2001

Mitsubishi Motors
Environmental Report



MITSUBISHI MOTORS

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About the Environmental Report

The focus of this report is on our environmental protection activities undertaken in Japan during FY2000 (April 1, 2000 to March 31, 2001), though some activities undertaken in FY2001 are also described. Every effort has been made to make extensive use of quantitative data and to present the information on MMC's environmental activities in a clear and easy-to-understand manner. This report is the third of our series of environmental reports, which we plan to continue to publish annually, and we hope it helps raise awareness and understanding of our environmental protection activities.

Although we recognize the importance of this report being reviewed by a third party to ensure its reliability, in the current absence of clear standards on the method and scope of third-party reviews, we decided that the time was still too early for such a review. This report has thus not been reviewed by a third party.

Corporate profile

Company name
MITSUBISHI MOTORS CORPORATION

Date of establishment
April 22, 1970

President & CEO (Representative Director)
Takashi Sonobe

Head office
5-33-8, Shiba, Minato-ku, Tokyo 108-8410, Japan

Stocks
Authorized share: 3,220,000,000
Outstanding share: 1,470,163,624 (March 31, 2001)
Number of shareholders: 39,146 (March 31, 2001)

Capital
¥ 252.2 billion (March 31, 2001)

Employees
24,360 (including 3,284 temporary staff covering for employees on leave)

Turnover
Non-consolidated: ¥2,012.7 billion (FY 2000)
Consolidated: ¥3,276.7 billion (FY 2000)

Main lines of business

1) To develop, design, manufacture, assemble, sell or purchase, export and import and otherwise deal in motor vehicles and components thereof and replacement parts and accessories thereof.
2) To develop, design, manufacture, assemble, sell or purchase, export and import and otherwise deal in agricultural machinery and industrial engines, etc., and components thereof and replacement parts and accessories thereof.
3) To sell or purchase used motor vehicles and components thereof and replacement parts and accessories thereof.
4) To sell test-machines, meters, gauges, etc.
5) To carry out an agent's business of non-life insurance and insurance conforming with the Automobile Accident Compensation Security Act.
6) To carry out financial services
7) To carry out any business incidental or relating to any of the foregoing.

Introduction

Being a corporate leader in "the Century of the Environment"

The 21st century has begun, and with awareness of the importance of environmental protection already high, action is underway around the world to create sustainable economies and societies.

The debate on ratification of the Kyoto Protocol to combat global warming is drawing to a conclusion, and in Japan as elsewhere, environmental legislation is being enacted and implemented. Action to protect the environment is at last really underway.

Mitsubishi Motors Corporation (MMC) will this year be strengthening its alliance with DaimlerChrysler, and has begun implementing its turnaround plan to reinvent itself and revamp its organizational and management structure. On the environmental front, MMC continues to regard the environment as a management priority, and will pursue action to protect the environment being aware of its position as a leading company in the 21st century.

We shall work to minimize the environmental impact at every stage of our activities, from vehicle development, procurement and production through to the sale and servicing of vehicles. We shall therefore strive to reduce the impact on the environment of each vehicle supplied to the consumer, recycle as much of the content of end-of-life vehicles as possible, and make our plants and other facilities more environmentally friendly.

Automobiles improve the convenience of everyday life, and their central role in the logistics system makes them vital to the growth of industrial activity. It is also true, however, that they have a considerable impact on the environment. The challenge we face, then, is to produce vehicles that have high fuel efficiency so as to protect the global environment, and that emit clean exhaust so as not to harm the urban environment.

All of our production plants have already been certified as being compliant with the ISO14001 environmental management standard. Accordingly, we are continuously implementing measures to protect the environment around plants, conserve energy, and reduce waste emissions. We are also working in collaboration with our suppliers and dealers to protect the environment.

By using the Internet and producing pamphlets such as this, we aim to provide full information disclosure and keep the public fully informed and up-to-date concerning our activities to protect the environment.

And I can promise you that MMC will continue to take voluntary action to protect the global environment for the benefit of future generations.



Takashi Sonobe
President & CEO



On the publication of the 2001 Environmental Report

Protection of the environment has become a priority for both business and society at large, requiring swift and effective action.

When MMC reorganized its internal structure in June this year, it also revised the organization of its Environmental Council. The main improvements were to streamline the council's setup to enable more vigorous discussion than in the past, to establish a new study team enabling a more rapid response to the Automobile Recycling Law in Japan, and to clarify the shared and separate components of passenger vehicles and commercial vehicles. We will continue to enhance the activities.

Concern for the environment is an important pillar of our product development policy. As well as developing GDI engines offering outstanding fuel efficiency and clean energy vehicles such as fuel cell vehicles, electric vehicles, CNG vehicles and hybrid vehicles, we are also promoting the recycling of vehicles and the reduction of use of hazardous substances such as lead.

In FY2000, we also began introducing Life Cycle Assessment (LCA), and further enhanced our environmental accounting.

Regarding our production activities, we eliminated the landfill disposal of waste at our Nagoya and Kyoto Plants in March this year, and aim to eliminate such disposal at all our other plants in Japan by the end of March 2002. All our plants in Japan have in addition been certified as ISO14001 compliant, and aim for all our affiliates, both within Japan and overseas, become compliant in the future. In addition, as part of our drive to promote "Green Procurement" begun in November last year, we have requested that our suppliers also become ISO14001 compliant.

As regards our sales operations, we set up a system last December in cooperation with our dealers to facilitate action to protect the environment.

Our intention in the future is to actively work hand in hand to protect the environment with not only other businesses, but also the national and local governments, customers, investors and the general public.

The 2001 Environmental Report was therefore published to inform our stakeholders and the public in general of our activities in the environmental arena. We shall continue with our efforts to protect the environment, and look forward to receiving any comments our readers may have concerning how to make our activities even more environmentally friendly.



Tadayoshi Juge
Environmental Officer & EO



1. Environmental Management

MMC regards environmental protection as an important priority, and is totally committed to reducing the impact on the environment at every stage of the car lifecycle, from development and production to disposal. So that these activities are conducted in an efficient and reliable manner, we are enhancing our environmental management setup.

MMC's Environmental Guidelines

In order to clarify group policy on environmental protection, "MMC's Basic Philosophy on the Environment" was replaced in August 1999 by "MMC's Environmental Guidelines".

These guidelines reflect the corporate philosophy of "iimono nagaku (making good products that last for a long time)". The first section on basic policy sets out protection of the environment as a priority, and describes ongoing, all-out measures to protect the environment. In the section on behavioral standards are described concrete measures for implementing this basic policy.

In January 2000, MMC adopted a new slogan, "Heart-Beat Motors, Mitsubishi Motors", and laid down the following three core values to guide its business activities:

Earth technology - Technology born of a love of the earth and the joy of driving

Industrial beauty - The attraction of the authentic

Next frontier - Creativity that cultures the coming age

"Ecology" was identified as one concrete element of these core values.

1) "iimono nagaku"

"iimono nagaku" was adopted as a central plank of MMC's corporate philosophy in March 1998. It is a principle that MMC takes seriously in its goal to become a company that delivers quality goods and services and builds long-lasting relationships of trust with customers, and it sums up the company's culture.

ENVIRONMENTAL GUIDELINES OF MITSUBISHI MOTORS CORPORATION

Basic Policy

Mitsubishi Motors recognizes that protection of the global environment is a priority for humankind and as such makes the following undertakings:

(1) From a global viewpoint, we are committed to continual reduction of negative environmental impact of our corporate activities with all our strength, these including development, procurement, production, sales, and after-sale servicing activities related to automobiles.

(2) As a good corporate citizen, we are committed to action to protect the environment at the level of local communities and society as a whole.

Behavioral standards

(1) We will endeavor to protect the environment by forecasting and assessing the environmental impact of our products at all stages in their life cycle.
Priority is given to the following areas:
- **Prevention of global warming by reducing emissions of greenhouse gases**
- **Prevention of pollution by restricting emissions of substances harmful to the environment**
- **Reduction of waste and maximizing efficient use of resources by promoting conservation of resources and recycling.**

(2) We will endeavor to improve our environment management practices as part of ongoing efforts to ameliorate the environment.

(3) We will comply with environment regulations and agreements, and will work to protect the environment by establishing voluntary management targets.

(4) We will encourage our affiliates and suppliers, both in Japan and overseas, to cooperate in working to protect the environment.

(5) We will actively disclose environment-related information and will seek the understanding of local communities and of society at large.

