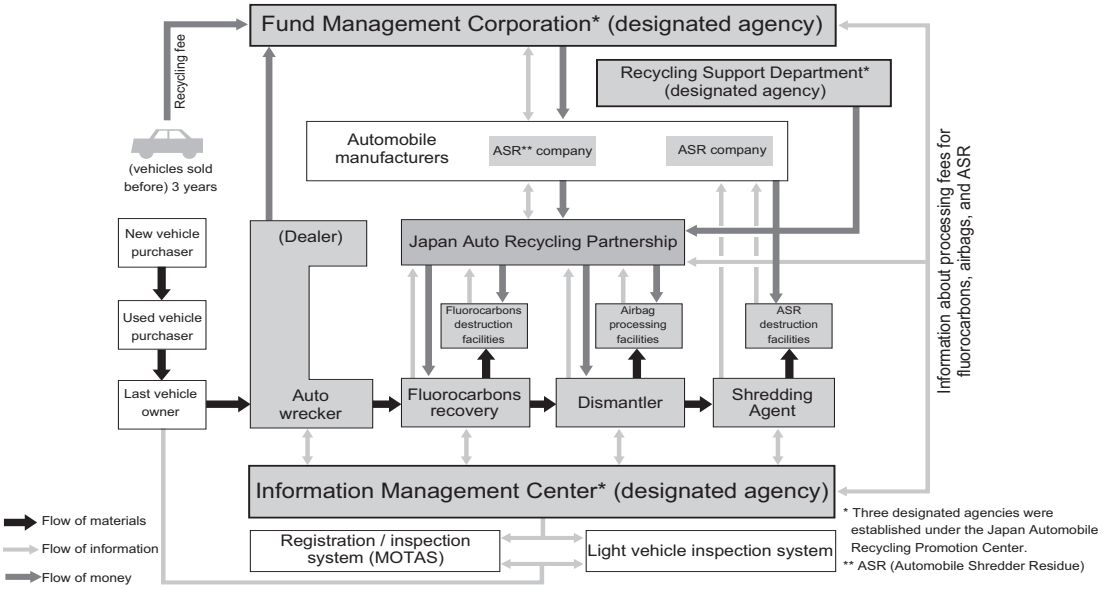
Source: Analysis of The Effects of Persuasive Communication on Choosing Housing Based on Public Transportation Accessibility (Ayako Taniguchi, Kazuhide Asami, Satoshi Fujii, Haruo Ishida / Proceedings of Infrastructure Planning Research (CD-ROM) Vol. 37, 2008)

Fig. 3 Examples of auto parts made of recycled materials from discarded bumpers



Source: Toyota Motor Corporation

Fig. 4 How the Automobile Recycling Law works



Source: Japan Automobile Manufacturers Association, Inc.

Table 2 Recycling percentage of automobile manufacturers

	Recycling percentage (%)	
	Shredder residue	Airbags
Goals	70 (2015-) 50 (2010-) 30 (2005-)	85
FY 2009	77.5 – 82.1	93.9 – 94.7
FY 2008	72.4 – 80.5	94.0 – 94.9

Note: Excludes manufacturers that entrust recycling to designated recycling agents. Figures are based on information furnished by each company; significant digits are rounded differently in each case.

Source: data of Industrial Structure Council and Central Environmental Council

Table 3 Voluntary efforts to recycle cargo holds on commercial vehicles

1. Promoting the manufacture of recyclable cargo holds
(1) Improving design of vans with an aluminum refrigerator / freezer easy to dismantle; promoting appropriate processing
(2) Suggesting alternatives to materials like wood and insulation that are difficult to process properly
(3) Creating a manual for dismantling
2. Reducing the use of materials that impact on the environment
(1) lead; (2) mercury; (3) hexavalent chromium ; (4) cadmium
3. Promoting proper recycling procedures
(1) Building and expanding cooperative recycling networks
4. Promoting information sharing and educational activities
(1) Producing and distributing fliers about cargo hold recycling. (2) Providing information to dismantlers

Source: Japan Automobile Manufacturers Association, Inc.

Table 4 Reduction goals for chemicals that impact on the environment; achievements won through voluntary efforts

Chemicals to be reduced	Goals	Achievements
Lead	Starting from Jan., 2006, less than 1/10 of the amount used in 1996 (exc. batteries) • For large commercial vehicles (incl. buses), less than ¼	• Achieved with all models from Jan., 2006

Mercury	Prohibited from Jan., 2005 onward
	• However, the following parts, which are used for the purpose of traffic safety, will be excluded.
	(1) liquid display for navigation devices; (2) gauge array;
	(3) discharge headlamps; (4) room fluorescent light
		• Achieved with all models from Jan., 2003
		- How the exceptional parts are being handled:
		for (2), all models replaced with mercury-free materials;
		for (4), not used conventionally in passenger cars.

Hexavalent chromium	Prohibited from Jan., 2008 onward	• Achieved with all models from Jan., 2008
Cadmium	Prohibited from Jan., 2007 onward	• Achieved with all models from Jan., 2006

Note: (1) Reduction goals apply to new models. (2) Large commercial vehicles are those whose gross vehicular weight is more than 3.5 tons.

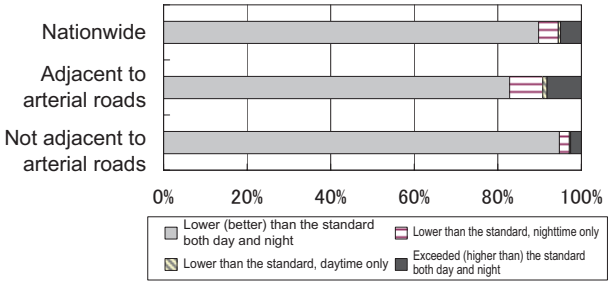
Source: Japan Automobile Manufacturers Association, Inc.

3-2 Traffic Noise and Measures to Control it

Associate Professor, Graduate School of Urban Environmental Sciences, Tokyo Metropolitan University
Hiroyuki Oneyama

According to an FY 2008 assessment, slightly less than 90% of the environmental standard for traffic noise was met nationwide both day and night; the score for areas adjacent to arterial roads was about 83%. The percentage has been gradually improving over the past several years; however, noise levels under special road conditions, with a multi-level structure are still high. Dealing with the problem in those cases has involved strengthening comprehensive measures that target noise sources, reduce traffic flow, alter the road structure, or change roadside conditions.

Fig. 1 Meeting the environmental standard: assessment results (overall, FY 2008)



Note: The assessment was based on the percentage of all roadside structures whose noise level readings were compared with the standard.

Note: Areas adjacent to arterial roads were defined by the distance from the edge of the road, depending on the number of the lanes on the road, as mentioned below. (Roads that bear arterial traffic are national expressways, urban expressways, national highways, prefectural roads, and municipal roads that have at least four lanes.)
- Roads that bear arterial traffic and have two or less lanes: 15 meters
- Roads that bear arterial traffic and have more than two lanes: 20 meters

Note: Areas not adjacent to arterial roads are: (1) areas that are hinterlands of the area adjacent to the road that bear arterial traffic, or (2) areas adjacent to roads other than arterial roads.

Fig. 2 Meeting the environmental standard: assessment results for highway sections with multi-level structure, FY 2008

■ Compared to the previous fiscal year, improvements have been seen in meeting the standard at highway sections with multi-level structure. However, compared to the overall results (Fig. 1), there is a high percentage of areas not meeting the standard.

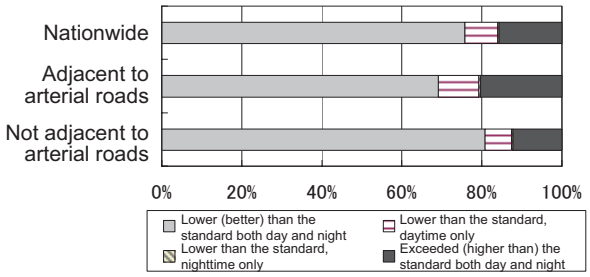
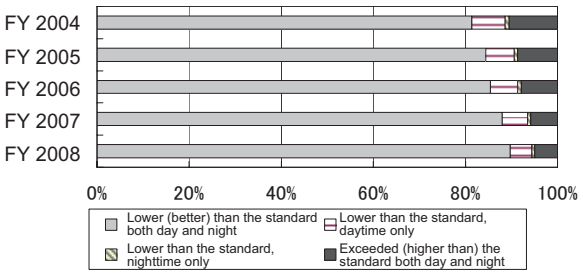


Fig. 3 Changes in meeting the environmental standard by year (overall)

■ The percentage of the environmental standard that is being met is gradually improving.



Source for Fig. 1 to Fig. 3: Traffic Noise in 2008 (Ministry of the Environment)

Table 1 Environmental standards and required limits regarding traffic noise

Classification of area		Environmental standards (Leq*)	
		Daytime	Night
General areas			
	AA areas	50	40
	A areas / B areas	55	45
	C areas	60	50
Areas facing roads			
	A areas facing road(s) with two or more lanes	60	55
	B areas facing road(s) with two or more lanes / C areas	65	60
Exceptions for areas adjacent to roads that bear arterial traffic			
	Areas adjacent to arterial roads	70	65

Classification of area		Required limits (Leq)	
		Daytime	Night
Areas facing roads			
	A areas facing road(s) with one lane / B areas facing road(s) with one lane	65	55
	A areas facing road(s) with two or more lanes	70	65
	B areas facing road(s) with two or more lanes / C areas	75	70
Exceptions for areas adjacent to roads that bear arterial traffic		75	70

AA areas: Special quiet zones

A areas: Exclusively residential

B areas: Primarily residential

C areas: Extensively residential, but also commercial / industrial

* L_{eq} = equivalent continuous sound pressure level [dB]

Fig. 4 Providing traffic noise conditions on the Internet

■ Traffic noise conditions can be viewed on the Nationwide Traffic Noise Map (survey report on traffic noise provided on the website, "Environment GIS," run by National Institute for Environmental Studies;
URL: http://www-gis.nies.go.jp/noise/car/)

