

Achieving Greater Safety and Environmental Protection in Road Transport

On the Road to Sustainable Mobility



Automobiles and the Automotive Industry: A Socioeconomic Perspective

An Economic Pillar, Impacting Lives and Livelihoods

Auto manufacturing and its vast array of related industries—including the materials and parts supply industries and the automotive sales and services industries—currently employ 5.32 million people, or 8.5% of Japan's working population (Fig. 1).

Fig. 1 Employment in the Auto Manufacturing and Related Industries (Number of employees)

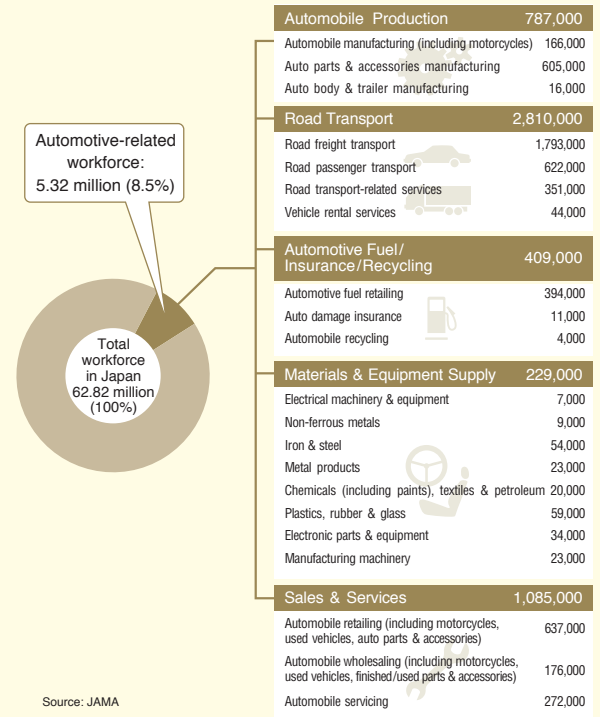
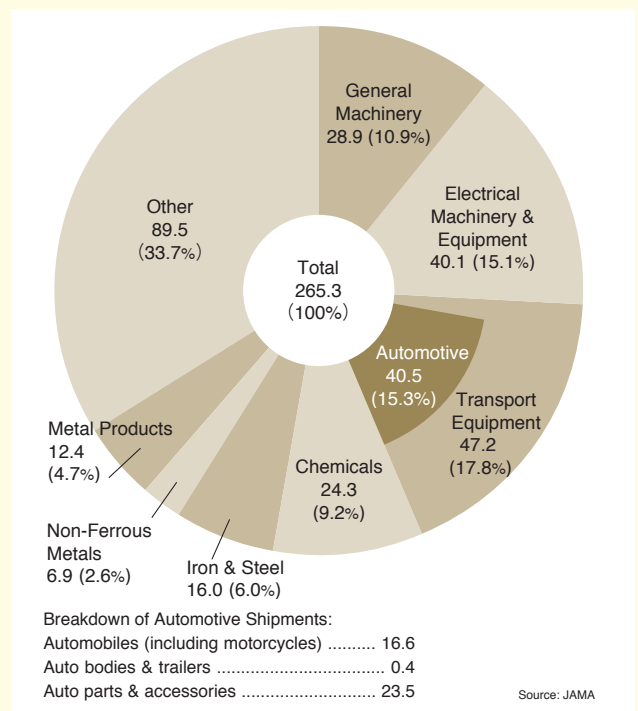


Fig. 2 Shipments of Major Manufacturing Sectors in Value Terms (2009) (x 1 trillion yen)



Automobiles play an essential role in sustaining economic activities around the world and in enhancing people's lives. Japanese automakers therefore continuously strive to meet society's evolving requirements with respect to automotive performance.

Greater safety and environmental protection in road transport are pivotal issues in society's quest for sustainable mobility, and Japan's automakers are determined to meet the challenges confronting them in these areas. As regards safety, Japanese automakers are—individually and through the activities of the Japan Automobile Manufacturers Association, Inc. (JAMA) which they established in 1967—focusing not only on the introduction of advanced vehicle safety technologies, but also on raising public awareness of the role of all road users in achieving greater road safety. Their initiatives in this area also serve the Japanese government's stated goal of making Japan's roads the safest in the world.

With respect to environmental protection and specifically the priority issue of climate change, Japan's automakers are working hard to supply highly fuel-efficient vehicles and implement other measures promoting CO₂ reduction in the road transport sector to help combat global warming.

This pamphlet brings readers up to date on the strategies and measures adopted domestically by Japan's automakers to increase road safety and further reduce the impact of automobiles on the environment, on the road to sustainable mobility.

Japan Automobile Manufacturers Association
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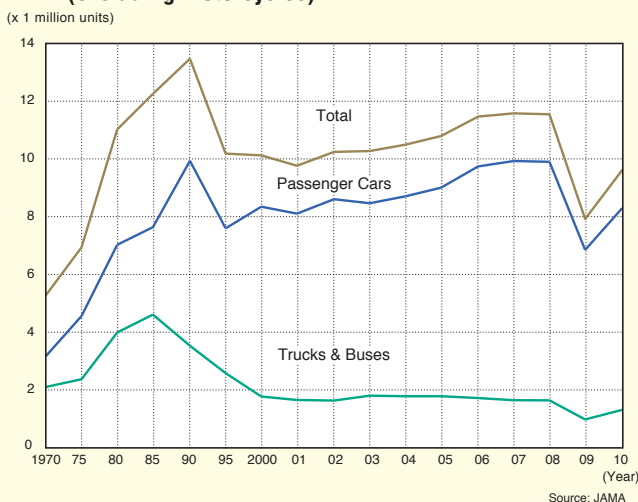
In 2009 automotive shipments (both domestic and export shipments, including motorcycles and parts) in value terms totalled 40.5 trillion yen, accounting for 15.3% of the total value of Japan's manufacturing shipments that year (Fig. 2).