Development of environmental measures and organization

In order to promote environmental protection throughout the company, MMC established an Environmental Council chaired by the president in 1993.

The purpose of the Environmental Council is to determine basic corporate policy on the environment, and to discuss and reach decisions on matters proposed to it by its various committees.

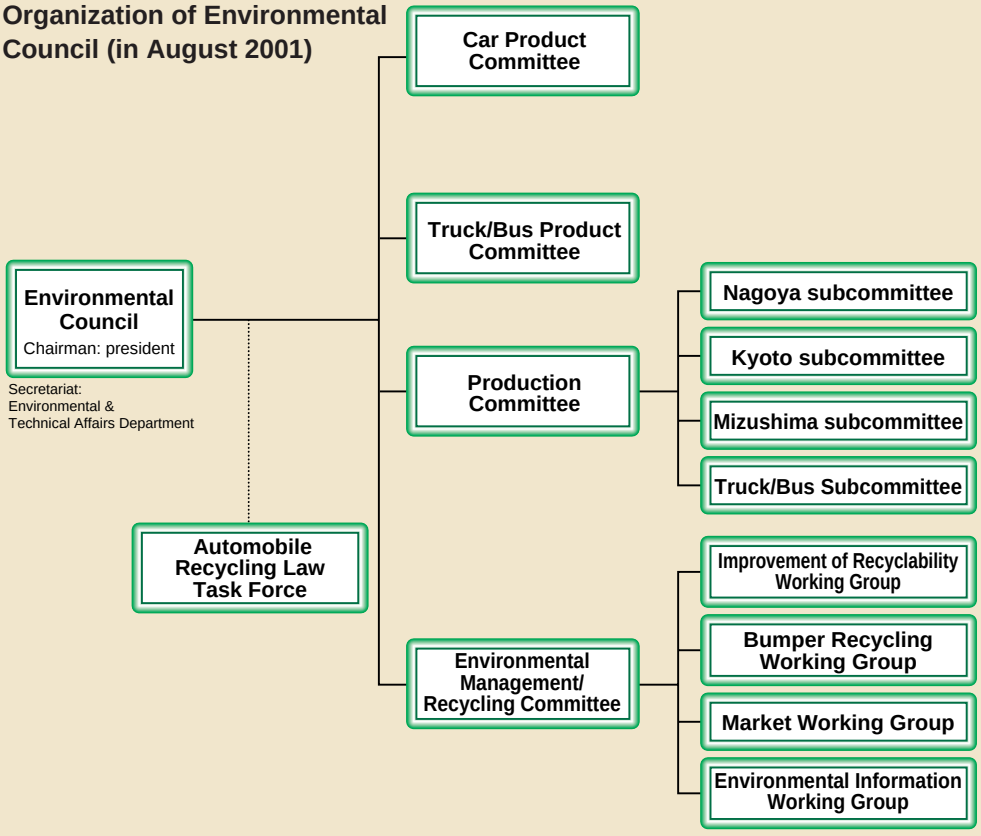
Under the Environmental Council's aegis are Car Product Committee, Truck/Bus Product Committee, Production Committee, and Environmental Management/Recycling Committee, whose individual areas of responsibility are listed on the following pages.

In order to coordinate MMC's response to the Automobile Recycling Law in Japan, a cross-committee Automobile Recycling Law Task Force has also been established under the Environmental Council.

This setup was revamped when MMC reorganized its internal structure in June 2001, and has been in operation since August 2001.

An Environmental Affairs Department with special responsibility for the environment was established in May 1999. It was renamed the Environmental & Technical Affairs Department in April 2000, which continues to promote the effectiveness of its activities. This department is responsible for determining the overall direction of the company's environmental activities, and also serves as a secretariat for the Environmental Council and its committees.

Organization of Environmental Council (in August 2001)



Environmental Council committees

Car Product Committee	● Improvement of fuel efficiency ● Reduction of exhaust emissions ● Development of clean-energy vehicles ● Improvement of traffic flow
Truck/Bus Product Committee	● Improvement of fuel efficiency ● Reduction of exhaust emissions ● Development of clean-energy vehicles ● Improvement of traffic flow
Production Committee	● Protection of plant environment ● Reduction of emissions of industrial waste ● Energy conservation ● Improvement of logistics ● Improvement of production processes ● Correspond to PRTR scheme ● Cooperation with domestic manufacturing affitiates ● Concern for the environment in overseas Business activities
Environmental Management/ Recycling Committee	● Improvement of recyclability of new vehicles ● Reduced use of environmentally harmful substances ● Greater use of recycled materials in new vehicles ● Improvement of environmental management system ● Disclosure of information on environmental matters ● Promotion of environmental management at dealers ● Greater use of used / recycled parts ● Green procurement policy ● Expansion of sales of clean energy vehicles

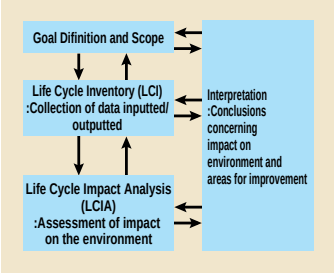
1) LCA

Life Cycle Assessment

2) LCI

Life Cycle Inventory

The ISO14040 provides an international standard for Life Cycle Assessment as shown in the following diagram. Life Cycle Inventory (LCI) forms a part of this framework, and refers to the collection of data inputted and outputted in the system surveyed.



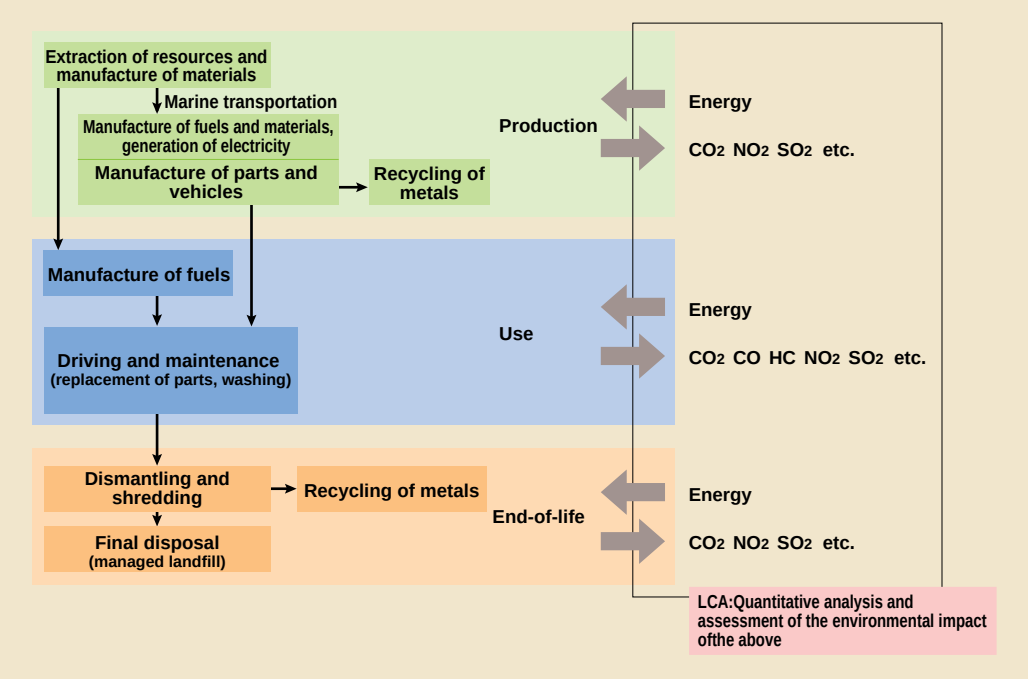
ISO14040 LCA framework

LCA[1)]

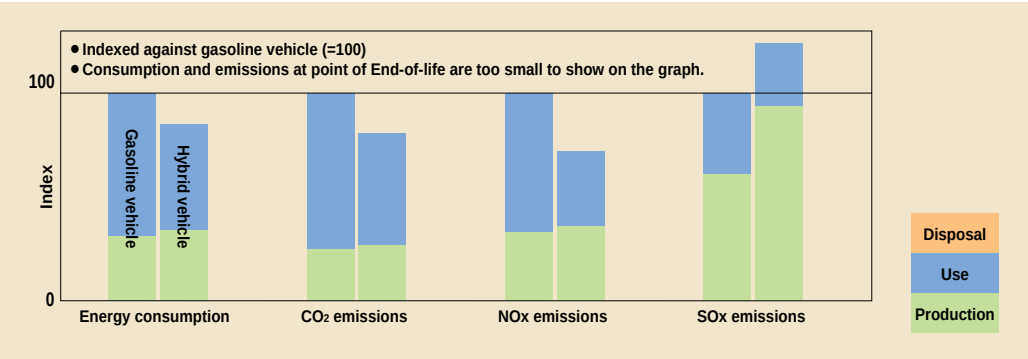
Life Cycle Assessment, or LCA, is a method of predicting and assessing the impact on the environment of products at every stage of their life cycle. This enables quantitative analyses and assessments to be made of the type and extent of the impact of each individual part at each stage of the life cycle.