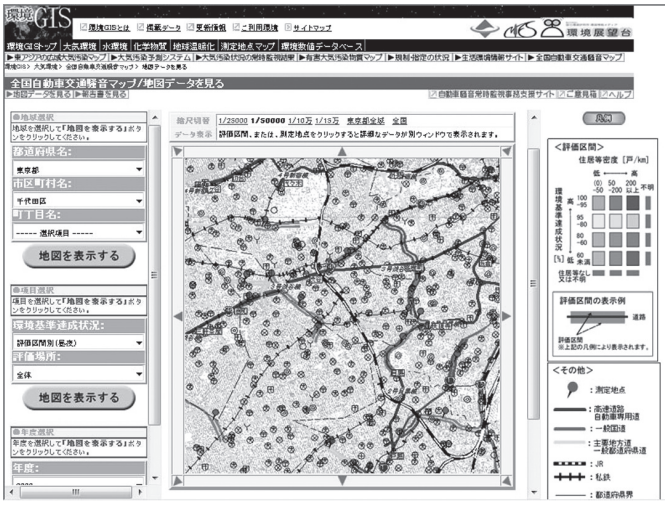
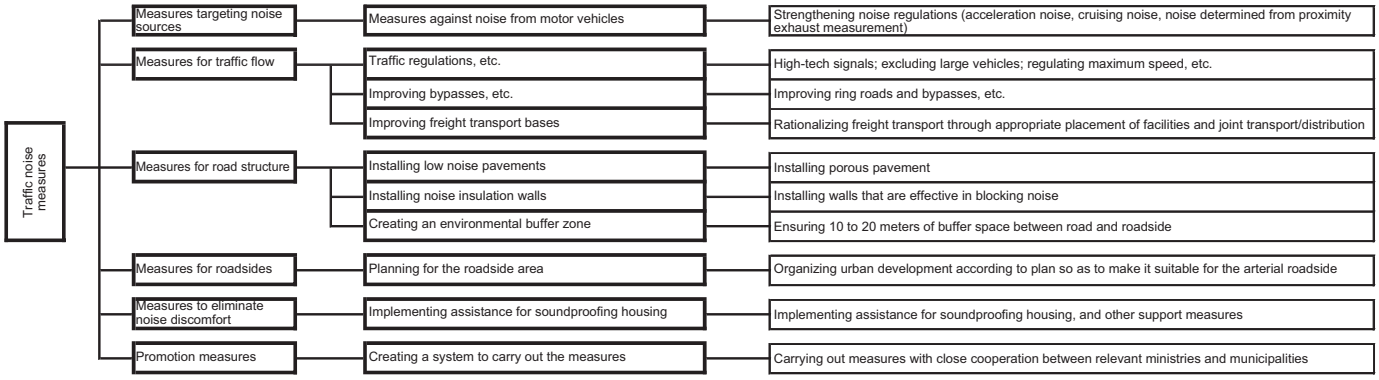


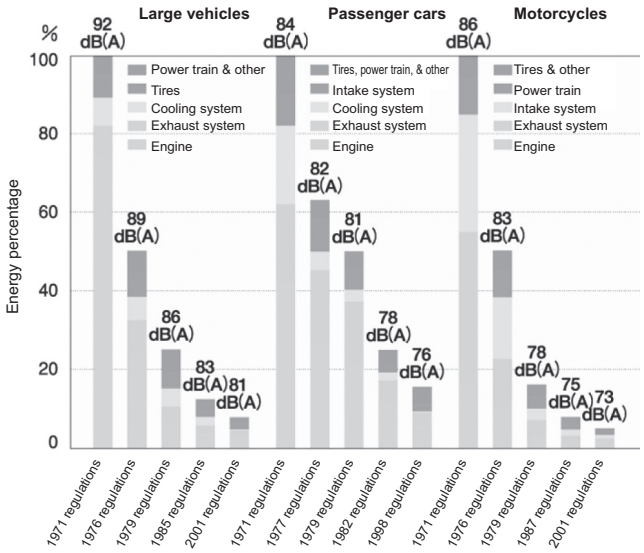
Fig. 5 Classification of measures against traffic noise, with main strategies



Source: Annual Report on the Environment in Japan 2008 (Ministry of the Environment)

Fig. 6 Composition of motor vehicle noise (acceleration noise) by source of noise, and how it has changed

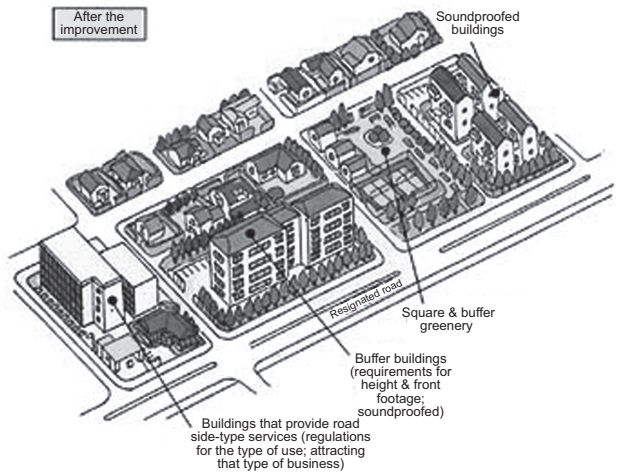
■ Noise regulations have been noticeably strengthened since 1971.



Source: website of Japan Automobile Manufacturers Association, Inc.

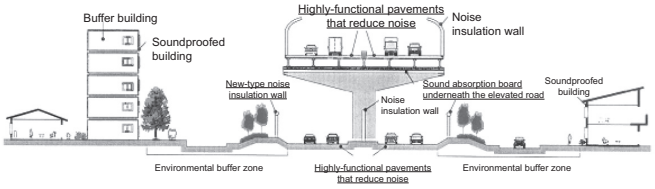
Fig. 7 Example of roadside area planning

■ Planning for the roadside area will organize urban development to accommodate arterial roadsides (e.g., planned placement of buffer buildings, spaces reserved for buffer greenery, soundproofing of buildings).



Source : website of Kobe City Urban Development Corporation

Fig. 8 Example of major measures against traffic noise and their effects

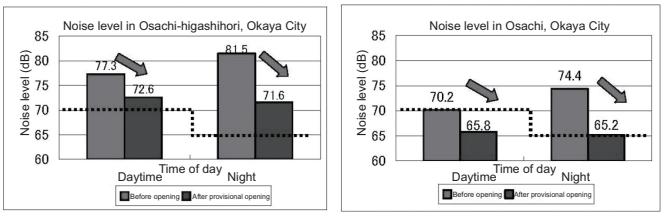


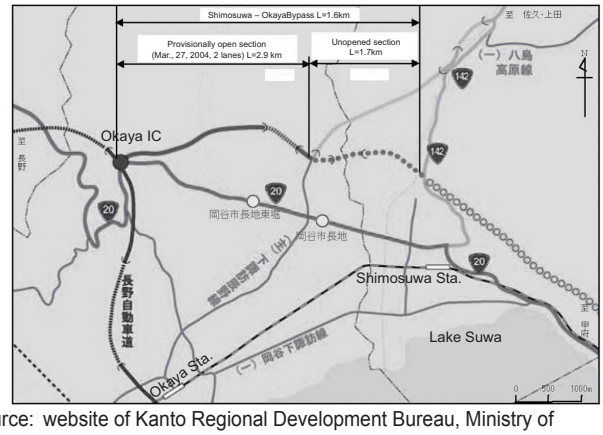
Measures	Properties	Effects
Highly-functional pavements that have noise-reduction properties	Mainly reducing vibration and noise	Ca. 3 dB
Noise insulation walls	Reducing noise by diffraction	Ca. 10 dB
Environmental buffer zone	Reducing noise by attenuation over a distance	5 – 10 dB
Sound-absorbing board underneath the elevated road	Reducing reflected noise from the elevated road	2 – 5 dB (depending on the contribution of reflected noise)

Source: website of Ministry of Land, Infrastructure, Transport and Tourism; http://www.mlit.go.jp/road/ir/data/souon/souon3.html

Fig. 9 Examples of effects of reducing noise by road improvements

■ The Shimosuwa – Okaya Bypass (partially opened) has caused a noticeable reduction in the noise level of National Highway No. 20.





Source: website of Kanto Regional Development Bureau, Ministry of Land, Infrastructure, Transport and Tourism; http://www.ktr.mlit.go.jp/nagano/ir/hyouka/simosuwa/pdf/simosuwa-4.pdf

3-3 Air Pollution Today and Countermeasures against It

Associate Professor, Interdisciplinary Graduate School of Science and Engineering, Tokyo Institute of Technology
Yasunori Muromachi

The percentage of the environmental standard achieved for atmospheric nitrogen dioxide and suspended particulate matter has improved; it is now nearing to 100%. Between 1995 and 2008, the achievement rate for roadside air pollution monitoring stations improved from 70.5% to 95.5% for nitrogen dioxide, and from 35.2% to 99.3% for suspended particulate matter. However, there are still monitoring stations in some urban locations that have yet to show such achievements; and along with a new standard for fineer particles (e.g., PM2.5), consideration is now being given to stronger emissions regulations.

Fig. 1 Changes in the achievement rate for the nitrogen dioxide environmental standard

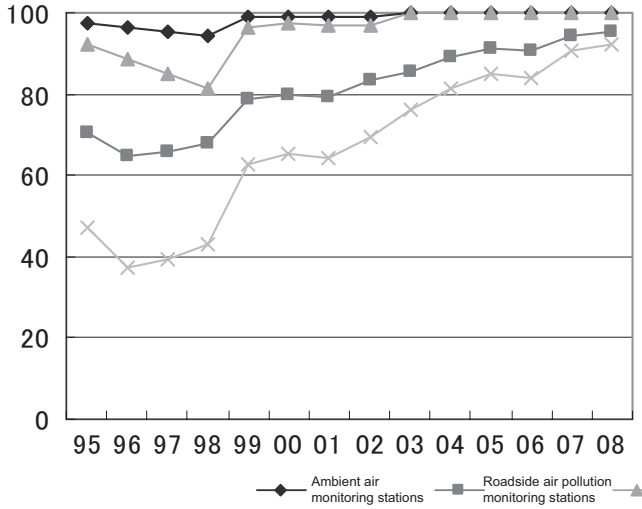
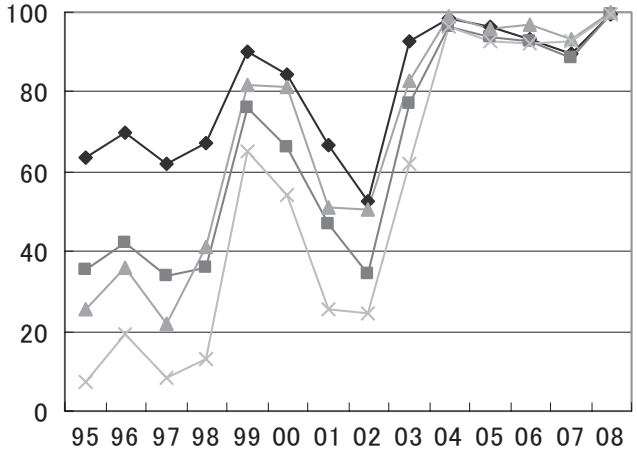


Fig. 2 Changes in the achievement rate for the suspended particulate matter environmental standard



Note: Specified areas are the areas where, pursuant to the Motor Vehicle NOX and Particulate Matter (PM) Law, measures are being taken to reduce the amounts of nitrogen oxides and particulate matter. The areas are some parts of Tokyo, Kanagawa, Saitama, Chiba, Aichi, Mie, Osaka, and Hyogo Prefectures.
Source: http://www.env.go.jp/air/osen/