Vehicle Production

During most of the last decade, total domestic production of passenger cars, trucks, and buses exceeded 10 million units annually.

In 2009, however, Japan's vehicle production plummeted to 7.94 million units in the wake of a global economic slump. In 2010, although still below the 10-million level, production volume rebounded by 21.4% to 9.63 million units, recording the first year-on-year gain in three years.

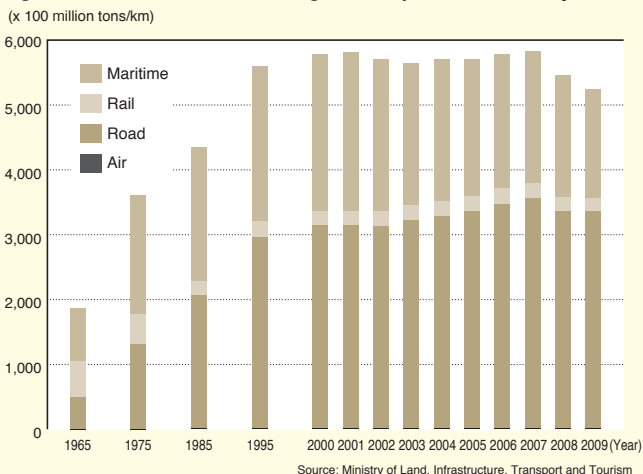
Fig. 3 Trends in Motor Vehicle Production (excluding motorcycles)



The Mainstay of Goods Distribution

The role of motor vehicles in freight transport in Japan expands yearly. Road transport has a 63.9% share of total domestic freight transport, well ahead of any other segment of the transport sector (Fig. 4). Almost 100% of goods considered daily household necessities—including basic foodstuffs, beverages, fisheries products, fruits and vegetables, textiles and clothing, and other products for everyday use—are transported by motor vehicle. Locally, interregionally and nationwide, the role of motor vehicles in both goods distribution and passenger transport is thus a critical one.

Fig. 4 Trends in Domestic Freight Transport Volumes, by Mode










Responding to the Need for Assisted Mobility

Over its more than century-long existence, the automobile has continuously evolved in response to users' needs and expectations. Japan in recent years has seen an increased need for assisted-mobility vehicles as a means to encourage the active participation in society of persons with otherwise limited mobility, including not only the physically disabled but also, in a rapidly aging population, the elderly.

Japanese automakers have therefore introduced innovative technologies, including IT and active safety technologies, to enhance the convenience of these vehicles and thereby provide their users with optimal-quality mobility.

Fig. 5 Types of Assisted-Mobility Vehicles

Vehicle Type	Vehicle Feature	Description
Nursing care	Revolving seats Revolving sliding seats	Front and rear seats can be rotated to the exterior or rotated and slid out to the exterior. Helpful for those who have a little difficulty in boarding/exiting. 
	Elevator seat	Equipped with a seat that, once rotated to the exterior, can be lowered to adjustable positions for easy boarding/exiting. Assists those who have considerable difficulty in boarding/exiting and those who need to move to the seat from a wheelchair. 
	Wheelchair-accessible (with ramp)	Equipped with an electrically-operated ramp that allows boarding/deboarding while remaining seated in a wheelchair. 
Self-operating	Drive-assist system	Equipped with drive-assist devices so that it can be driven by the physically disabled. 
Other	Stretcher-bearing	A passenger can be boarded into/deboarded from this vehicle while in a fully reclined position. For professional use at medical/nursing care facilities. 
	Low-floor bus	A "non-step" bus equipped with an electric lift allowing boarding/deboarding while seated in a wheelchair. Their use in local intra-community transport is being promoted. 
	Assisted-mobility taxi	Equipped with revolving seats. Some taxis are wheelchair-accessible. 

Source: JAMA

Achieving Sustainable Mobility: The Road Ahead

Automobiles are indispensable to modern society and its everyday functioning, whether in the conduct of economic activities or in other spheres. Historically, however, expanding motorization has been followed by the unacceptable consequences of swiftly rising rates of road accident occurrence and an increasingly adverse impact on the environment.

Sustainability in road transport will therefore not be achieved in the future without taking the necessary measures to maximize road safety and minimize the burden posed by automobiles on the environment. Meeting those goals will require broad-ranging measures and concerted efforts on the part of all the stakeholders concerned, including the automotive and other relevant industries, governments, and vehicle users themselves.

Achieving Greater Road Safety

- Automakers are continuously advancing the development and onboard installation of vehicle safety features.
- JAMA conducts, in cooperation with other organizations, “hands-on” training sessions throughout Japan to promote safe driving among vehicle users of all ages.
- JAMA has also developed its own road safety educational materials targeting elderly and young drivers.
- Every spring and autumn, road safety public awareness campaigns are conducted by JAMA to coincide with the government’s own nationwide traffic safety campaigns.