MMC has joined a working group set up by the Japan Automobile Manufacturers Association (JAMA) to study LCA, and has succeeded in increasing understanding of LCA. In FY2000, an LCA study team was established under the Environmental Council's Recycling Committee, and study with a view to full-scale introduction is now underway.

In FY2000, a trial study was made of the LCI [2)] of gasoline and hybrid vehicles of the same class. As a result was gained valuable know-how, and a database for vehicle components was developed.



Car Life Cycle Flow and LCA



Results of LCI study of gasoline vehicle and hybrid vehicle

ISO14001 certification

In order to increase transparency and raise confidence in its measures to conserve the environmental protection, MMC actively seeks to obtain ISO14001 certification (the international standard for environmental management) for its various observations.

With the acquisition of ISO14001 certification by the Tokyo Plant[1)] in December 1999, all MMC's plants in Japan are now ISO14001 compliant.

Our main affiliates in Japan and overseas are also all expected to be registered ISO14001 compliant during 2001.

Plants in Japan	
Nagoya Plant	**'98/11**
Mizushima Plant	**'98/12**
Kyoto Plant	**'98/12**
Truck & Bus Production Office, Kawasaki Plant	**'99/12**
Overseas affiliates	
NedCar (Netherlands)	**'99/9**
ATC (Philippines)	**'00/10**
MMMA (U.S.)	**'01/03**
MMPC (Philippines)	Inspected April 2001
Domestic affiliates	
Pajero Manufacturing Co., Ltd.	**'99/7**
Mitsubishi Automotive Engineering Co., Ltd.	**'00/2**
Pabco Co., Ltd.	**'00/6**

State of ISO14001 registration

1) Tokyo Plant

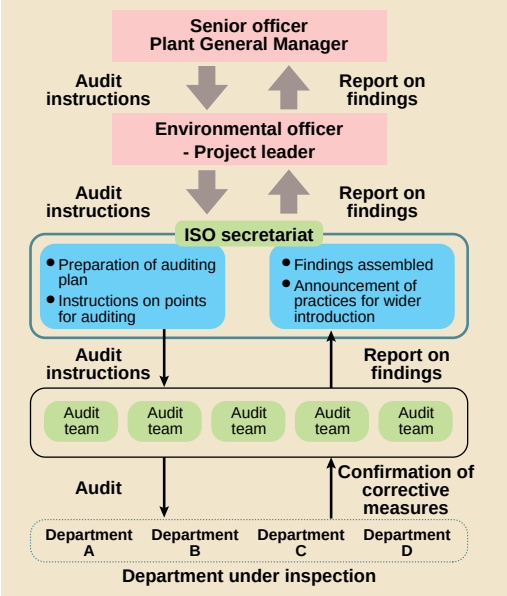
Name as of December 1999. Renamed Truck & Bus Production Office, Kawasaki Plant in May 2001.

Environmental auditing

Internal environmental audits of individual plants are conducted twice a year by MMC to confirm that their environmental management systems are functioning properly.

Internal environmental audits are conducted by teams of certified auditors who have been trained within and outside the firm under the internal auditor certification system.

Internal environmental audits take the form of inspections based on a check list consisting of some 600~700 items. Any problems that are identified are reported to those in charge, and the necessary corrective measures taken. Particularly outstanding environmental measures in the division under inspection are identified for introduction by other divisions.



System for internal environmental auditing of each of MMC's plants

*Audit teams made up of 3~4 members

Emergency measures, environmental incidents and legal actions

MMC constantly strives to maintain the safety and stability of production operations at its plants in line with appropriate operational and work standards to ensure safety and reduce the impact of its activities on the environment. In order to be able to cope in the best possible way with natural disasters such as earthquakes and emergency situations that could foreseeably arise during everyday operations, the company has established guidelines to be followed in an emergency, and in addition conducts regular training exercises. In FY2000, there were no environmental incidents.

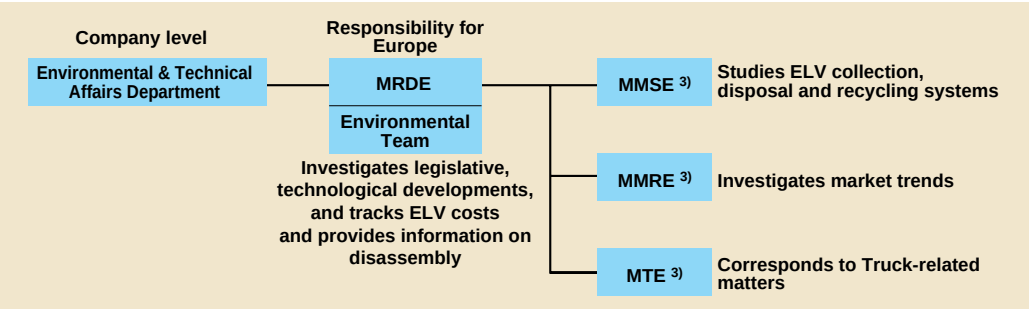
Regarding lawsuits, one action is in progress-the Tokyo Air Pollution Lawsuit-regarding the impact on health of exhaust emissions from automobiles.

Measures in Europe

MMC is also pursuing action to protect the environment in its overseas business activities. One particular move made by MMC in this respect was to set up the specialist environment team in MRDE[3)] in January 2001 in order to deal with the strengthening of environmental regulations in Europe, where some of the world's leading countries in the environmental arena are concentrated, and the introduction of the ELV [1)] Directive [2)] by the EU.

The "Environmental Team" is responsible for researching matters such as legislative and technological developments in European countries, and the methods and cost of collection and disposal of ELVs, and actively collaborates with other MMC-affiliated dealers in Europe.

In addition, information is being actively exchanged with the environmental divisions of partner DaimlerChrysler and MCC Smart [4)].



Setup for environmental action in Europe

1) ELV

End-of-life vehicle

2) ELV Directive

Directive 2000/53/EC of the European Parliament and of the Council on End-of-Life Vehicles (effective from October 21, 2000).

The directive is intended to minimize the impact of ELVs on the environment. Among other things, it prohibits the use of hazardous substances (such as lead, mercury, cadmium and hexavalent chrome), and requires the collection of ELVs from users, the establishment of recyclability targets, the material coding of parts, and information disclosure. The EU's member states will introduce the necessary legislation to enforce this directive by April 21, 2002.

3) European affiliates of MMC

MRDE :Mitsubishi Motor R&D Europe GmbH
MMSE:Mitsubishi Motor Sales Europe B.V.
MMRE:Mitsubishi Motor Marketing research Europe GmbH
MTE :Mitsubishi Trucks Europe, S.A.

4) MCC Smart

Micro Compact Car Smart GmbH

Education/personal development

1) Employee education

Level	Frequency (times per year)
New employees	1
Middle management	1
New Assistant Manager	1
New Manager	2
New General Manager	1
New Assistant Foreman New Foreman New Health & safety directors	2~4

2) OJT

On-the-job training

■ Education of employees of all levels

Fiscal year	FY1998	FY1999	FY2000
No. of participants	1,250	1,317	1,095

Ensuring the success of activities to protect the environment requires the voluntary participation of each and every employee. As part of its training for new employees and employees of all levels, MMC provides education on the environment. The content is designed to emphasize the importance of environmental protection and to motivate employees to take part.

The fall in the number of participants in FY2000 compared with the previous year was due to the fall in intake of new employees.

Training and education are also provided for employees in each division in the form of on-the-job training (OJT) as and when necessary. Staff in the environmental division in addition provide environmental education on an ongoing basis for mid-level sales staff and service staff at MMC dealers.

■ Employees with public environment-related qualifications

	Pollution control manager	Energy manager
No. of qualified employees at MMC	180	55

■ Environment Month activities (FY2000)

June each year is "Environment Month". MMC uses this event as a vehicle for education and personal development regarding environmental matters.