Table 1 Examples of monitoring stations that didn't achieve the environmental standard (stations with highest amounts of pollutants)

■ Roadside monitoring stations: nitrogen dioxide

Monitoring station	Prefecture	City / ward / town / village	98% value (ppm)	Environmental standard
Kamiuma, Tamagawa-dori	Tokyo	Setagaya Ward	0.078	Failed to achieve
Matsubarabashi, Kannana-dori	Tokyo	Ota Ward	0.077	Failed to achieve
Yamatocho, Nakasendo	Tokyo	Itabashi Ward	0.073	Failed to achieve
Naya	Mie	Yokkaichi City	0.069	Failed to achieve
Chiba City Hall	Chiba	Chuo Ward, Chiba City	0.066	Failed to achieve
Ohira (ex Okazaki 3rd monitoring station)	Aichi	Okazaki City	0.066	Failed to achieve
Miyajima	Shizuoka	Fuji City	0.065	Failed to achieve
In front of Ikegami-Shinden Park	Kanagawa	Kawasaki Ward, Kawasaki City	0.064	Failed to achieve
Asahi	Aichi	Okazaki City	0.064	Failed to achieve
Hinode	Chiba	Funabashi City	0.063	Failed to achieve
Endomachi intersection	Kanagawa	Saiwai Ward, Kawasaki City	0.063	Failed to achieve

■ Roadside monitoring stations: suspended particulate matter

Monitoring station	Prefecture	City / ward / town / village	2% exceptional value (mg/m³)	Continuation of 2 days and longer	Environmental standard
Ohira (ex Okazaki 3rd monitoring station)	Aichi	Okazaki City	0.105	Yes	Failed to achieve
Ichikawa	Chiba	Ichikawa City	0.081	No	Achieved
Tonoki	Shizuoka	Fuji City	0.081	No	Failed to achieve
Shimo-ochiai, Shin-Mejiro-dori	Tokyo	Shinjuku Ward	0.080	No	Achieved
Ozone	Chiba	Sodegaura City	0.078	No	Achieved
Miyajima	Shizuoka	Fuji City	0.077	No	Achieved
Nakamura-minami	Ibaraki	Tsuchiura City	0.076	No	Achieved
Shimo-sueyoshi Elementary School	Kanagawa	Tsurumi Ward, Yokohama City	0.075	No	Achieved
Hiraide	Tochigi	Utsunomiya City	0.073	No	Achieved
Eitai-dori Shinkawa	Tokyo	Chuo Ward	0.073	No	Achieved

Source: http://www.env.go.jp/air/osen/

Fig. 3 Outline of regulations for types of vehicles in Motor Vehicle NOX and PM Law and special municipal ordinances

	Motor Vehicle NO_x and PM Law	Ordinance for Tokyo and three prefectures in the Kanto area	Hyogo Prefecture Ordinance
Targeted area	Some areas in 8 Prefectures (Saitama, Chiba, Tokyo, Kanagawa, Aichi, Mie, Osaka, and Hyogo)	Whole area of Saitama, Chiba, Tokyo (excl. islands), and Kanagawa	Southeast Hanshin area [Nada Ward & Higashinada Ward in Kobe City, Amagasaki City, Nishinomiya City (excl. northern part), Ashiya City, and Itami City]
Target pollutants	NOX, PM	PM	NOX, PM
Targeted motor vehicles	Motor vehicles based in the specified areas	Motor vehicles driven in the target area	Motor vehicles driven in the target area
Targeted vehicle types	Trucks, buses, special vehicles (for passenger cars, only diesels), and diesel passenger cars	Diesel trucks, buses, and special vehicles	Ordinary trucks and special vehicles whose total weight is over 8 tons; big buses with over 30-person capacity
Regulated value: NO_x	Same level as the value in the long-range regulations	No regulations	Same as those in the Motor Vehicle NOX and PM Law
PM	Weight over 3.5 tons: same level as the value in the long-range regulations Weight less than 3.5 tons: half the value in the new short-range regulations	Same level as the value in the long-range regulations (however, for Tokyo and Saitama, starting April, 2006, same level as the value in the new short-range regulations)	
Start of regulation	Oct., 2002	Oct., 2003	Oct., 2004
Grace period	As a general rule, 8 to 12 years (depending on the type of vehicle) from the first registration. Extended period for preparation (Sept., 2003 to Sept. 2005) depending on when the first registration was made.	7 years from the first registration	As a general rule, 10 to 13 years (depending on the type of vehicle) from the first registration. Extended grace period (Sept., 2004 to Sept. 2006) depending on when the first registration was made.
Compliance procedure	Motor vehicle inspection	On-the-spot inspection by "vehicle G-men", on-the-road inspection	On-the-road inspection, inspection by camera
Penalty	Imprisonment for less than 6 months or fine of less than 300,000 yen	Fine of less than 500,000 yen (violation of order and duty), publishing name of owner	Fine of less than 200,000 yen, transmitting owner's name to relevant businesses (consignors, etc.)

Source: Regulations by motor vehicle type in the Motor Vehicle NOX and PM Law (2005, Ministry of the Environment & Ministry of Land, Infrastructure, Transport and Tourism)

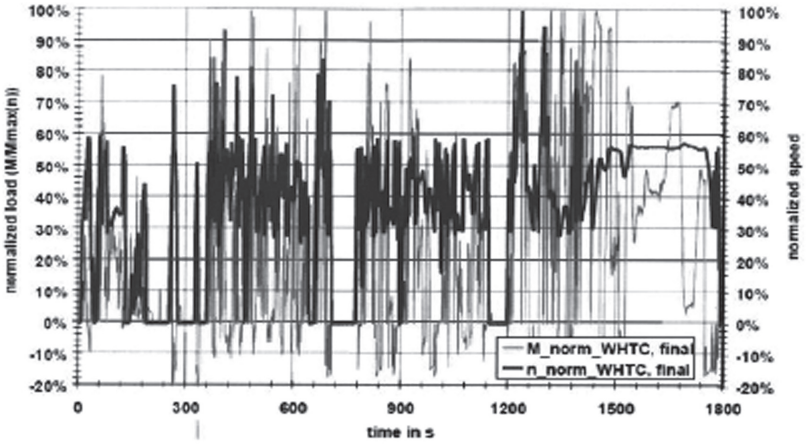
Table 2 Outline of countermeasures against motor vehicle emissions

		Detailed description		
		PM countermeasures	NOX countermeasures	CO_2 countermeasures
Measures to reduce exhaust emissions	1) Making less polluting vehicles with higher fuel efficiency	○ Promoting DPF (Diesel Particulate Filter) and oxidation catalysts ○ Lowering the sulfur content in diesel fuel ○ Enforcing laws against use of improper diesel		○ Promoting the use of vehicles that conform to energy-saving standards (through the tax system, official advisories, etc.)
		○ Imposing regulations according to the types of vehicles ○ Developing less polluting vehicles to replace big diesel vehicles		
		○ Promoting less polluting vehicles like those fueled by CNG (Compressed Natural Gas) through the tax system, exemplary use by public agencies, etc. ○ Promoting installation of fuel supply facilities for less polluting vehicles ○ Promoting fuel cell vehicles for practical use		
	2) Reducing demand for motor vehicle transport	○ Road pricing to reduce burden on environment.		○ Traffic restrictions
		○ Road pricing ○ Promoting "park and ride" ○ Improving sidewalks and bicycle routes ○ Improving train station plazas ○ Encouraging staggered working hours and flextime ○ Improving public transportation such as LRT (Light Rail Transit) and streetcars ○ Providing more information to drivers by spreading VICS (Vehicle Information and Communication System), etc. ○ Making freight distribution more efficient by organizing joint collection/delivery centers, etc. ○ Promoting rail and ship transport ○ Encouraging the campaign to shut off idling engines ○ Requesting commercial vehicles to detour		
	3) Increasing traffic capacity	○ Improving arterial road networks with ring roads, bypasses, etc. ○ Dealing with bottlenecks by installing grade-separated intersection approaches, improving railway crossings, etc. ○ Promoting ETC (Electronic Toll Collection) ○ Reducing road work ○ Enforcing parking regulations ○ Enhancing traffic safety facilities, etc.		

Source: Road Bureau, Ministry of Land, Infrastructure, Transport and Tourism; http://www.mlit.go.jp/road/sisaku/k2.html, 2008

Fig. 4 Outline of "Future Countermeasures to Reduce Motor Vehicle Emissions (the 10th report)" (draft) — Strengthening emissions regulations for diesel trucks and busses (outline of goals to be met by 2016)

■ Introducing WHTC (World Harmonized Transient Cycle), the world wide standard test cycles etc.

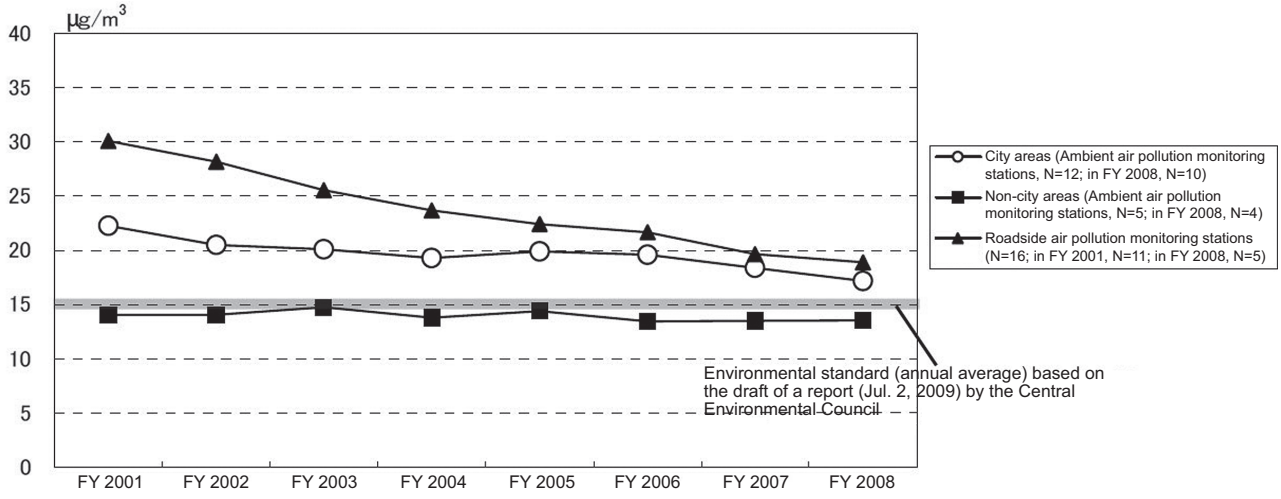


■ Time frame, goals; etc.