The National Context

Road Fatalities Continue to Decline

In 2010 road fatalities in Japan totalled 4,863 (in notable contrast to the peak total of 16,765 fatalities recorded in 1970), marking the tenth straight year of decline and maintaining, for the second consecutive year, a level below 5,000, not seen since 1952. Road accidents and injuries (the latter having dropped below one million in 2008 for the first time in a decade), which reached historic highs in 2004, decreased as well, for the sixth consecutive year (Fig. 6).

Also in 2010 there was a continued surge in the number of “senior” (aged 65 or older) drivers, reflecting Japan’s rapidly graying society. Meanwhile, the share of elderly persons in total road fatalities rose to an alarming 50.4%, representing a road fatality rate 3.6 times higher for seniors than for the total population.

Objective: The World’s Safest Roads

Aiming to make Japan’s roads the safest in the world, the Japanese government introduced in 2003 its 8th Basic Plan for Road Safety, applicable from 2006 through 2010. The plan’s mid-term goal of reducing annual road fatalities to fewer than 5,500 by 2010 was achieved early, in 2008. The current 9th Basic Plan for Road Safety (2011-2015) calls for a further reduction in annual road fatalities to fewer than 3,000 by 2015, with a view to ultimately achieving zero fatalities in road transport.

In the belief that not only fatalities but all types of road accidents must be significantly reduced in order to build a sustainable society that will continue to benefit from the use of automobiles, JAMA has recommended to the government comprehensive safety-promotion measures related to road users, motor vehicles, road infrastructure, and ITS (Intelligent Transport Systems) technologies.

Overview of the Japanese Automobile Industry’s Road Safety Activities

Road Accident Causation and Prevention

Road safety involves the interrelationship of three factors: road users, vehicles, and road infrastructure. Research has indicated that human error is directly or indirectly involved in over 90% of road accidents (Fig. 7).

Greater road safety therefore requires that progress be made in all three areas, on the basis of comprehensive accident causation analysis. Accordingly, those three factors are the focus of JAMA’s and its members’ road safety activities, which are summarized as follows:

- Activities targeting *road users* include public awareness-raising campaigns and the development and implementation of road safety educational programs;
- Activities targeting *road vehicles* include the introduction of advanced vehicle safety technologies, in terms of both active safety (collision avoidance) and passive safety (injury mitigation);
- Activities targeting *road infrastructure* include petitions and proposals to the government and related agencies calling for specific improvements in Japan’s road infrastructure.

JAMA’s Eight Priority Areas of Focus for Greater Road Safety

In 2004 JAMA pledged its support of the government’s goals for improved road safety (see above) and identified eight key areas of effort for the Japanese automobile industry in the ensuing decade. These priority areas are:

- (1) Accidents involving pedestrians or cyclists;
- (2) Special measures for the elderly;
- (3) Greater use of seatbelts;
- (4) Delays in driver recognition and incorrect vehicle control;
- (5) Accidents occurring at twilight/night;
- (6) Accidents occurring at intersections;
- (7) Collisions with stationary objects; and
- (8) Vehicle compatibility.

Note: Advancing vehicle compatibility involves improving the safety performance of a vehicle in the event of a crash with another vehicle, with a particular focus on reducing the ability of larger vehicles to cause damage to smaller vehicles in a collision. Greater compatibility is achieved through improvements to vehicle body structure aimed at minimizing occupant injury.

Fig. 6 Road Accidents/Injuries/Fatalities

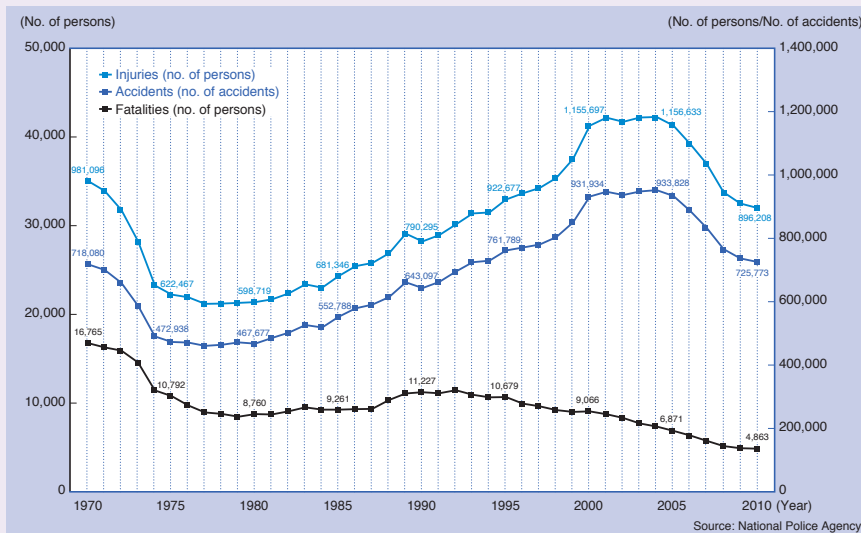
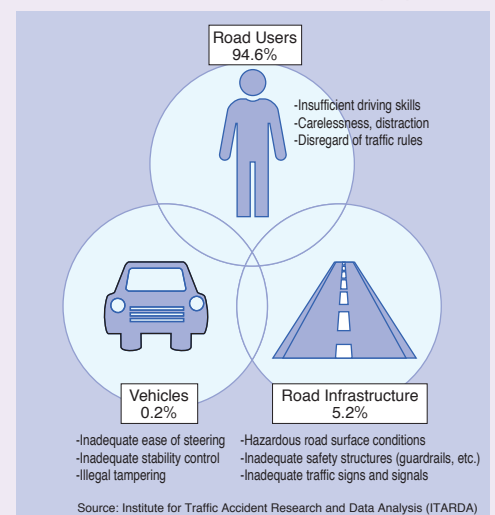