Type of activity	Details
Personal development	1. Instructions from managers at morning meeting 2. Publication in the company newsletter and on the intranet site of articles concerning Environment Month 3. Educational signs and posters about the environment 4. "Zero emissions" poster competition for all employees and affiliates 5. Participation in symposiums (panelists)
Practical	1. Inspection patrols of environmental facilities 2. Inspection of state of management of waste disposal and treatment contractors
Other	1. Inspection of trees and other greenery on company property 2. Organization of environmental management briefings for onsite partners 3. Donation to elementary schools of colored carps raised in factory effluent 4. Participation in lectures and talks

■ Personal Development

Pamphlets and the intranet are used to boost employees' awareness and knowledge of environmental matters.

In July 2000, an environment page was added to the company's website. This is to explain both to employees and the general public in easy to understand terms MMC's measures to protect the environment. This page is continually updated as necessary.

Type of activity	Details
Personal development activities	1.Raising of awareness of Environmental Guidelines (cards distributed to all employees and posters put up) 2.Raising of awareness of environmental action taken by MMC (environmental leaflets distributed to all departments) 3.Provision of information on the environment (publication of articles on the environment in company newsletters in all regions, provision of information via company intranet) 4.Publication of issues 6 (April 2000) and 7 (October 2000) of "Plant Environmental Topics" for distribution within the company and to affiliates. (Content: PRTR, waste and energy conservation measures)



Poster competition entries



Website environment page

2. Measures to reduce environmental impact

2-1. Targets and performance

Category and policy	Targets in FY2000	Performance in FY2000	Assessment	Additional information
Prevention of global warming ● Achievement of domestic 2010 fuel efficiency targets by 2005	● Improvement of fuel efficiency of new models	● All main new models met 2010 fuel efficiency targets Commercial production of CVT and GDI turbo	○	13~15
● Reduction of use of air-conditioner refrigerant	● Use of air conditioners requiring less refrigerant	● Use in two models launched in 2000	○	
Reduction of exhaust emissions ● Early compliance with tightened emission standards around the world	● Progressive acquisition of certification under LEV certification programs	● Certification of five models on sale Two new models launched in 2000 certified in 2001	△	15,16
	● Compliance with exhaust emission standards in various countries	● Progressive compliance as planned	○	
Reduction of use of hazardous substances ● Reduction of lead use	● Attainment of target for reduction of lead use (for new models) - Reduction of lead use to under half of 1996 level after the end of 2000 - Reduction of lead use to under one third of 1996 level after the end of 2005	● All new models meet 2005 target	○	17
Promotion of recyclability ● Improvement of potential recyclability rate ● Improvement of recycling rate	● Achievement of target for potential recyclability rate (new models) - At least 90% from 2000 ● Measures to raise recycling rate	● All new models meet targets	○	17,18
		● Surveys conducted of infrastructure and recycling rate of vehicles on the market Study of measures to improve recycling rate	○	
Development of clean energy vehicles ● Development of clean energy vehicles	● Promotion of development of clean energy vehicles	● Trial production and evaluation of GDI-HEV (hybrid electric vehicle)	○	18,19
		● Trial production and evaluation of hybrid electric drive system for large buses	○	
		● Trial production and evaluation of fuel cell vehicle	○	
		● Development of technologies for CNG vehicles and electric vehicles	○	
Energy conservation at plants ● Reduction of CO_2 emissions	● Stabilization at FY1990 level	● 12% reduction compared with 1990	○	25
Reduced waste emissions at plants ● Reduction of final disposal rate ● Elimination of waste for landfill disposal	● Reduction by at least 80% from 1990 level ● Attainment of target by "pacemaker" Nagoya Plant	● 94% reduction compared with 1990	○	26,27
		● Target achieved by Nagoya and Kyoto Plants	○	
Improvement of logistics ● Reduction in proportion of use of wooden cases ● Reduction of CO_2 emissions	● Use of wooden cases: 18% reduction compared with FY1999 ● CO_2 emissions: 1% reduction compared with FY1999 (Per passenger vehicle shipped in Japan)	● 19% reduction from FY1999	○	37
		● 2% reduction from FY1999	○	

○=achieved △=partially achieved ✕=not achieved

2-2. Development and products

Global warming, air pollution, acid rain, automobile noise, waste, exhaustion of resources... The car, an indispensable part of modern society, is also a contributor to environmental problems such as these. At MMC, however, we are making steady progress, one step at a time, toward making our products more environmentally friendly.

Environmental protection at the R&D stage

Research and development activities at MMC are guided by the company's philosophy of making "iimono nagaku" and three core values identified as being common to all in line with "Environmental Guidelines of Mitsubishi Motors Corporation". Concern for the environment at the product development stage is also regarded as an important priority.

In accordance with these guidelines, MMC is actively pursuing higher fuel efficiency (by developing the GDI engine,[1)] for example), reduced exhaust emissions, reduced noise pollution, and greater recycling.

In the interests of better environmental management, MMC has set targets in a variety of fields concerning, for example, fuel efficiency, exhaust emissions, automobile noise and recycling, to guide the development of new technology and products. At the same time, the Car Product Committee of the Environmental Council deliberates policy at regular intervals and monitors attainment of targets.

In the future, too, MMC will focus its technological resources on research into environmental technology and the development of greener products.

1) GDI engine

A highly fuel efficient engine that utilizes MMC's proprietary stratified air-fuel combustion technology based on use of a vertical vortex in the cylinder to achieve ultra-lean combustion.

GDI engines inject fuel directly inside the cylinder. In addition to better fuel efficiency, they also offer outstanding response and starting properties and superior torque management, and minimize knocking. The GDI turbo engines that entered commercial production in FY2000 take full advantage of the anti-knocking properties, and at the same time offer better response and fuel efficiency.

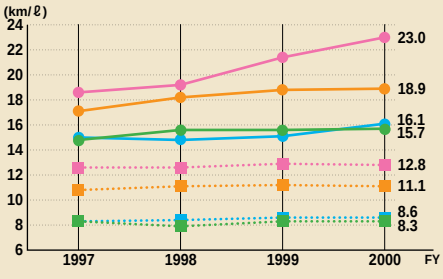




Main measures in FY2000

Prevention of global warming

To combat global warming, it is necessary to improve the fuel efficiency of cars and cut emissions of CO_2, which is a greenhouse gas. At MMC, we are continuously working to improve fuel efficiency by, for example, expanding the use of fuel-efficient engines such as GDI engines, and reducing drive train loss, weight and drag. We are also actively reducing the use of greenhouse gas air-conditioner refrigerants.



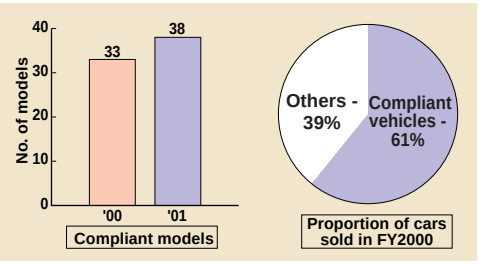
Vehicle weight (kg)	2010 fuel efficiency standard
) ~702	21.2
703~827	18.8
828~1015	17.9
1016~1265	16.0
1266~1515	13.0
1516~1765	10.5
1766~2015	8.9
2016~2265	7.8

Trends in average fuel efficiency
(gasoline passenger cars)

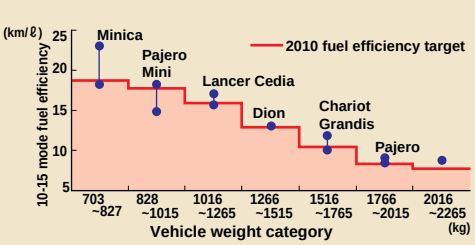
■ Continuous improvement of fuel efficiency

In order to achieve the new fuel efficiency targets laid down under the amended Energy Conservation Law (to be met by gasoline vehicles by 2010 and diesel vehicles by 2005), MMC is progressively improving the fuel efficiency of each new model that it launches.

38 gasoline passenger car models had met these new targets by the end of FY2000, and around 60% of the passenger cars sold in FY2000 met these new standards.