- Time frame: through the end of 2016. Exceptions are for tractors (through the end of 2017) and for vehicles whose total weight is less than 7.5 tons (through the end of 2018).
- Goal: the amount of NOX is to be approximately 40% less than that in the emissions regulations of 2009 (post-"new" long-range regulations); that is, 0.4 g/kWh (from 0.7 g/kWh). Goals for other pollutants (CO, NMHC, and PM) are to be the same as those in the post-"new" long-range regulations.
  Because the "cold start" factor will also be included, the goal will be harder to achieve than it looks.
- The new 2016 goal will reduce the total amount of NOX emissions by about 9% in 2020, and about 35% in 2030, which would not have been the case, had only the 2009 regulations applied.

Source: Outline of "Future Countermeasures to Reduce Motor Vehicle Emissions (10th report)" (draft) (2010, Ministry of the Environment)

Fig. 5 Relationship of the amount of minute particulate matter ($PM_{2.5}$) to the environmental standard



Source (with author's additions): Report of the Minute Particulate Matter Environmental Standard Special Committee, Air Quality Group, Central Environmental Council (Jul. 2009)

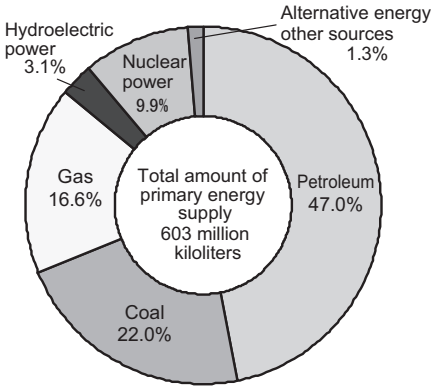
3-4 Improving Energy Efficiency

General Manager, Eco-Driving Promotion Department, The Energy Conservation Center, Japan
Masaaki Taniguchi

Transport means rely heavily on petroleum as a source of energy. From the viewpoint of preventing global warming and saving energy, improving the efficiency of energy consumption in the transport sector generally, and in motor vehicles in particular, is becoming an important challenge. Steady progress has been made in improving the energy efficiency of motor vehicles themselves, and the effects are becoming obvious (see 3-7 Development and Promotion of Environmentally Friendly Vehicles that are in Harmony with The Environment). At the same time, as roads are being improved, attention is being paid to improving how people handle motor vehicles. The four Ministries made the decision to form the Eco-driving Advocacy League, cooperating in a united effort of bureau chiefs (or their equivalents) to educate the public on a wide variety of topics related to eco-driving.
For commercial vehicles (trucks, etc.), eco-driving is being promoted thanks to the spreading of the EMS (Eco-driving Management System) and of the installation of a digital tachometer. The question remains as to how to develop an awareness of eco-driving in ordinary drivers whose practice of it is entirely voluntary.

Fig. 1 Amount of primary energy supply in Japan (FY 2008)

■ In Japan, petroleum accounts for nearly half the energy supply. Most transport meansuse petroleum as an energy source.

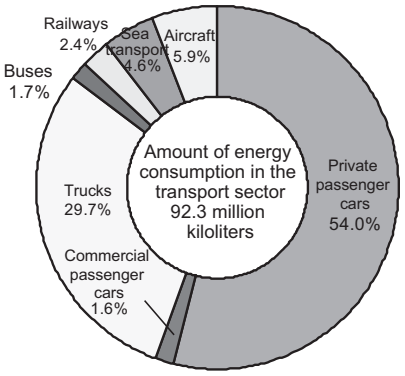


Note: Figures were converted to crude oil equivalents.

Source: Energy And Economy Statistics Handbook 2010 (The Energy Conservation Center)

Fig. 2 Amount of energy consumption by transport menas (FY 2008)

■ 87% of the energy is consumed in the motor vehicle sector. The challenge for the future is to reduce energy consumption in that area.

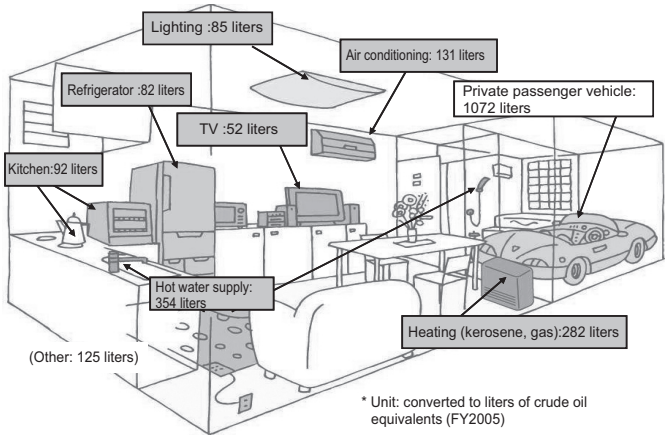


Note: Figures were converted to crude oil equivalents.

Source: Energy And Economy Statistics Handbook 2010 (The Energy Conservation Center)

Fig. 3 Annual energy consumption per household (FY 2005)

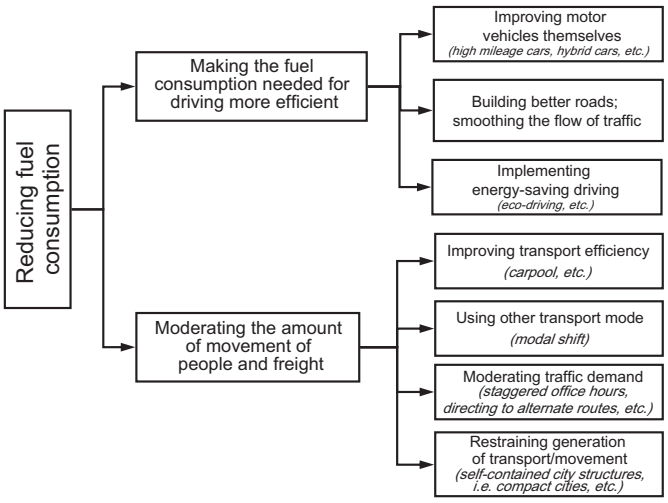
■ Nearly half the energy consumed in an ordinary household is consumed by the use of motor vehicles.



Source: Future Energy Saving Measures (Mar., 2003, Agency of Natural Resources and Energy, data updated for FY 2005)

Fig. 4 Measures to reduce motor vehicle fuel consumption

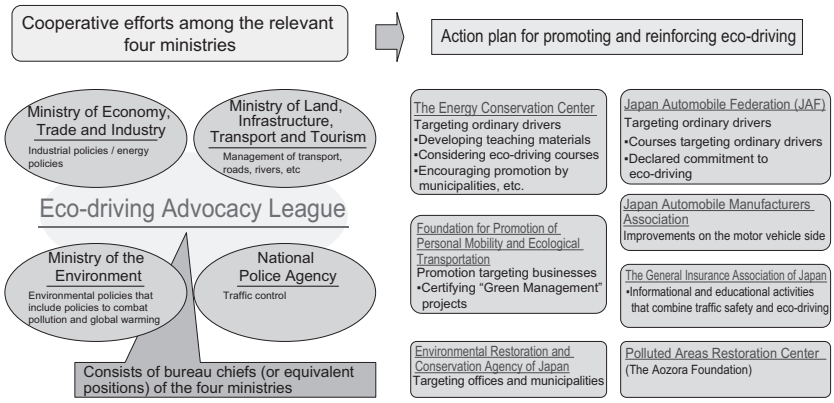
■ Measures to reduce motor vehicle fuel consumption are making use of fuel more efficient for driving, while moderating demand for it. For efficient transport, the vehicle, the road, and the motorist are each expected to play a role in contributing to the reduction.



(Chart made by The Energy Conservation Center)

Fig. 5 How eco-driving is being promoted

■ The Eco-driving Advocacy League was established in fiscal 2006. It announced its action plan whereby central and local governments and related organizations are to lay emphasis on promoting and reinforcing eco-driving.



■ Major policies of the action plan

○Reviewing the definition of eco-driving; establishing criteria (indexes) for assessing its effects
→ establishing effective and consistent terms for the definition of eco-driving, indexes of its effects, problems, contents of the trainingcourses, etc.

○Informational and educational activities for eco-driving
→ relevant people cooperate and perform various informational and educational activities, such as setting up an "Eco-driving Promotion Month (November)"

○Promoting eco-driving support devices, etc.
→ promoting "idle stop" vehicles and devices that support eco-driving such as the instant mileage meter

○Establishing an eco-driving evaluation system
→ promoting an eco-driving evaluation system by which the driver can judge his/her own eco-driving; establishing an evaluation system in which outsiders judge eco-driving

○Cooperative efforts with municipalities and related organizations
→ promoting more effectiveness by having the government and related agencies cooperate with municipalities

○Research activities to promote and reinforce eco-driving
→ doing research as a background for future eco-driving measures

Source: Eco-driving Advocacy League press material (Jun. 9, 2006)

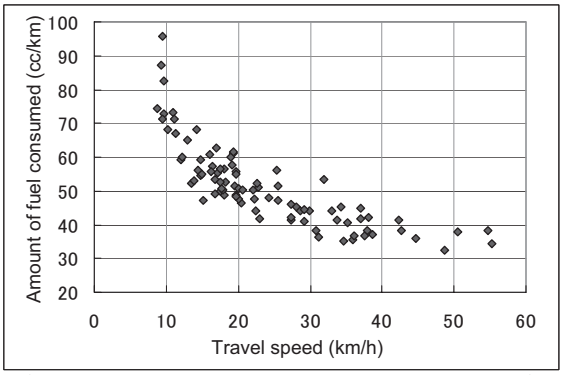
Table 1 Activities of eco-driving promotion organizations