Fig. 7 Road Accidents: Causal Factors & Their Share of Involvement (%)



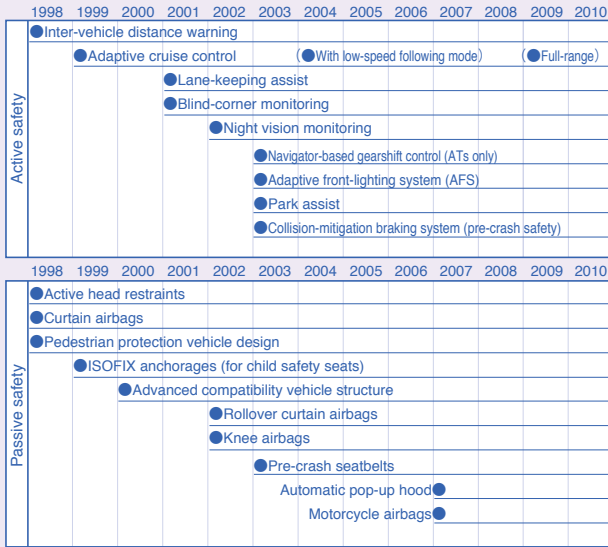
Road Safety Activities to Date

■ Expanding the Installation of In-Vehicle Safety Features

Japan's automakers are equipping more and more of their vehicles with advanced safety features to help prevent accidents from happening (active safety) and to increase occupant protection when collisions are unavoidable (passive safety).

In parallel with the expanded installation of onboard safety equipment, JAMA and its members are engaged on a continuous basis in real-world accident analysis, cutting-edge accident simulation studies, and the advancement of test methods for safety evaluation.

Fig. 8 Vehicle Safety Features Introduced in Recent Years



Source: JAMA

Table 1 Safety Feature Onboard Installation Status

Safety Feature	Installation Status			
	In no. of models (see Note 2)	In % (see Note 3)	In vehicle units	In % (see Note 3)
Anti-lock braking system (ABS)	191 (167)	98.5	3,851,786	95.1
Brake assist	170 (158)	87.6	3,716,284	91.8
Unfastened seatbelt warning (driver's seat)	191 (191)	98.5	4,049,410	100.0
Unfastened seatbelt warning (front passenger's seat)	61 (62)	31.4	1,420,625	35.1
High-intensity discharge headlamps	150 (58)	77.3	1,764,517	43.6
Adaptive front-lighting system (AFS)	44 (18)	22.7	223,932	5.5
Back-up monitoring (rear obstacle detection)	109 (21)	56.2	521,283	12.9
Vehicle perimeter monitoring	37 (6)	19.1	122,156	3.0
Vehicle perimeter obstacle warning	33 (4)	17.0	186,141	4.6
Blind-corner monitoring	18 (2)	9.3	81,424	2.0
Night vision monitoring	4 (0)	2.1	1,279	0.0
Curve detection	24 (1)	12.4	174,736	4.3
Tire pressure monitoring	7 (5)	3.6	83,881	2.1
Driver inattention warning	26 (1)	13.4	185,593	4.6
Inter-vehicle distance warning	43 (1)	22.2	41,727	1.0
Lane deviation warning	21 (0)	10.8	23,882	0.6
Rear collision warning-equipped headrest control	8 (0)	4.1	3,599	0.1
Collision-mitigation braking system (pre-crash safety)	47 (2)	24.2	47,882	1.2
Adaptive cruise control	45 (2)	23.2	38,843	1.0
Adaptive cruise control with low-speed following mode	6 (0)	3.1	12,877	0.3
Full-range adaptive cruise control	9 (0)	4.6	17,665	0.4
Lane-keeping assist	17 (0)	8.8	10,040	0.3
Back-up monitoring (parking assistance)	18 (0)	9.3	39,164	1.0
Navigator-based gearshift control	29 (8)	14.9	79,037	2.0
Pre-crash seatbelts	39 (5)	20.1	28,623	0.7
Electronic stability control	117 (55)	60.3	1,010,588	25.0
Traction control with ABS	112 (54)	57.7	985,581	24.3
Navigator-based stop sign alert with brake assist	11 (6)	5.7	119,844	3.0
Rearward-approaching-vehicle warning	3 (1)	1.5	1,377	0.0
Side airbags	130 (52)	67.0	1,086,455	26.8
Curtain airbags	131 (49)	67.5	988,676	24.4
Active head restraints	117 (112)	60.3	2,502,817	61.8
ISOFIX anchorages (for child safety seats)	144 (126)	74.2	3,255,095	80.4
Three-point seatbelt for rear center seat*	81 (71)	50.9	1,091,546	36.7
Total			194	4,049,894

Notes: 1. Figures are for passenger cars produced in 2010 for the domestic market. 2. "In no. of models" indicates the number of models in which the safety feature is installed as standard or optional equipment. Figures in parentheses indicate the number of models in which the safety feature is standard equipment. 3. "In %" means as a percentage of the total number of models/units produced. 4. Passenger cars here include minicars.