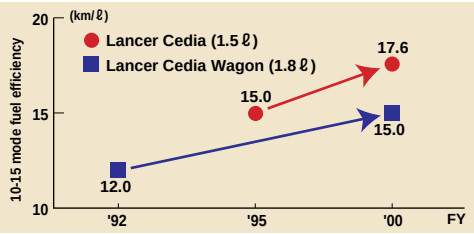


Number of models meeting new fuel efficiency standards and compliancy of cars sold in FY2000
(gasoline passenger cars)



Fuel efficiency targets and fuel efficiency of main MMC vehicles (gasoline passenger cars)

Despite being larger than conventional models, the new Lancer Cedia and Lancer Cedia Wagon launched in FY2000 offer significantly improved fuel efficiency.



Comparison of fuel efficiency of conventional vehicles and new models launched in FY2000

■ GDI engines

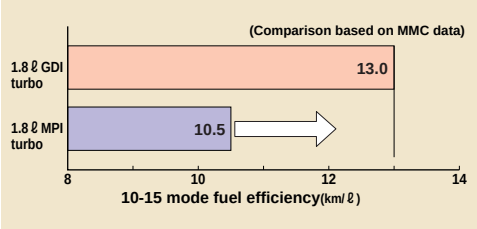
GDI engines are more fuel efficient than conventional engines. Since mass production began in 1997, production has been steadily expanded, and eight types of GDI engine were in production for use in 12 models at the end of FY2000.

Engine type	Displacement	Main vehicles equipped with GDI engines
6G74	V6 3.5 ℓ	Pajero, Challenger
6G72	V6 3.0 ℓ	Diamante, Chariot Grandis
6G73	V6 2.5 ℓ	Diamante
4G64	L4 2.4 ℓ	Chariot Grandis, Galant, Legnum
4G63	L4 2.0 ℓ	Dion
4G94	L4 2.0 ℓ	Pajero io, Galant, Legnum
4G93	L4 1.8 ℓ	Lancer Cedia Wagon, RVR
4G15	L4 1.5 ℓ	Lancer Cedia, Mirage Dingo

GDI engines and main vehicles fitted with GDI engines
(end FY2000, domestically produced vehicles)

■ GDI turbo engines

MMC has developed a GDI turbo engine that takes advantage of the features of GDI engines to offer superior fuel efficiency and response. This was adopted for the Pajero io in July 2000. As well as meeting domestic 2000 exhaust emission regulation, the Pajero io was the first turbo-powered car to meet the 2010 fuel efficiency target.



Fuel efficiency of Pajero io (GDI turbo)

■ Direct-injection diesel engine [1)]

FY2000 saw the adoption of the new 6M70T5 [2)] high-pressure combustion engine for heavy trucks. This new engine has a higher boost (volume of inducted air), fuel injection volume and injection pressure, enabling high-pressure combustion and yielding even greater efficiency and fuel efficiency. This engine has a four-valve SOHC,[3)] EGR,[4)] VG [5)] turbo charger, electronically controlled common-rail fuel injection system, and MIQCS [6)] combustion system. As well as offering improved fuel efficiency, it also meets the FY1999 long-term exhaust emission regulations. The Pajero passenger car, which is powered by a direct-injection diesel engine, meets the new fuel efficiency targets.

■ Idling stop systems for trucks and buses [7)]

An idling stop-start system (ISS) that automatically stops the engine when the vehicle is not in motion was fitted as standard in the Aero Star large city bus launched in May 2000 and Aero Midi medium-sized city bus launched in September 2000, and made an optional extra for the Canter small truck launched in September 2000.

■ CVT (continuously variable transmission)

MMC has developed a light, compact continuously variable transmission (CVT) that transmits power by means of a metal belt. This was adopted for the Lancer Cedia in May 2000, the Lancer Cedia Wagon in November 2000, and the Mirage Dingo in February 2001.

Combined with a GDI engine, this CVT enables integrated control, resulting in a smoother ride and better fuel efficiency.



GDI-CVT

■ INOMAT [8)] automatic transmission for heavy-duty vehicles

Taking full advantage of the engine performance of heavy-duty vehicles, MMC has developed a fuzzy control mechanical automatic transmission system combining the comfort of an automatic and improved fuel efficiency in 1996. CAN communication has been used for inter-ECU communication from 1999-model year vehicles onward, improving control speed and precision and yielding improved fuel efficiency and drive comfort.

In FY2000, a new nine-gear transmission was developed for the Super Great large truck, and use was expanded to include semi-trucks for expressway routes. Combined with a low final gear, it offers greater fuel efficiency at high speeds.



INOMAT gearshift lever

1)Direct-injection diesel engine

Durable and fuel efficient, the diesel engine has long been used to power heavy-duty vehicles such as trucks and buses. Now, however, direct-injection diesel engines are being increasingly widely used for passenger cars in place of indirect-injection engines because of their improved fuel efficiency and lower exhaust emissions.

2) 6-cylinder 6M70T5-type engine

12.9 ℓ turbo engine

3) SOHC
(Single overhead camshaft)

Design comprising a single camshaft at the top of the cylinders to operate the engine valves.

4) EGR
(Exhaust gas recirculation)

5) VG
(Variable geometry)

6) MIQCS (See p.16.)
(Mitsubishi Innovative Quiescent Combustion System)

Used for the 6M7 engine.

7) Idling stop

A system that shuts off the engine when a vehicle is at rest in order to reduce fuel consumption and exhaust emissions. Used for the Super Grade large truck launched in February 2002.

8) INOMAT
(Intelligent and Innovative Mechanical Automatic Transmission)

■ Weight reduction

We are reducing vehicle weight in all kinds of ways, such as by switching to use of lighter materials and using computers to optimize construction, and making use of integrated and modular parts.

Being safer and bigger, the Lancer Cedia and Lancer Cedia Wagon launched in FY2000 are also heavier. By making use of high-strength steel sheet and tailor welded blank, fitting cars with SWS,[1)] and improving the structural design of various parts, however, the increase in weight was minimized.



Lancer Cedia's reinforced collision-safety body

1) SWS
(Smart wiring system)

A streamlined wiring system that limits the increase in complexity and weight of the wiring harness caused by the increased use of electronics by transmitting multiple signals by a single harness.

■ Improvement of load efficiency

The large truck launched in FY2000 has a short cabin that gives it the longest bed and largest compartment capacity of its class, resulting in improved transportation efficiency and reduced transportation costs.

The short-cab design reduces the total length of the cab by 350mm and gives the truck the longest bed (measured internally) of its class without exceeding the 12m length limit. The Super Great FS low body, all-wheel air suspension truck has a 67m^3 compartment that is the largest of its type in Japan.



■ Reduction of aerodynamic drag

A world best Cd [2)] of 0.44 has been achieved for Super Great large-sized truck, resulting in massive increases in fuel efficiency impossible to attain from improvements to engines and drive lines alone.

Wind tunnel testing and various simulations have also given the Lancer Cedia Wagon launched in FY2000 better aerodynamism than conventional cars.



Aerodynamics test

2) Cd
(Coefficient of drag)

■ Reduced use of air-conditioner refrigerant

Action has been taken to reduce use of HFC-134a [3)] air-conditioner refrigerant, a greenhouse gas, since the 1997-model year.

The Lancer Cedia and Lancer Cedia Wagon launched in FY2000 are fitted with a type of air conditioner that requires less refrigerant. Because of the increased capacity of their passenger compartments, however, the reduction actually achieved was only around 5%.

In the case of the non-step low-floor CNG bus that went on sale in February 2000, use of duct-in evaporators and new condensers has enabled reductions of 7% compared with existing vehicles. MMC is not resting on its laurels, however, and will continue to strive to reduce refrigerant use in the future.

3) Air-conditioner refrigerant

CFC-12, the ozone-layer destroying refrigerant normally used in air conditioners, was dropped from all new models in 1994, and a total switch made to a new refrigerant HFC-134a. As HFC-134a has a greater greenhouse effect than CO_2, however, it is important that it should be used less and be removed properly from ELVs.

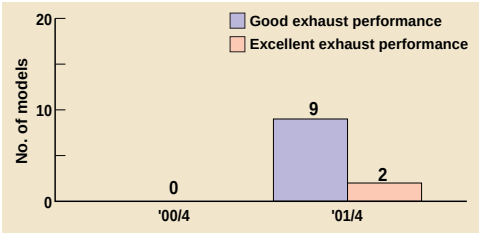
Prevention of air pollution

■ Reduction of gasoline engine exhaust emissions

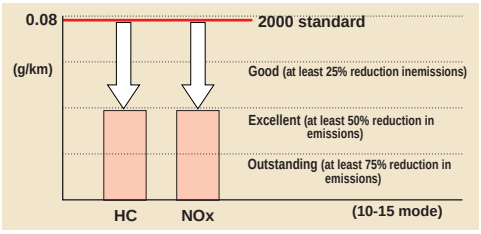
MMC is reducing exhaust emissions by improving engine parts, rethinking the composition and arrangement of catalysts, and improving the design of control systems.