Promotion organizations	Activities
Organization for The Promotion of Low Emission Vehicles	○Promoting the Eco-driving Management System (EMS) (Directing eco-driving program targeting transport businesses (trucks, buses, taxis, etc.); comprehensive assessment of operations and guidance) • Leasing the EMS devices; collecting and analyzing data • By FY 2009, about 89,000 EMS devices were brought into about 5100 business establishments nationwide. • Started eco-driving diagnosis project (with fees) targeting businesses that are implementing the EMS
Environmental Restoration and Conservation Agency of Japan	○Holding the eco-driving awards (Excellence awards to businesses for efforts in eco-driving activities) • Awards to corporations that own vehicles • Examining and evaluating corporation activities, their system for collecting/handling fuel efficiency data, their achievements in improving fuel efficiency, etc. • Number of businesses participating in awards: FY 2007: 1766: FY 2008: 3810: FY 2009: 9733 (increasing every year)
Foundation for Promotion of Personal Mobility and Ecological Transportation (Eco-Mo Foundation)	○Public recognition of eco-driving courses for trucks (Public recognition of courses that conform to eco-driving curriculum standards for businesses that own trucks) • Publicly recognized 14 organizations (manufacturers, truckers' associations, driving schools, etc.) • Distributing course textbooks; issuing certificates of participation • Number of participants: 2007: 10,585: 2008: 25,572: 2009: 22,826 ○Publicly recognizing eco-driving courses for ordinary motorists • From the autumn of FY 2008, it joined The Energy Conservation Center in joint recognition • The Energy Conservation Center trains instructors. The Eco-Mo Foundation distributes textbooks and provides eco-driving diagnosis software to publicly recognized organizations, and issues certificates of participation • By FY 2009, 1828 people had taken the course using actual cars ○Holding eco-driving symposium
Japan Automobile Federation (JAF)	○JAF eco-advisor system (Directing, training, and publicly recognizing those in charge of eco-driving promotion in organizations /corporations; directing training in eco-driving techniques and in using the mileage meter needed for teaching in the practical course) • By FY 2009, publicly recognized 11 organizationse course using actual cars ○Holding eco-training and courses • Held many eco-training sessions (eco-driving training with a real car) and courses at branch offices nationwide
The Energy Conservation Center	○Training eco-driving instructors (Training personnel who can teach the eco-driving course in order to promote eco-driving efforts in municipalities, etc.) • Targeting driving school teachers in the area. Issuing certificates of participation in the center's program • By FY 2009, trained 540 people as instructors ○Training personnel to encourage eco-driving (Targeting people in charge of promotion in municipalities/corporations, training personnel in lecturing) • Providing materials and DVD to be used in an app. one-hour lecture ○Producing "Smart Drive" (Based on the driving data and quantitative analysis of fuel consumption, producing and distributing a booklet that shows the techniques of eco-driving) • Used as basic data for textbooks and brochures of organizations that promote eco-driving

Source: websites of each promotion organization

Fig. 6 Reducing fuel consumption by regulating the flow of traffic

■ When travel speeds slow, the amount of fuel consumed increases because of more frequent stopping and starting and more low-speed travel. With bumper-to-bumper traffic and speeds of about 10 kilometers per hour, nearly twice the fuel is consumed compared to a smooth traffic flow of around 40 kilometers per hour.



(Traveled roads: ordinary roads in Tokyo; vehicle: 1300 cc)

Source: Smart Drive Competition 2004 (driving data of The Energy Conservation Center)

Fig. 7 Mileage meter to be installed in an automobile

■ More and more models have gauges useful for eco-driving, like the mileage meter.

Source: Japan Automobile Manufacturers Association, Inc.

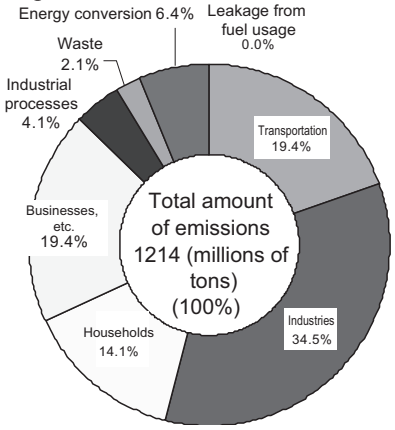
3-5 Efforts to Prevent Global Warming

Associate Professor, Interdisciplinary Graduate School of Science and Engineering, Tokyo Institute of Technology
Yasunori Muromachi

The amount of Japan's greenhouse gas emissions in FY 2008 increased by 8.3% compared to that of the base year (1990) in the Kyoto Protocol, while the amount of CO2 emitted showed a 4.1% decrease from last year's figure in transport sector. Measures to reduce greenhouse gas emissions that had been taken since the Kyoto Protocol are now being reviewed; more reduction is required. Minister of the Environment suggested a middle- and long-range road map to combat global warming.

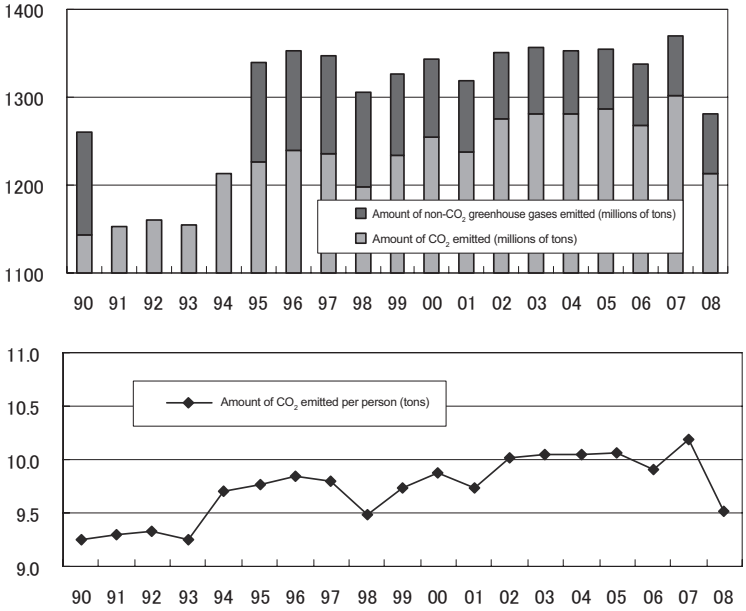
Fig. 1 Breakdown by activity sector of the amount of CO_2 emitted (FY 2008)

■ About 19.4% of the total emissions derived from the transportation sector.



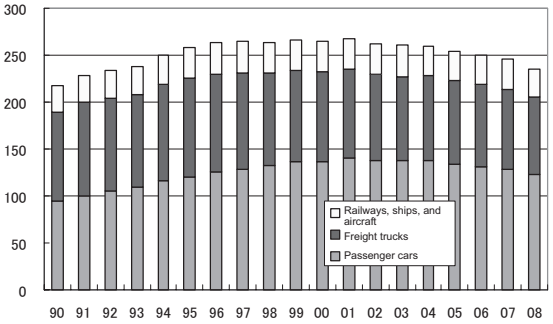
Source: http://www.env.go.jp/press/press.php, 2010

Fig. 2 Changes in amounts of greenhouse gas and CO_2 emissions in Japan



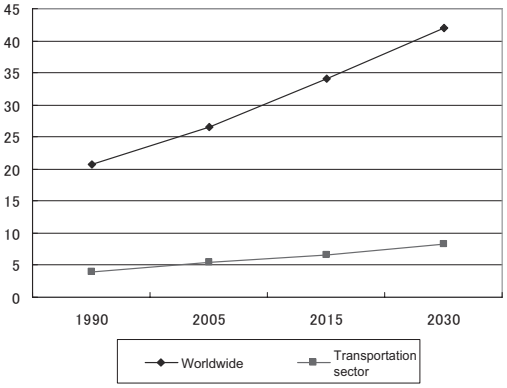
Source: http://www.env.go.jp/press/press.php, 2010

Fig. 3 Changes in the amount of CO_2 emitted by the transportation sector (millions of tons)



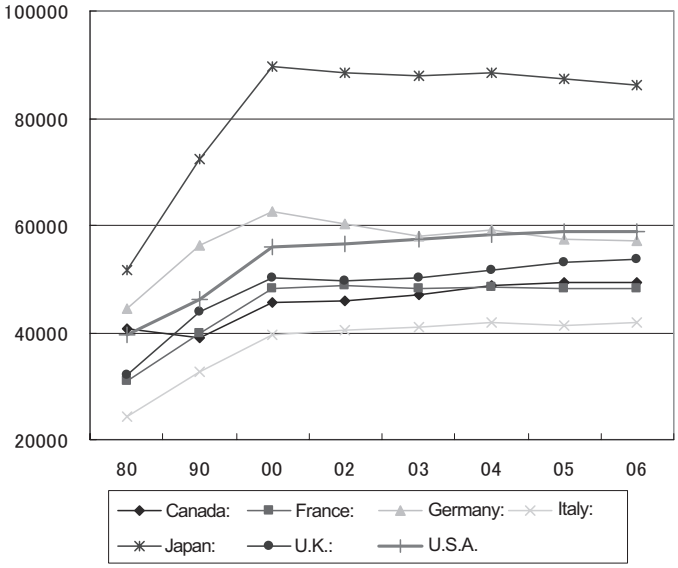
Source: http://www-gio.nies.go.jp/index-j.html, 2010

Fig. 4 Trends in the amount of CO_2 emitted worldwide or emitted by the transport sector (billions of tons)



Note: Includes bunker oil for international ships; excludes international air transport
Source: Reference Scenario in World Energy Outlook 2007 (IEA) and World Energy Outlook 2008 (IEA)

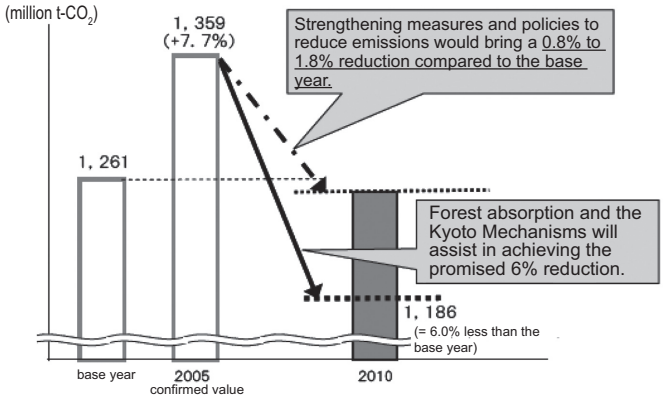
Fig. 5 Changes in the amount of oil consumed by the transportation sector in major countries (1000 tons; for U.S.A., 10,000 tons)



Source: Energy Statistics of OECD Countries, 2005-2006 (IEA) and Energy Statistics of Non-OECD Countries, 2004-2005 (IEA)