* In 2010 a total of 159 passenger car models (2,970,375 vehicle units) featured a rear center seat. Minicars do not feature a rear center seat.

Source: JAMA

In view of Japan's imminent practical introduction of two road-to-vehicle, intelligent communication-based driver support systems, JAMA has petitioned the government to prioritize the installation of the necessary roadside equipment on the basis of site-specific accident occurrence rates.

■ Promoting Greater Road Safety Awareness

• Through public awareness-raising campaigns

Every spring and autumn, the Japanese government launches a national traffic safety campaign in cooperation with citizens' groups and industry organizations. Supporting and supplementing this activity, JAMA conducts its own semi-annual campaigns to raise public awareness about road safety, focusing on, for example, reminding all road users—drivers, riders, and pedestrians—of the vital importance of both front and rear seatbelt use, correct helmet use, and paying special heed to elderly pedestrians.

Safe-driving training for "seniors":
Negotiating a wet, slippery road surface



• Through nationwide driver education programs

A number of organizations including JAMA and the Japan Automobile Federation jointly conduct educational programs targeting drivers of all ages and, in a format designed expressly for that purpose, senior drivers specifically. These programs feature one-day, hands-on training sessions held across Japan to heighten awareness of safe driving practices. Participants in those sessions are increasingly being given the opportunity to drive cars equipped with advanced safety features such as anti-skidding electronic stability control.

■ Developing & Disseminating Original Road Safety Educational Materials

• A refresher course for elderly drivers

Developed by JAMA as a means to promote, among elderly drivers, continued enjoyment of automobile use and the benefits of independent mobility, this study program examines issues related to safe driving and provides information and tips on safe driving practices.

• "Safety Action 21" educational materials for teenagers

JAMA targeted the youngest segment of the driving population in developing this set of road safety educational materials, aimed at prospective license holders in an effort to curb the high rate of accident occurrence in this demographic. JAMA hopes that these materials will increasingly be adopted by high schools nationwide.

Note: Materials (in Japanese only) can be downloaded free of charge from the JAMA Web site by accessing, for the refresher course, www.jama.or.jp/safe/safety_elderly/index.html and, for "Safety Action 21" materials, www.jama.or.jp/safe/safety/index.html.

The Need for Road Infrastructure Development

Improvements in road infrastructure are a key factor in reducing accident occurrence. To upgrade road and traffic management infrastructure nationwide, JAMA has appealed to the government to implement the following measures: a) Construction of disaster-resistant road networks (including alternative-route networks) providing protection against landslides and earthquakes, and the replacement of roadside utility poles with underground utility tunnels servicing municipal electrical, water and gas supply needs; b) Introduction of more conspicuous traffic signals and signage, ITS-based driver support systems, and comprehensive community zoning initiatives (to separate commercial from residential traffic); c) For more efficient road transport with reduced impact on the environment, the expansion of bypass networks around large cities and promotion of the greater use of expressways and ITS-based traffic management systems; and d) Improved road maintenance for longer service life.

Addressing Climate Change

- CO₂ emissions in Japan's transport sector dropped to 230 million tons in 2009, largely surpassing its Kyoto Protocol-related 2010 CO₂ reduction projection.
- In 2010 the average fuel efficiency of new gasoline-powered passenger cars in Japan reached 18.7 km/ℓ, a significant gain over the 14.4 km/ℓ targeted for that year.
- Japanese automakers are aiming to increase the supply of alternative-energy/next-generation vehicles to the domestic market.
- Japanese auto and auto-body manufacturers are targeting, for 2008-2012, a voluntary 25% reduction in CO₂ emissions from their production plants compared to the 1990 level.
- JAMA and its member automakers are proactively engaged in the global road transport sector's activities targeting CO₂ reduction.