Starting with the Chariot Grandis, which went on sale in July 2000, 11 models of five types were certified under the Ministry of Land, Infrastructure and Transport's LEV certification system [1)] in FY2000. Of these, 10 models meet the requirements for eligibility under the green tax system [2)] and Green Purchasing Law [3)] introduced in FY2001.

By developing a NOx trap catalyst that is highly efficient and durable even at high temperatures, and combustion control technology to enable rapid catalytic activation, we have succeeded in developing a GDI engine capable of meeting even tighter exhaust emission standards in the future, and we are proceeding with the commercial development of this engine.



Number of models certified as LEVs



Exhaust ratings of Pajero (3.0ℓ MPI)

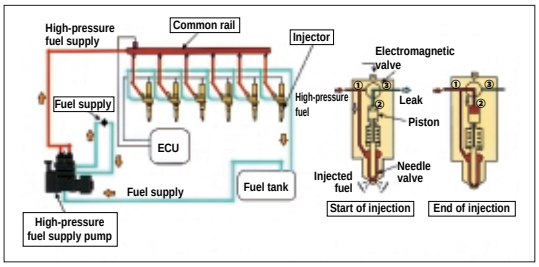
■ Reduction of diesel engine exhaust emissions

Advanced technology, such as common-rail systems and MMC's original new MIQCS [4)] combustion system, is used to make truck and bus emissions cleaner and to improve fuel efficiency. In addition, all engines employ EGR.

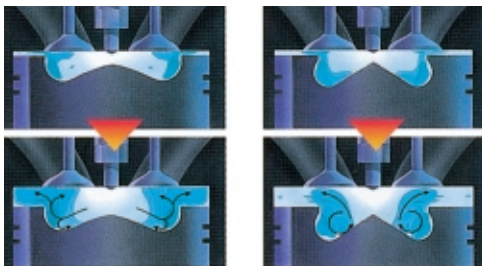
Since FY1999, the Canter and Canter Guts light trucks, Fighter medium-sized truck, Super Great large truck, Rosa small bus and Aero Midi medium-sized bus have met the FY1997~99 exhaust emission standards.

Among passenger car models, the Libero Cargo Business Wagon partially modified in June 2000 meets the FY1997~98 exhaust emission standards.

MMC will continue to research and develop new ways of further reducing exhaust emissions in the future, such as by improving combustion chambers and injection systems, NOx catalysts and DPF.[5)]



Common-rail fuel injection system



MIQCS combustion　　Conventional combustion

MIQCS combustion

1) LEV certification system

Under the system introduced in FY2000 to encourage the spread of LEVs, cars are labeled to make it easier for users to see which cars are more environmentally friendly. Cars are graded as "good", "excellent" or "outstanding" according to how well they meet emission targets, and stickers affixed accordingly.

2) Green tax system

Vehicles that are certified under the LEV system and meet the 2010 fuel efficiency targets are subject to reduced automobile tax and acquisition tax.

3) Green Purchasing Law

Law on Promotion of Procurement of Environmental Articles by the State, etc. Automobiles covered by this law are those covered by the green tax system.

4) MIQCS
(Mitsubishi Innovative Quiescent Combustion System)

Fuel injection in this system is optimized by widening the aperture of the piston combustion chamber in combination with the use of high-pressure injection and multiple injection nozzles. This results in cleaner exhaust emissions and better fuel efficiency and due to reduced NOx and particulate matter emissions.

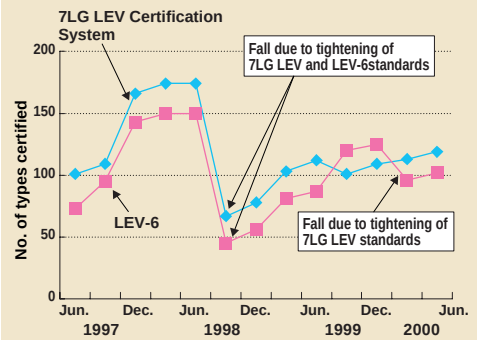
5) DPF
(Diesel Particulate Filter)

Filter for removing particulate matter (PM) contained in exhaust gas.

■ Compliance with local government LEV certification programs

MMC is taking active steps to reduce exhaust emissions and gain certification under the 7LG LEV [1] and LEV-6 [2] certification systems programs run by local governments of large cities.

At the end of FY2000, a total of 119 models of vehicle-44 passenger cars and 75 trucks and buses-were certified under the 7LG LEV Certification System, and 102 models were certified under the LEV-6 system.



Number of types certified under LEV certification systems

1) LEV Certification System for Seven Local Governments (7LG LEV Certification System)

A system operated by seven local governments in the Kanto region (the prefectures of Tokyo, Kanagawa, Saitama and Chiba, and the cities of Yokohama, Kawasaki and Chiba) for the assessment and certification of vehicles based on Ministry of the Environment guidelines on exhaust emissions by polluting vehicles.

2) LEV-6 (formerly the Low NOx Emission Vehicle Certification System of Six Local Governments: 6LG LEV Certification System)

A system similar to the 7LG LEV certification system run by six local governments in the Kansai region (the prefectures of Osaka, Kyoto and Hyogo, and the cities of Kobe, Osaka and Kyoto).

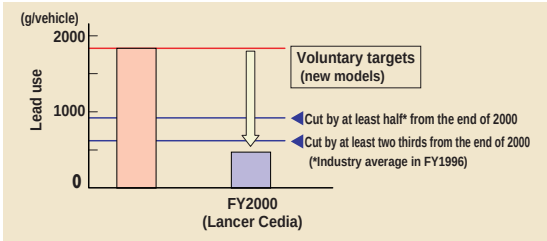
Reduction of automobile noise

MMC is working to cut the amount of noise generated by vehicles by, for example, improving engine construction and tires, positioning sound absorbing and soundproofing materials more effectively, and shielding engine rooms more efficiently in covers.

A 2dB tightening of regulations on acceleration noise emitted by passenger cars, small commercial vehicles and large-sized buses has been phased in since October 1998. In FY2000, vehicles such as cranes and the Libero Cargo have been made compliant with the new standards.

Reduction of environmentally harmful substances

MMC has been expanding the use of lead-free radiator cores, fuel tanks, harnesses and hoses. In FY2000, a new lead-free valve sheet was developed and adopted for use in new models. The Lancer Sedia and Lancer Sedia Wagon launched in FY2000 meet the voluntary targets set by MMC for the end of 2005.



Reduction of lead use in Lancer Cedia

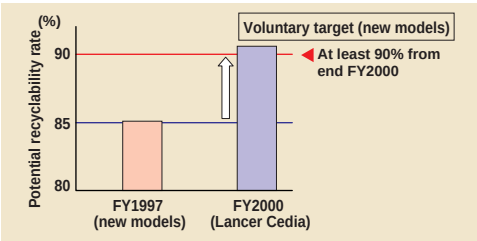
Lead use in trucks, too, has been reduced. In the 1999-model year Fighter medium-sized truck, for example, aluminum is used instead of lead for the heater core.

Practically no mercury or cadmium was used in new models in FY2000, with minute quantities present in parts such as fluorescent lighting. In addition, no sodium adize is used as an airbag gas generator.

Promotion of recycling

In order to improve recyclability, targets for potential recyclability rate [3] have been established, and the use of easily recyclable materials, easily dismantled designs and recycled materials [4] is being increased.

The Lancer Cedia and Lancer Cedia Wagon launched in FY2000 meet MMC's self-imposed target for potential recyclability rate.



Potential recyclability rate of the Lancer Cedia

3) Potential recyclability rate

A target for design improvement calculated by a method developed by MMC that takes into consideration economic efficiency.

4) Use of recycled materials

Since 1997, PP bumpers replaced by dealers been collected for recycling into resin products such as battery trays and under-covers.

In FY2000, the range of applications was expanded to include noise covers for trucks.