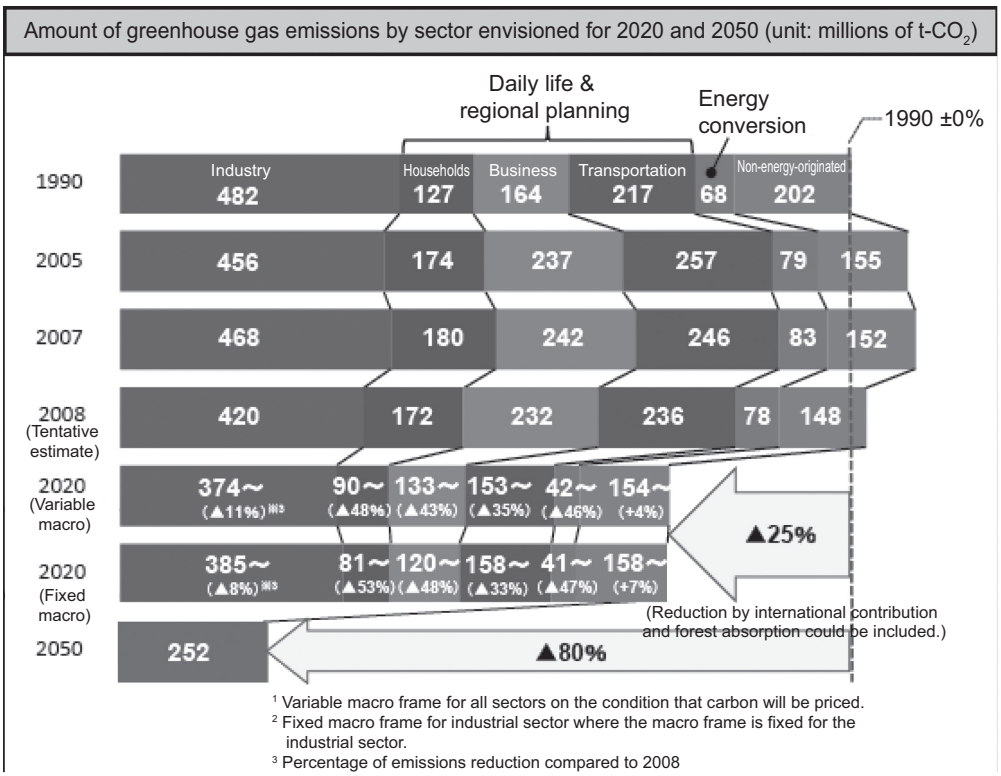
Fig. 6 Greenhouse gas emissions forecast for FY 2010

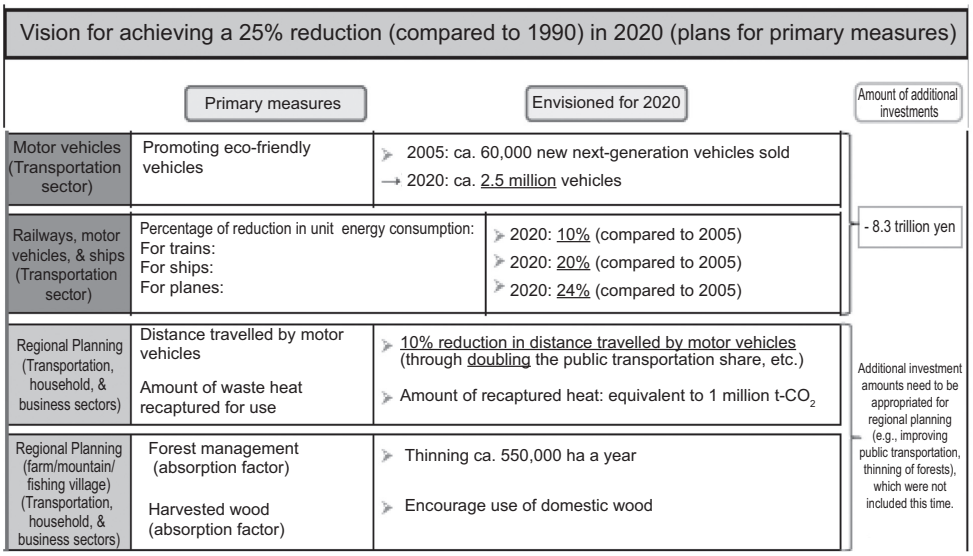
■ The final joint report of the Industrial Structure Council and the Central Environmental Council (February 2010) concluded that, with only the current measures being implemented, an estimated 22,000,000 to 36,000,000 t-CO_2 reduction will still be needed to achieve the goals of the Kyoto Protocol. However, from now on, with the utmost effort of each constituent in each sector to implement not just the current measures but also additional measures and policies, they could manage the estimated 37,000,000 t-CO_2 reduction, and even more; thus the report concluded that the Kyoto Protocol's goal of a 6% reduction could be achieved.



Source: http://www.env.go.jp/press/press.php, 2008

Fig. 7 Suggested middle- and long-range road map to combat global warming: tentative plan announced on March 31, 2010, by Sakihito Ozawa, Minister of the Environment





Source: Ministry of the Environment; http://www.env.go.jp/earth/ondanka/domestic.html#a03, 2010

3-6 Environmentally Friendly Institutional Measures

Associate Professor, Interdisciplinary Graduate School of Science and Engineering, Tokyo Institute of Technology
Yasunori Muromachi

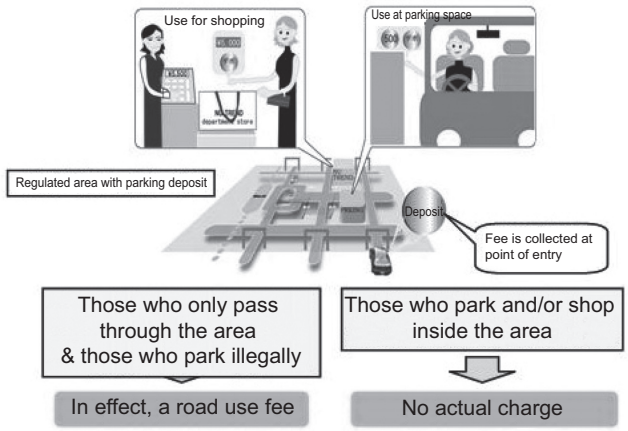
There are discussions inside Japan in regards to setting goals of global warming countermeasures for the years between 2020 and 2050. Suggestions have been made, and measures like road use fees or road pricing are proposed. There is international cooperation with developing countries to create low-carbon societies (e.g., CDM, the Clean Development Mechanism). And finally, in accordance with government guidelines, such programs as strategic environmental assessment and the creation of a Low-Carbon City have been introduced.

Fig. 1 The Nagoya City plan for a PDS (Parking Deposit System)

■ How the system would work:

1. Motorists pay a deposit when entering the regulated area.
2. Those who park inside the area will pay the parking fee from the deposit; those who do shopping can use it as a discount for purchases.
3. For those who only pass through the regulated area, the deposit functions as a road use fee.

The system achieves an uncongested flow of traffic into the city and at the same time solves the problem of illegal parking.



Source: Morikawa & Yamamoto Laboratory, Nagoya University; http://www.trans.civil.nagoya-u.ac.jp/last/research/PDS.jpg, 2008

Fig.2 Progress with the CDM (Clean Development Mechanism) in the transportation sector

■ Outline of Project 1351: Installation of low greenhouse gases (GHG)-emitting rolling stock in metro system

Date registered: December 29, 2007
Period: 2007 to 2017
Amount to be reduced: 41,160 t-CO2 per year
Procedure: Low greenhouse gas emission rolling stock equipped with regenerative brake systems is to be introduced to Delhi Metro Rail Corporation (DMRC).

Source: http://cdm.unfccc.int/Projects/DB/RWTUV1190204766.13/view, 2009
http://www.apic.or.jp/plaza/oda/special/20080521-02.html, 2009

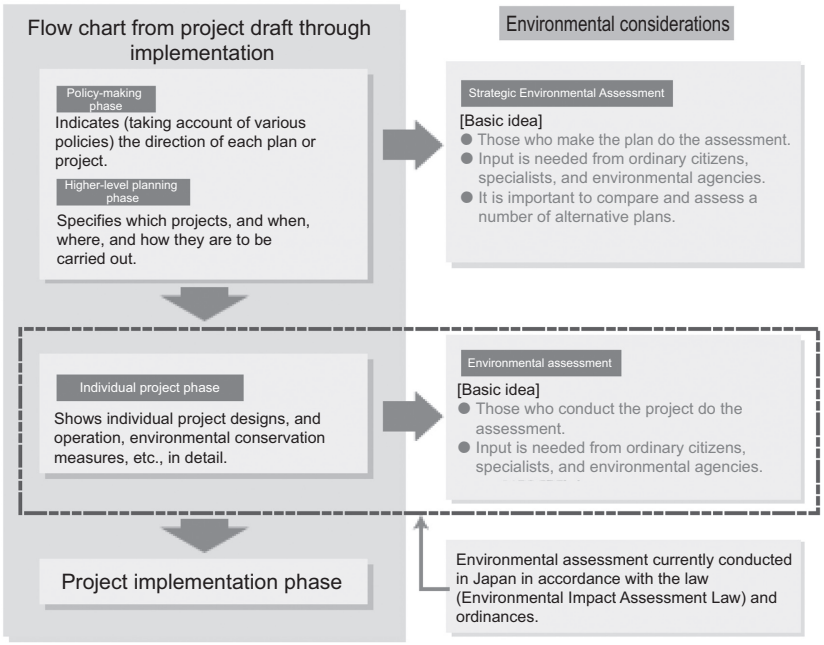
Table 1 "Fahrleistungsmodell" (cutting down vehicle-kilometers in new development) in the Canton of Bern, Switzerland

- Fahrleistungsmodell is a measure to cut down the amount of traffic (the number of trips and vehicle-kilometers) that is generated by a large-scale development project such as a new shopping center. At the same time, it aims at achieving air quality and spatial economy goals. The Canton of Bern estimates that it would achieve its conservation goals for air quality and against climate change if the growth rate of vehicle-kilometers of automobiles didn't exceed 8% (1.3 million kilometers per day) in 2015, setting 2000 as the bases year. Half of that limited growth rate has been allotted to general traffic growth in the canton; and the other half has been allotted to projects that will induce traffic on a large scale development.
- Since 2000, a project generating more than 2000 new automobile trips per day is permitted only when it conforms to space planning criteria and is allotted the number of automobile trip credits permitted for that project. For instance, the Bern Brunnen shopping mall plan obtained its allotment of 57,000 vehicle-kilometers per day (6000 trips / day × 9.5 km, the average length of a trip). After monitoring, if the permitted limit has not been maintained, the owner must employ remedies like charging for parking. And if that measure is not effective enough, the canton has the authority to impose a fine and to use the revenue for the improvements of the public transportation.