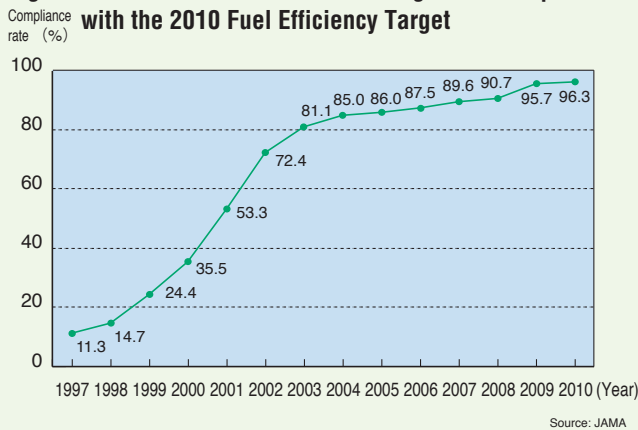
The CO₂ Challenge for Automakers

Increasing Vehicle Fuel Efficiency

■ Early Compliance with the 2010 Targets

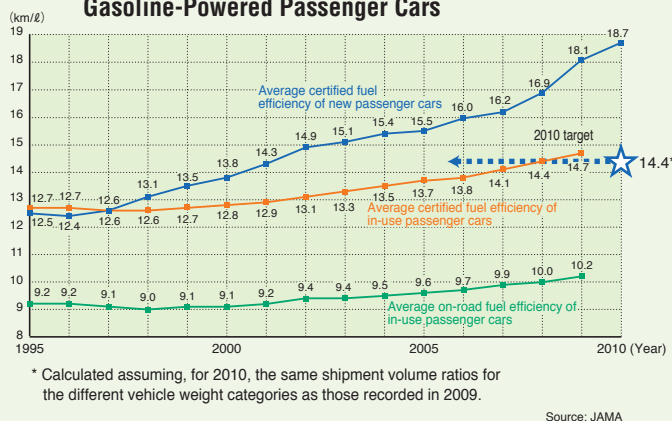
JAMA member automakers, for the most part, achieved compliance with Japan's 2010 fuel efficiency targets well ahead of schedule. In 2010, 96.3% of their domestically-sold new gasoline-powered passenger cars (≤2.5 tons) met the relevant 2010 target (Fig. 9).

Fig. 9 Trends in Domestic New Passenger Car Compliance with the 2010 Fuel Efficiency Target



The average certified fuel efficiency of new gasoline-powered passenger cars in Japan has improved yearly, reaching 18.7 km/ℓ in 2010 (Fig. 10) and thus largely surpassing their 2010 target of 14.4 km/ℓ.

Fig. 10 Trends in Average Fuel Efficiency of Domestic Gasoline-Powered Passenger Cars



■ New Fuel Efficiency Targets for 2015

The automakers' early compliance with 2010 fuel efficiency targets has made a significant contribution to CO₂ reduction in Japan's transport sector, with CO₂ emissions in 2009 largely surpassing the sector's Kyoto Protocol-related 2010 CO₂ reduction projection (Fig. 13).

Fuel efficiency targets for heavy-duty vehicles (trucks and buses over 3.5 tons)—the first in the world—were introduced in Japan in 2006, for enforcement in 2015; for passenger cars and trucks weighing 3.5 tons or less, fuel efficiency targets for 2015 were

formulated in 2007 (Table 2; buses not included). More stringent fuel efficiency targets are in the works for 2020. JAMA member manufacturers are working hard to ensure compliance through both the supply of conventional vehicles with even higher fuel efficiency and an expanded share of alternative-energy/next-generation vehicles.

Table 2 Japan's 2015 Fuel Efficiency Targets

Vehicle Type	Increase (%)	Target Value (Average)
Passenger cars	Up 23.5% from 2004 performance	16.8 km/ℓ
Trucks, GVW≤3.5t	Up 12.6% from 2004 performance	15.2 km/ℓ
Trucks, GVW>3.5t	Up 12.2% from 2002 performance	7.09 km/ℓ

Note: Fuel efficiency here is JC08 test cycle-measured (passenger cars, trucks≤3.5t) and JE05 test cycle-measured (trucks>3.5t); targets were established assuming the same shipment volume ratios by vehicle weight category for 2015 as those recorded in 2004 and in 2002, respectively.

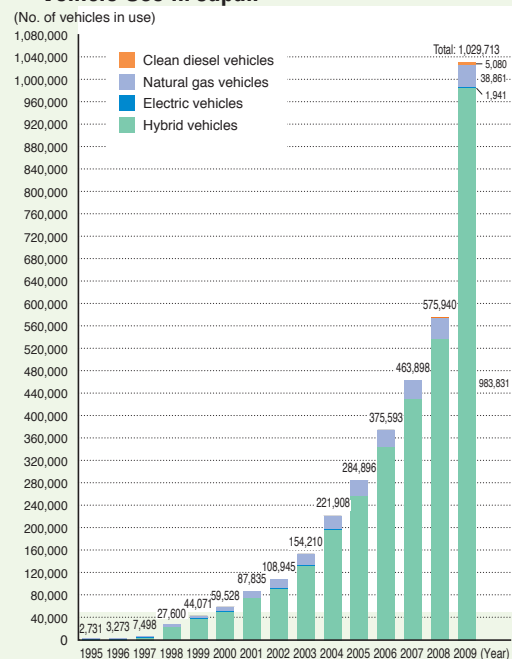
Sources: Ministry of Land, Infrastructure, Transport and Tourism; Ministry of Economy, Trade and Industry

Promoting the Wider Use of Alternative-Energy/Next-Generation Vehicles

The use of alternative-energy/next-generation vehicles is becoming an increasingly significant factor in Japan's reduction of CO₂ emissions in its road transport sector. In view of their outstanding environmental performance and steadily growing demand, Japanese automakers are aiming to expand the supply of these vehicles to the domestic market. Meanwhile, the government is actively promoting their wider use through tax incentives. At present there are nearly 1,030,000 alternative-energy/next-generation vehicles in use in Japan, most of which are hybrids (Fig. 11).

Notes: 1. Alternative-energy/next-generation vehicles include hybrid, plug-in hybrid, electric, fuel cell, natural gas, clean diesel, flex-fuel and hydrogen vehicles. 2. Summary information on the environmental performance of these vehicles is available on JAMA's Web site at www.jama.or.jp/eco/eco_car/info/index.html.