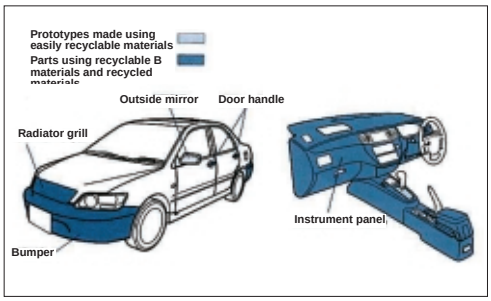
1) PP (Polypropylene)

2) Recycled paper PP air-cleaner cases

Made entirely from recycled materials, these cases were the first resin-formed automobile parts to be awarded the Ecomark (applied for by the manufacturer, Tokyo Filters Co., Ltd.)

In order to make use of waste materials generated in other industries, MMC has developed a new type of recycled air-cleaner case made from recycled polypropylene (PP)[1)] food containers and waste paper.[2)] This is scheduled to enter use in FY2001.

MMC is also actively making use of longer lasting oils such as engine oil.



Main recycled and recyclable parts of Lancer Cedia



Recycled PP air-cleaner case containing waste paper

R&D and promotion of spread of clean energy vehicles

MMC is developing and commercializing clean energy vehicles in order to help reduce air pollution, curb emissions of greenhouse gases, and save energy. In FY2000, no new products were launched.

3) LPG (Liquid petroleum gas)

■ LPG [3)] trucks

LPG generates less NOx emissions than diesel, and also produces no soot. MMC markets LPG-powered Canter small-sized trucks with a pay load of 1.5~3.0 tons.



LPG Canter

4) CNG (Compressed natural gas)

■ CNG [4)] vehicles

CNG vehicles emit less CO_2 than gasoline-driven vehicles and, unlike diesel vehicles, emit no soot, and so have considerable potential as clean energy vehicles. MMC is also developing and marketing vehicles such as small commercial vehicles and large buses.



Main CNG vehicles

■ Hybrid electric vehicles

MMC is pursuing the development of hybrid electric vehicles by combining the use of engines with motor generators to reduce exhaust emissions and produce significantly higher fuel efficiency. In FY2000, MMC developed and announced a hybrid electric drive system for large city buses that uses an engine to generate electricity and a motor to drive the bus [5)]. This is scheduled to enter trial operation in FY2002.



Large HEV bus

5) Hybrid electric drive system for large city buses

See "Topics" on p.20 for further information.

MMC is also involved in the development of vehicles such as the Canter HEV [1], [2] aerial platform truck and a CNG hybrid truck as part of a Ministry of Economy, Trade and Industry project.[3]

In relation to passenger cars, MMC has produced and assessed prototype GDI-HEVs that combine a motor with a GDI engine, yielding outstanding torque control and starting characteristics. MMC is pressing ahead with research into low-cost systems to make them commercially practical.

■ Fuel-cell electric vehicles

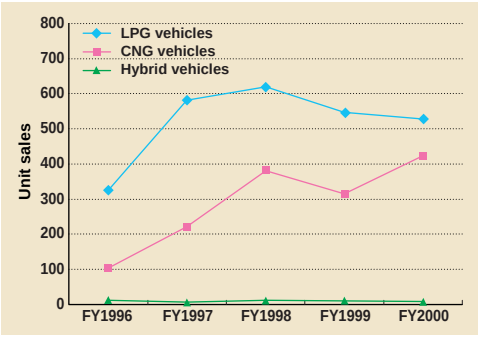
Fuel cell electric vehicles are powered by the electricity produced by reacting hydrogen and oxygen. They offer high energy efficiency and also generate low emissions, and so have great future potential for use as clean energy vehicles.

MMC is also involved in joint development work with Mitsubishi Heavy Industries. In FY2000, this collaboration resulted in the production and assessment of prototype vehicles.

■ Spread of clean energy vehicles

MMC is developing and striving to encourage the adoption of clean energy vehicles such as LPG and CNG-powered vehicles.

In FY2000, MMC sold 528 LPG vehicles, 423 CNG vehicles, and eight hybrid vehicles. [4]



Trends in sales of clean energy vehicles

1) HEV
(Hybrid electric vehicle)

2) Canter HEV aerial platform truck

This truck is driven by a motor and uses an engine to generate electricity. It can thus be driven short distances in residential districts without having to use its power-generating engine. As the power for aerial work is provided by the battery only, noise levels during use are reduced.

3) Ministry of Economy, Trade and Industry projects

MMC is a participant in the Ministry of Economy, Trade and Industry's ACE Project for researching and developing high-efficiency clean energy vehicles, and is now in the middle of a seven-year research program that began in 1997. This pioneering project ranks alongside projects between the public and private sectors in Europe and North America such as the Car of Tomorrow and PNGV programs.

4) Hybrid vehicles

Bus fitted with MBECS (motor vehicle brake energy conservation system).

Kinetic energy when the vehicle brakes is converted into pressure by a hydraulic pump, stored, and converted into drive force when the vehicle starts to move or accelerates in order to assist the engine.

TOPICS

Development of hybrid electric drive system for large buses

MMC has recently developed a highly practical, high efficiency, low emission hybrid electric drive system for use in large city buses that combines a low exhaust diesel engine with a high performance motor, electric generator and new type of lithium ion battery.

This drive system is used in the Mitsubishi Aero Star non-step low-floor bus. Used in tandem with the wide single tires freshly developed by MMC, this results in a larger interior floor space. Trial operation of this bus, which provides the ultimate in barrier free public transport as well as producing low emissions and high fuel efficiency, will begin in FY2002. After the views of users have been obtained, full-scale sales will begin in FY2003.

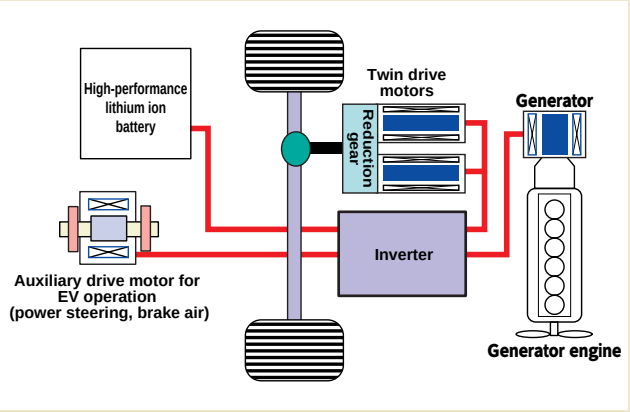


1. Summary of components

(1) HEV drive system

The system consists of a series-type hybrid system that uses an engine to generate electricity only. The engine operates at a fixed speed so that power can be generated at the ideal point for efficiency and exhaust emissions, and brake energy is conserved by means of a brake energy conservation system. When the vehicle is not in motion or can be driven by the battery as an electric vehicle, the engine remains off. Operation of the engine can thus be precisely matched with running conditions, reducing NOx and PM emissions to within the strict levels expected to be required following the introduction of the new short-term controls.

Type	Series-type hybrid system
Electricity-generating engine	6M6 (8.2 ℓ) diesel engine
Power generator	100kW
Drive motor	Max. 150kW x 2
Control	VVVF inverter control with brake energy conservation system
Battery	High-performance 648V lithium ion battery



(2) Newly developed lithium ion battery

MMC's newly developed lithium ion battery has the superior rechargeability (input density) required for an HEV bus, greatly improving the conservation of brake energy. On top of high EV (battery) drive frequency because of the high energy density, the high output density provides sufficient traction for acceleration.

	Lithium ion battery	
	New type	Conventional type
Input density W/kg	425	165
Output density W/kg	1000	1050
Energy density W/kg	60	92



TOPICS

(3) Wide single tire (rear)

Using wide single tires for the rear wheels in combination with a compact, high output motor enables the aisle of the rear section to be widened (by 40% according to MMC's estimates) without making any changes to the construction of the axles or suspension.