Source: Swiss Confederation, Switzerland's Fourth National Communication under the UNFCCC, 2005

Fig. 3 Guideline for introducing the SEA)

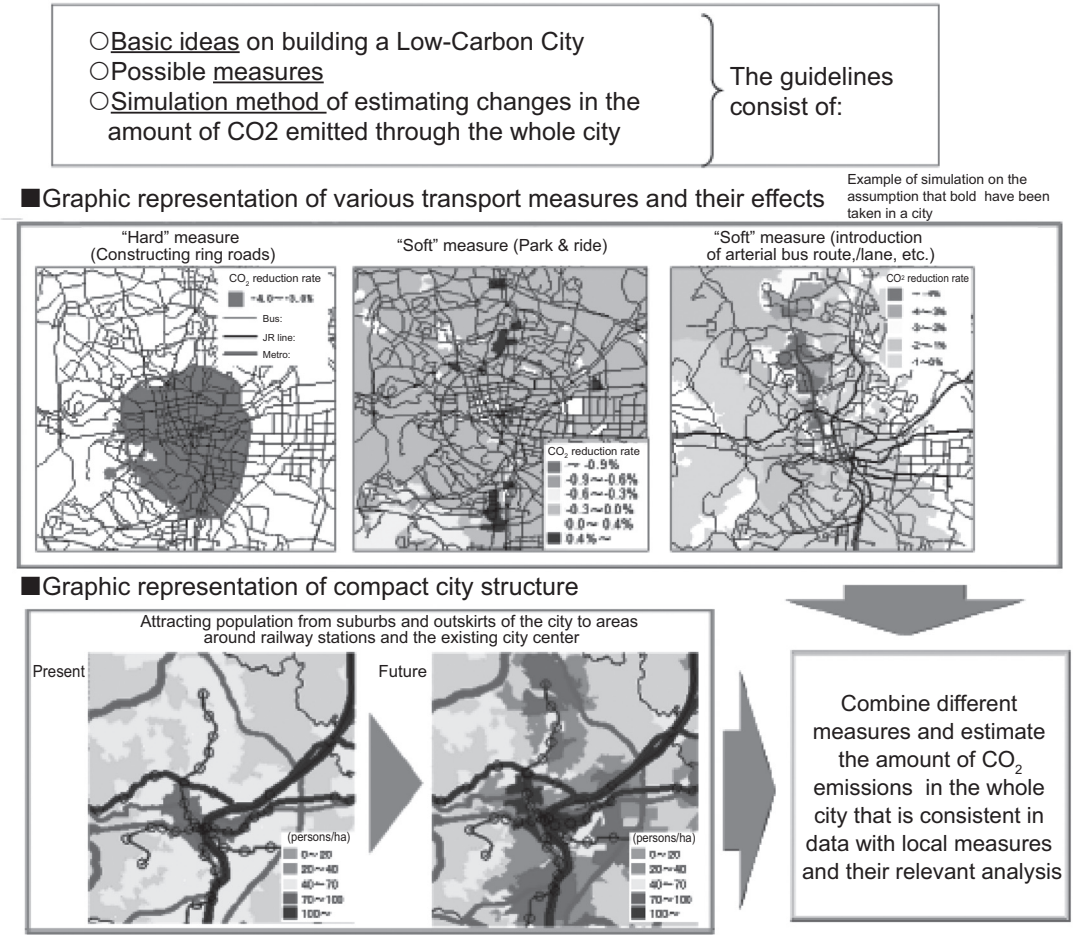
SEA (Strategic Environmental Assessment) is the environmental assessment in the strategic decision-making stage that precedes the construction of an individual project — in other words, it targets the three Ps: Policy-making, Planning, and Programming. The system permits environmental considerations to be included from an early stage, and more extensively. There have been discussions about introducing it inside and outside the country, and it is now being put into practice.



Source: Guidelines for the Strategic Environmental Assessment (SEA) (2007, Ministry of the Environment)

Fig. 4 Guidelines for building a Low Carbon City

In order to technically support the planning and implementation of "Building a Low-Carbon City" in various areas, new guidelines have been issued by the Ministry of Land, Infrastructure, Transport and Tourism; the guidelines show steps to be taken in building a Low-Carbon City, and ways to analyze outcomes.



Source: Basic guidelines for building a low-carbon city (2010, Ministry of Land, Infrastructure, Transport and Tourism)

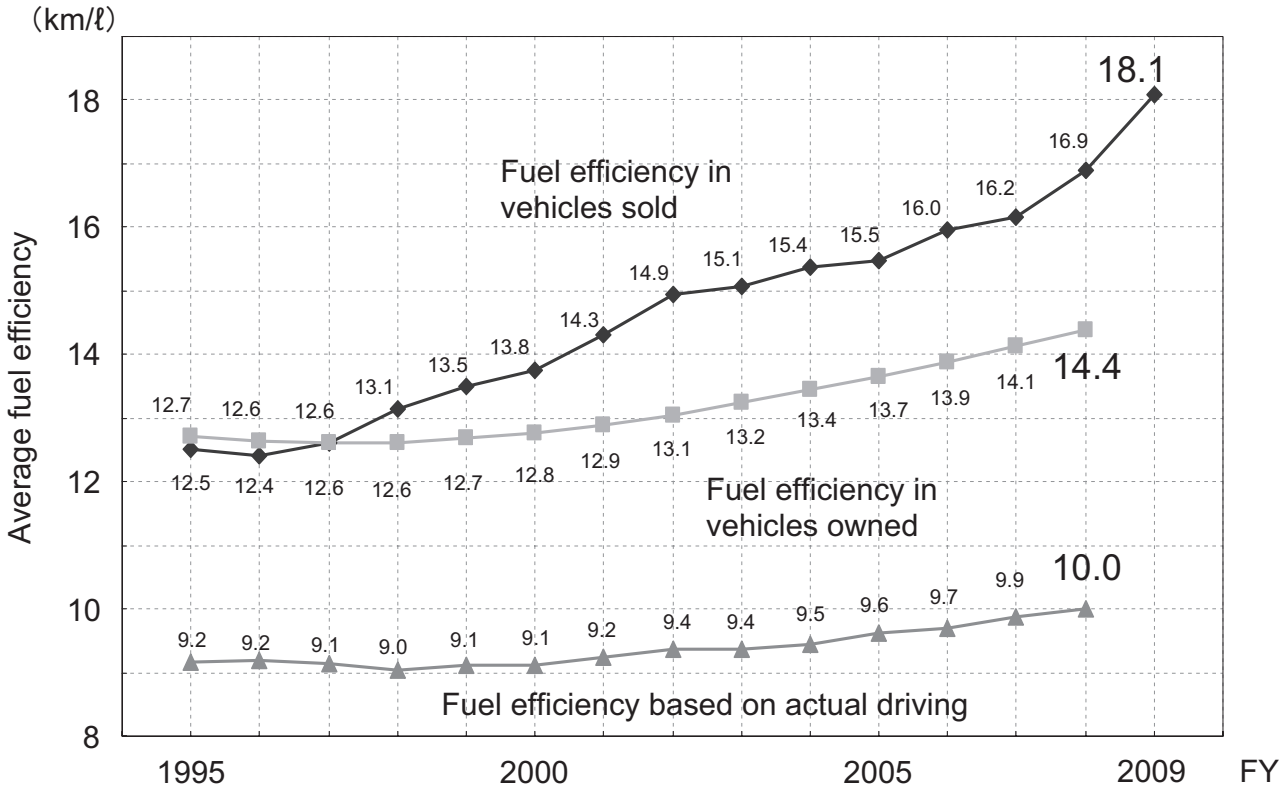
3-7 Development and Promotion of Environmentally Friendly Vehicles

Group Leader, Environment Department, Japan Automobile Manufacturers Association, Inc.
Tadashi Kotake

Taking steps against global warming, automotive manufacturers introduced various technologies to improve fuel efficiency, and achieved — long before 2010 — the fuel efficiency standard specified for that year. We continue that pace as we look toward the 2015 fuel efficiency standard. In addition, the Green tax system and subsidies have been implemented, and the development and promotion of next-generation motor vehicles are on schedule.

Fig. 1 Changes in average fuel efficiency of gasoline--engine passenger vehicles

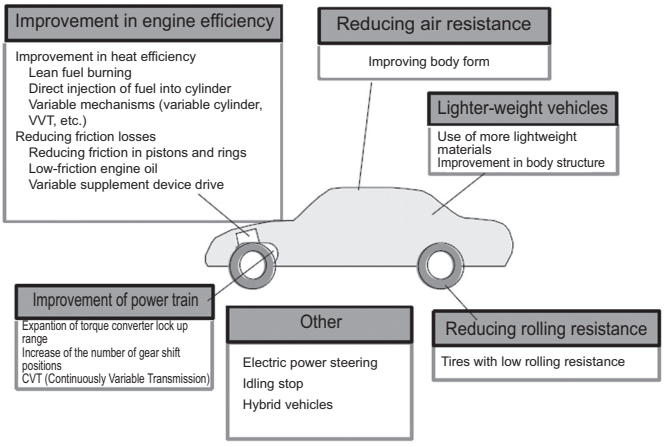
■ Fuel efficiency, as observed in both vehicles sold and vehicles owned, is increasing every year.



Note: Imported cars are not included among motor vehicles sold and motor vehicles owned.
Source: Japan Automobile Manufacturers Association, Inc.

Fig. 2 Technologies to improve the fuel efficiency of motor vehicles

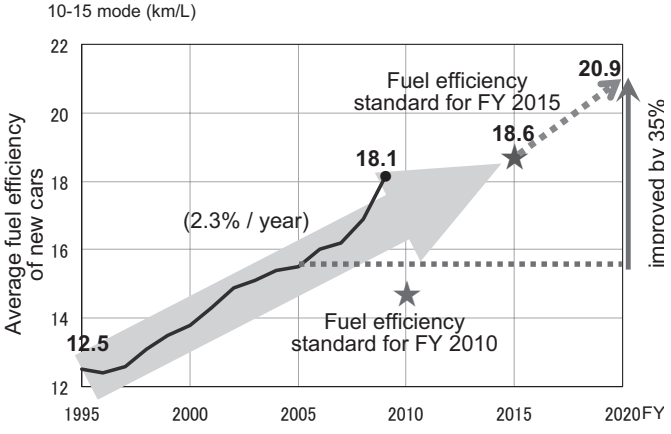
■ Improvement of fuel efficiency has been achieved step by step with the development of various technologies.



Source: Japan Automobile Manufacturers Association, Inc.

Fig. 3 Actual figures for average fuel efficiency of gasoline-engine passenger vehicles, with prospects for improvement

■ Efforts are being made toward the FY 2015 fuel efficiency standard and even further improvement.
■ Thanks to the eco-car subsidies, the average fuel efficiency increased noticeably in FY 2009.



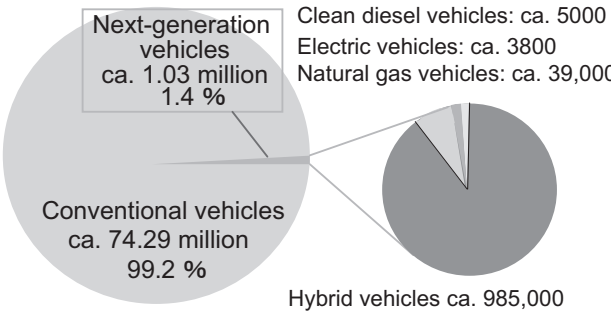
Source: Japan Automobile Manufacturers Association, Inc.