Fig. 11 Status of Alternative-Energy/Next-Generation Vehicle Use in Japan

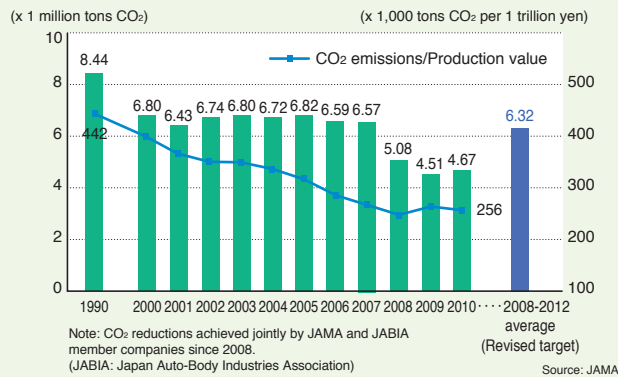


CO₂ Reduction in Road Transport: A Sectorwide Challenge

Reducing CO₂ Emissions in Production Processes

Japan's auto and auto-body manufacturers are reducing energy consumption and otherwise cutting CO₂ emissions at their production plants in order to conserve resources and help curb global warming. Their combined 2008-2012 target of 6.32 million tons of CO₂ annually—down 25% from the 1990 level—has already been surpassed, largely as a result of the recent economic downturn (Fig. 12).

Fig. 12 Reductions in Production Plant-Generated CO₂ Emissions



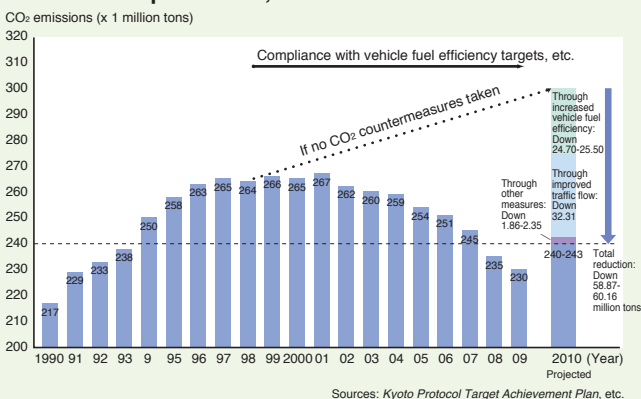
The Kyoto Protocol Target Achievement Plan and CO₂ Reduction in Japan's Transport Sector

The enforcement of the Kyoto Protocol in 2005 prompted the Japanese government to formulate, in the same year, its *Kyoto Protocol Target Achievement Plan* to help the country meet its goal of reducing total CO₂ emissions to 6% below the 1990 level by 2008-2012. The plan prescribed individual CO₂ reduction targets and specific reduction measures for Japan's industrial, consumer, transport and other major sectors.

Of Japan's total CO₂ emissions, the transportation sector accounts for roughly 20%, of which 90% are auto-emitted—making CO₂ reduction in road transport a priority concern. With steadily declining CO₂ emissions since 2001, the transport sector's original target of an annual 250 million tons of CO₂ emissions by 2010 was consequently revised in March 2008 to a more challenging projection of 240-243 million tons (Fig. 13).

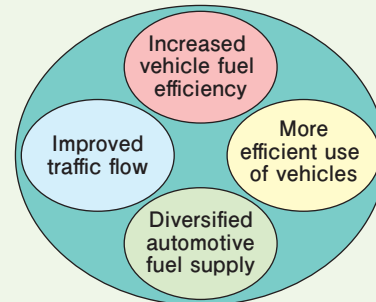
In fact, Japan's transport sector emitted a total of 230 million tons of CO₂ in 2009, already largely surpassing the 2010 projection. This was achieved by means of increased vehicle fuel efficiency, road congestion mitigation, and the wider practice of ecodriving, among other measures.

Fig. 13 Actual & Targeted CO₂ Emission Volumes in Japan's Transport Sector, 1990-2010



Road Transport CO₂ Reduction Requires Initiatives in Four Areas

CO₂ reduction in road transport, both nationally and globally, requires measures to (1) increase vehicle fuel efficiency, (2) diversify fuel supply, (3) improve traffic flow (i.e., reduce congestion), and (4) use motor vehicles more efficiently, involving the cooperative efforts of vehicle manufacturers, fuel/energy providers, government, and vehicle users.



JAMA recommends that the road transport sector worldwide implement the following specific measures in the four areas concerned.

- Measures to increase vehicle fuel efficiency
 - Fuel efficiency standards for passenger cars and trucks should be adopted by all countries/regions, taking into account local conditions and circumstances.
 - Lighter vehicles with consequently higher fuel efficiency should be increasingly introduced into the market.
 - Next-generation vehicles that run on alternative energies should progressively replace conventional vehicles in the interest of achieving sustainable energy use.
 - Green vehicle purchasing incentives should be implemented by governments to encourage the purchase of highly fuel-efficient and low-emission vehicles and thereby accelerate the replacement of the vehicle fleet.

- Measures to diversify automotive fuel supply
 - The widespread use of low-carbon fuels and sources of energy, such as biofuels and electric power generated by renewable energy, should be facilitated in line with national requirements. Key to expanding the biofuel supply will be the commercialization of new fuels such as cellulosic ethanol and biomass-to-liquid (BTL) fuels, which have no adverse impacts on food supply and soil quality. Technological development should be advanced through the coordinated efforts of industry, government and academia.

- Measures to improve traffic flow
 - Road congestion mitigation should be achieved through the adoption by governments of road infrastructure-related measures that represent the most effective responses to local conditions. Improving traffic flow through road construction and road infrastructure development is a particularly urgent priority in countries with rapidly expanding motorization. In most cases, ITS (Intelligent Transport Systems)-related technologies are effective in improving traffic flow.
 - Low-carbon urban planning—especially in areas where significant population influxes are projected—should incorporate effective road congestion-mitigation measures, including road network development and ITS applications, from the earliest stage of planning.

Measures to promote the more efficient use of vehicles

• Drivers everywhere should be urged to practice ecodriving to help reduce fuel consumption and CO₂ emissions. When adopted by truck fleet operators and their drivers, ecodriving also helps reduce operating costs. The use of onboard equipment such as fuel-efficiency gauges (for passenger cars) and digital tachographs (for trucks) facilitates ecodriving.

Onboard Equipment for Ecodriving



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

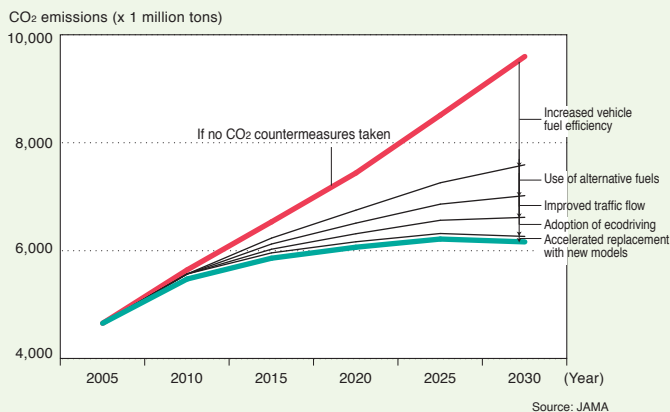


1. Accelerate gently.
2. Maintain a steady speed.
3. Slow down by releasing the accelerator.
4. Limit the use of your air conditioner.
5. Don't idle your engine.
6. Don't warm up your engine before starting off.
7. Know your itinerary.
8. Check your tire pressure regularly.
9. Reduce your load.
10. Respect parking regulations.

Anticipated Impact of the Recommended Measures on Global Road Transport CO₂ Emissions

JAMA has carried out a hypothetical study to estimate the potential for CO₂ reduction in global road transport assuming the combined implementation of the measures recommended above. Study results showed that a very significant reduction in CO₂ emissions could be achieved (Fig. 14).

Fig. 14 CO₂ Emissions Reduction Potential in the Global Road Transport Sector assuming the implementation of recommended measures



The Vehicles Supplied by JAMA Member Manufacturers Incorporate Advanced Emissions Control Technologies

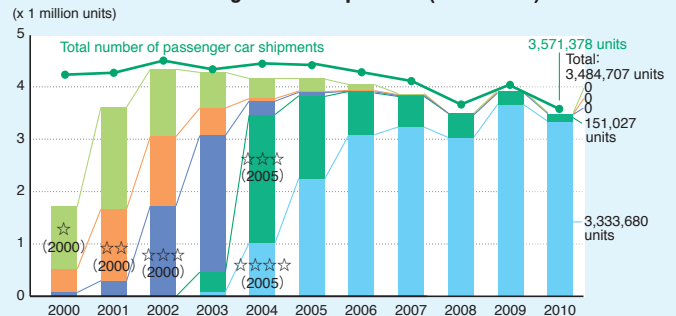
Emissions Reduction in Gasoline-Powered Passenger Cars

JAMA member manufacturers have for years been energetically introducing low-emission vehicles (LEVs) into the domestic market. LEV-certified passenger cars accounted for 98% (over 3.5 million units) of total passenger car shipments in 2010, with more than 90% of them very largely surpassing 2005 emission standards (see ☆☆☆☆ in Fig. 15).

Since the introduction of vehicle emission regulations in Japan, JAMA members have developed and advanced numerous technologies to enable compliance. Those most commonly in application today for gasoline-powered vehicles are electronically-controlled fuel injection (for more efficient combustion) and catalytic converter technologies, the result of important development breakthroughs.

Japan's low-emission vehicle certification system initially used 2000 emission standards as baseline criteria, whereby passenger cars surpassing those standards by 25%, 50%, or 75% were LEV-certified. With the introduction in 2005 of new, more stringent emission regulations, the system was expanded to include passenger cars that surpass the 2005 standards by 50% or 75%. This system has been highly effective in promoting the widespread use in Japan of passenger cars with significantly reduced exhaust emissions.

Fig. 15 Low-Emission Passenger Car Shipments Compared to Total Passenger Car Shipments (Domestic)



Note: Low-emission vehicles (LEVs) are certified on the basis of the following criteria.

☆☆☆☆: Emissions down by 75% from 2005 standards

☆☆☆☆: Emissions down by 50% from 2005 standards

☆☆☆☆: Emissions down by 75% from 2000 standards

☆☆☆☆: Emissions down by 50% from 2000 standards

☆☆: Emissions down by 25% from 2000 standards

Source: JAMA

Emissions Reduction in Heavy-Duty Diesel Vehicles

Compliance with new regulations enforced as of 2009 signifies even greater reductions in PM and NO_x emissions from heavy-duty diesel vehicles, making those emission levels as low as those of gasoline-powered heavy-duty vehicles.



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