Table 1 Issues in mass marketing next-generation motor vehicles by 2020

1. It will take time to make an impact on the existing "market stock" of automobiles
   - Motor vehicle CO_2 emissions derive from the market stock.
   - Even if more new cars were sold, it will take time for the market stock to be replaced.
   - It is not likely that, by 2020 (only 12 years left), there will be a massive impact on the stock.
2. Will they be chosen by consumers?
   - Does the price of the vehicle motivate consumers to purchase?
   - Amid uncertainty in the market, the automotive businesses cannot make large investments.
3. Lead time for technical research and product development is necessary
   - Time is necessary for technical research and development for next-generation motor vehicles.
   - Time is necessary to develop a large number of models for the market.
   - Research and development personnel are needed in large numbers for the new technology.
   - It is difficult for manufactures to start developing hybrid vehicles immediately.
4. Lead time to establish a mass production system is necessary
   - Preparation and investment for assembly lines and facilities/equipment for new-generation vehicles
   - Preparation and investment for assembly lines and facilities/equipment for parts industries
   - Preparation and investment for supply system of materials manufacturers
   - When new technology is massively promoted over a short period, it is difficult to maintain quality.

Source: Japan Automobile Manufacturers Association, Inc.

Fig. 4 Number of motor vehicles owned and the breakdown for next-generation vehicles (estimate for FY 2009)



<Data>

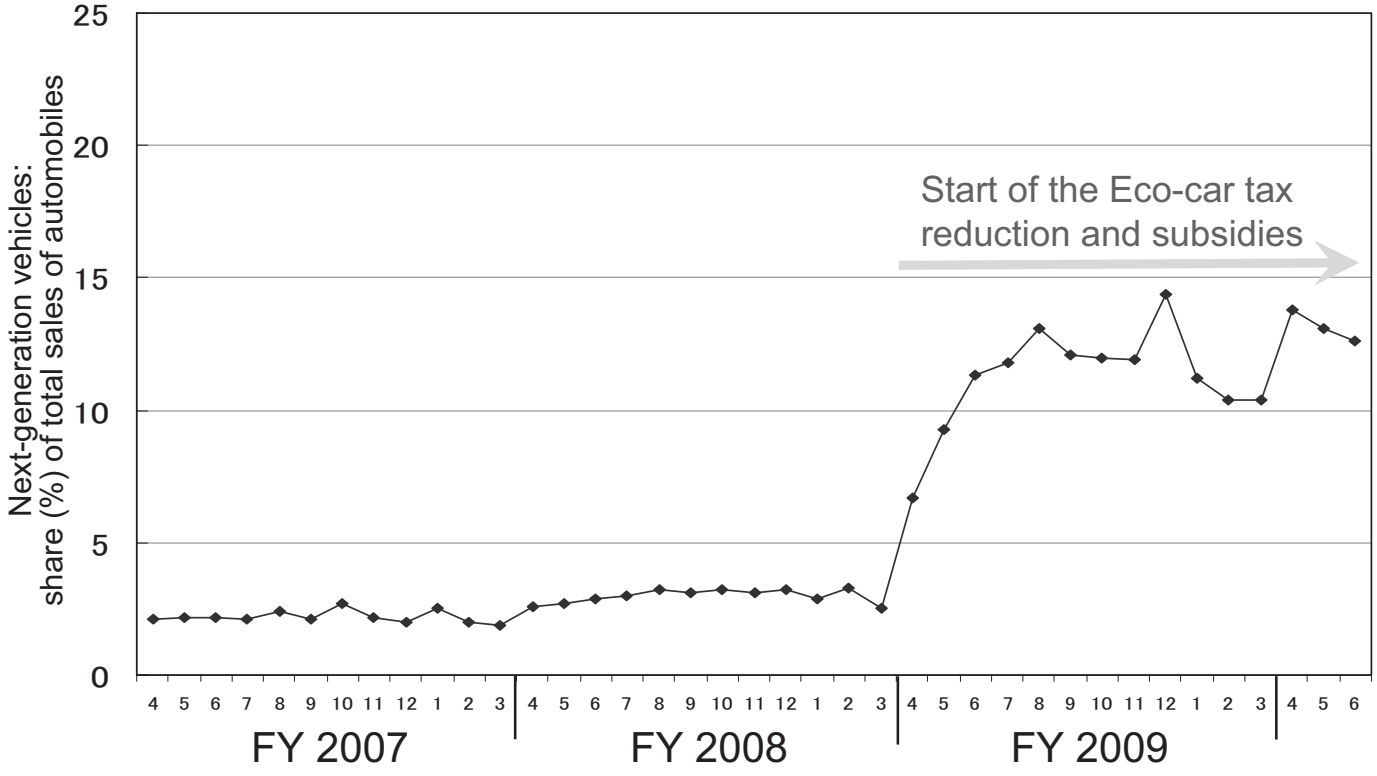
Out of 4,609,256 motor vehicles sold in Japan in fiscal 2009:

- Hybrid vehicles: 449,021 (9.7%)
- Electric vehicles: 1560 (0.03%)
- Clean diesel vehicles: 3119 (0.07%)
- Natural gas vehicles: 1744 (0.04%)
- Fuel cell vehicles: 18 (0.0004%)

Note: Next-generation vehicles: hybrid vehicles, clean diesel vehicles, plug-in hybrid vehicles, electric vehicles, natural gas vehicles, biofuel vehicles, fuel cell vehicles, and hydrogen vehicles
Source: Japan Automobile Manufacturers Association, Inc.

Fig. 5 Effects of the government's assistance for eco-cars

■ Due to the Eco-car tax reduction and subsidies of which about 600 billion yen was spent, the sales of next-generation vehicles increased, temporarily to about 10% of total sales (passenger cars only).



Note: The percentage includes imported cars. However, because they could not be included in the statistics, Kluger Hybrid and X-Trail Diesel are not included among the next-generation cars that were sold in the above period.
Source: Japan Automobile Manufacturers Association, Inc. and other sources

Table 2 Next-generation vehicles fuel initiative (May, 2007)

■ Aiming at the 2030 goal for the transport sector (80% dependence on oil and 30% improvement in energy efficiency), benchmarks (cost, performance, etc.) have been set as check points until 2030 (2010, 2015, and 2020), targeting market production at each point.

		Present	2010	2015	2020	
Using batteries	Use / form	Compact EV for electric companies	Limited use: commuter EV advanced HV**	Fuel cell vehicles; ordinary commuter EV; plug-in HV	Advanced plug-in HV	Commonplace EV
	Performance	1	1	1.5 times	3 times	7 times
	Cost to run	1	1/2	1/7	1/10	1/40
		200,000 yen/kwh	100,000 yen/kwh	30,000 yen/kwh	20,000 yen/kwh	5000 yen/kwh
Using hydrogen	Travel range	300km	400km		800km	
	Price of vehicle	20 times	3-5 times		1.2 times	
	Cost to run	Several million yen/kw	5000 yen/kw		4000 yen/kw	
Using diesel	Durability	2000 hours	3000 hours		5000 hours	
			Same exhaust gas, performance & price (incl. fuel cost) as gasoline-engine vehicles			
Using bio resources	Materials			Rice straw, etc. (leftover from lumber mills etc.)		
	Cost			100 yen/L (Biomass Nippon Comprehensive Strategies Promotion Council — Schedule for expanding production of domestic biofuel); 40 yen/L (technology innovation model)	100 yen/L (Biomass Nippon Comprehensive Strategies Promotion Council — Schedule for expanding production of domestic biofuel); 40 yen/L (technology innovation model)	
Using IT				Average speed in 3 major metropolitan areas: 1.5 times (20% less CO_2 emissions)		Average speed in 3 major metropolitan areas: twice (30% less CO_2 emissions)

Source: data of Ministry of Economy, Trade and Industry

Table 3 Next-generation Motor Vehicles Strategies 2010 (Ministry of Economy, Trade and Industry) — Promotion goals and overall strategies for encouraging the use of next-generation vehicles

■ To accelerate popular demand for next-generation vehicles, optimal marketing goals set by the government (by vehicle type, as a percentage of all new cars sold) are mentioned below. To meet those goals, the government needs to implement strong incentive measures (assisting development and purchases, tax writeoffs, infrastructure improvements, etc.).

■ In the Next-generation Motor Vehicles Strategies 2010, action plans for popularizing next-generation vehicles were made in each of the six strategic areas.

■ Automotive manufacturers primarily, but also related businesses and research institutions, are to do their best to speed development.

Government goals for next-generation vehicles

	2020
Conventional vehicles	50–80%
Next-generation vehicles	20–50%
Hybrid vehicles	20–30%
Electric vehicles Plug-in hybrid vehicles	15–20%
Fuel cell vehicles	–1%
Clean diesel vehicles	–5%

Prospects of spreading the use of next-generation vehicles (through private-sector efforts)

	2020
Conventional vehicles	80% and more
Next-generation vehicles	Less than 20%
Hybrid vehicles	10-15%
Electric vehicles Plug-in hybrid vehicles	5-10%
Fuel cell vehicles	negligible
Clean diesel vehicles	negligible

Note: For successful marketing without governmental incentive measures, the Japan Automobile Manufacturers Association estimates prospects at 10% + α

[Six strategies and major action plans]

	Overall Strategies	Batteries Strategie	Resources Strategies	Infrastructure Improvements Strategies	Systems Strategies	International Standards Strategies
	Making Japan the center of development and production of next-generation motor vehicles	Researching and developing technology to produce the world's most advanced batteries	Obtaining rare metals and building a resources recycling system	Ordinary chargers: 2 million; Rapid chargers: 5000	Export vehicles on the basis of a system (smart grid, etc.)	International standards under Japan's leadership
Major action plans	▪ Goal for promotion success of next-generation vehicles for 2020: maximum 50% ▪ Advanced environmental vehicles (next-generation vehicles + conventional vehicles that are particularly excellent in their performance for the environment): 2020: maximum 80% ▪ Diversity in fuel types	▪ Improving performance of lithium-ion batteries ▪ Developing post-lithium-ion batteries ▪ Spreading the use of electric vehicles to speed mass production ▪ Improving the market for secondary use of batteries	▪ Upper-stream Strategic procurment of resources ▪ Mid-stream Developing batteries and motors without rare metals ▪ Lower stream Building a system for recycling batteries	▪ Well-planned and intensive infrastructure improvements during market preparation period Mainly electric vehicle towns / plug-in hybrid vehicle towns ▪ Building a path toward a time of universal acceptance Electric vehicle town / Plug-in hybrid vehicle town Producing a "'Best Practices" compendium	▪ Creating new business models in electric vehicle and plug-in hybrid vehicle towns ▪ System verification in next-generation energy public demonstration projects ▪ International standardization based on the verification results; commercial development of results	▪ International standards for battery performance, safety, and evaluation methods ▪ International standards for charger connection system ▪ Encouraging administrative and private sectors to advocate standardization ▪ Training standardization personnel

Source: Compiled from the data in NEXT GENERATION MOTOR VEHICLES STRATEGIES 2010