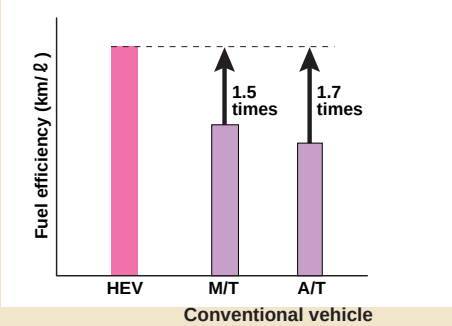


Size	435/45R 22.5
Rolling resistance	15% reduction (compared with conventional double tire)
Weight	18% reduction (compared with conventional double tire)

2. Fuel efficiency and exhaust emission performance

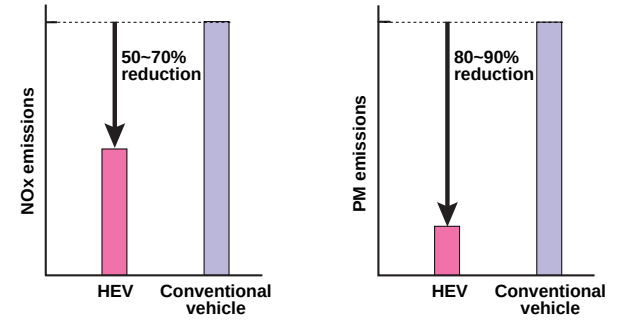
(1) Fuel efficiency level

Using a newly developed lithium ion battery, brake energy generated is efficiently recovered using a motor as an electricity generator when braking. Used in concert with an electronically controlled main braking system (EBS), this enables over 80% of brake energy to be recovered, which translates into a 70% improvement in fuel efficiency compared with a conventional diesel-powered bus with hydromechanical automatic transmission (according to MMC estimates).



(2) Exhaust emission level

The series-type hybrid system's engine operates at a fixed speed regardless of vehicle speed or running load. This, combined with the fact that brake energy is conserved by the brake system, enables exhaust emissions to be dramatically reduced compared with a conventional vehicle that uses the full range of engine revolutions.

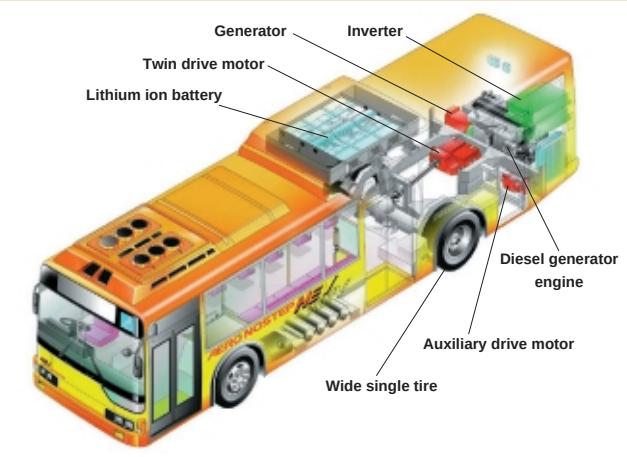


3. Use in large HEV city bus

By arranging the engine and generator as a unit transversely across the rearmost part of the vehicle and placing the fuel cell in the roof section, a non-step low-floor bus design can be used. The floor area around the rear wheels is increased compared with a conventional bus by moving the rearmost seats back, which in addition increases freedom regarding the location of the doors.

The bus delivers performance sufficient for city use and, being propelled by an electric motor, provides a smooth ride without any shocks caused by changing gear when accelerating.

The bus is also easier to drive, with the fully automatic drive due to use of an electric motor rendering a clutch unnecessary.



Environmental data on new models sold in FY2000

1) Environmental data on passenger cars

Only data on the main high-selling new models launched in FY2000 are given in this table.

Environmental data for the Lancer Cedia and Lancer Cedia Wagon are for the partially modified versions, which became available in May 2001.

Environmental data on passenger cars[1)]

Name				Lancer Cedia	Lancer Cedia Wagon	Lancer Evolution VII
Start of sales				May 2000	November 2000	February 2001
Seating capacity				5	5	5
Model				GH-CS2A	GH-CS5W	GH-CT9A
Engine	Model			4G15 (GDI)	4G93 (GDI)	4G93 (MPI T/C)
	Displacement(ℓ)			1.468	1.834	1.997
	Type			DOHC 16V 4 cylinder	DOHC 16V 4 cylinder	DOHC 16V 4 cylinder T/C
	Fuel			Unleaded gasoli	premium unleaded gasoline	premium unleaded gasoline
	Fuel supply system			Internal direct injection (electronically controlled)	Internal direct injection (electronically controlled)	ECI multi (electronically controlled)
	Max. output (net) (kW (PS)/rpm)			74(100)/6000	96(130)/6000	206(280)/6500
	Max. torque (net) (N.m(kg.m)/rpm)			137(14.0)/3500	177(18.0)/3750	383(39.0)/3500
Drive train	Drive system			2WD	2WD	4WD
	Transmission			CVT	CVT	5M/T
Vehicle weight(kg)				1130	1220	1400
Environmental information	Fuel consumption rate	10-15 mode fuel efficiency (km/ℓ)		16.8	15.0	9.6
		CO_2 (g/km)		140	157	247
		Additional data		2010 fuel efficiency standards	2010 fuel efficiency standards	–
	Exhaust emissions	Compliance level, 10-15 mode controls (g/km)		Good exhaust performance	Good exhaust performance	2000 control
			CO	0.67	0.67	0.67
			HC	0.06	0.06	0.08
			NOx	0.06	0.06	0.08
			PM	–	–	–
	Noise	Noise compliance level		1998 control	1998 control	1998 control
	HFC134a air-conditioner refrigerant (g)			550	550	550
	Lead use			MMC target for end 2005 (less than 1/3 level in 1996) achieved	MMC target for end 2005 (less than 1/3 level in 1996) achieved	MMC target for end 2005 (less than 1/3 level in 1996) achieved
	Parts made from easy-to-recycle materials			Bumpers, inverter, etc.	Bumpers, inverter, etc.	Bumpers, inverter, etc.
	Use of recycled materials			Air cleaner case, air duct, sound absorbing and soundparoofing materials, etc.	Air cleaner case, air duct, sound absorbing and soundparoofing materials, etc.	Air cleaner case, air duct, sound absorbing and soundparoofing materials, etc.



Lancer Cedia



Lancer Cedia Wagon



Lancer Evolution VII

2-3. Procurement and production

(1) Procurement

The cooperation of suppliers is essential to MMC's efforts to make its manufacturing operations more environmentally friendly. Working in collaboration with suppliers of parts and materials, MMC will continue to pursue activities to protect the environment.

Environmental protection at the procurement stage

Because of the high proportion of purchased parts, activities to protect the environment need to be undertaken in cooperation with the suppliers of parts and materials. In order to further reduce the impact on the environment at the procurement stage, MMC has adopted a policy of green procurement whereby it seeks to procure parts and materials that have less of an impact on the environment.

MMC has drawn up green procurement guidelines that clarify the guidelines for environmental protection activities at the procurement stage, and has requested the cooperation in following these guidelines of some 400 main suppliers of parts and materials.[1)]





Green procurement guidelines



Briefing for suppliers

The concrete action requested of suppliers relates to two areas, as shown in the table below. With regard to the independent development of environmental management systems, suppliers have been requested to become ISO14001 compliant by around the end of FY2003.

Taking action to acquire ISO certification will enable suppliers to independently and efficiently develop their own environmental management systems and so continuously reduce the impact of their activities on the environment.

As a consequence, it will be possible to manufacture products that have less of an environmental impact in line with social needs.

Action		Content
1	Independent development of environmental management system	Acquisition of ISO14001 certification Deadline: By end FY2003 (target)
2	Control and indication of hazardous substances	Indication and reduction of amount of environmentally harmful substances (as designated by MMC) contained in parts and materials supplied to MMC. Deadline: arrangements for introduction in progress

Details of requests to suppliers

1) Main suppliers

Major suppliers of materials and members of MMC's Kashiwa Association, an association made up largely of parts suppliers.

Global environmental problems

Global environmental problems	Global warming, destruction of the ozone layer, depletion of earth's resources
Environmental problems over a wide area	Acid rain, photochemical smog
Local environmental problems	Air, water and soil pollution, noise, vibration, bad smells, ground subsidence

Models produced by MMC (March 2001)

plant		Mainproducts
Nagoya plant	Oye	DIAMANTE STRADA (export only) CHALLENGER Small Bus
	Okazaki	GALANT ASPIRE LEGNUM CHARIOT GRANDIS RVR PAJERO IO
Mizushima plant		DION LANCER CEDIA MIRAGE(export only) LANCER(export only) MIRAGE DINGO LIBERO(export only) LIBERO CARGO DELICA STAR WAGON(export only) DELICA SPACE GEAR MINICA TOPPO BJ TOWN BOX MINICAB PAJERO MINI
Truck & Bus Production Office Kawasaki		Heavy Truck Medium Truck Light Truck Special Heavy Truck

Models produced by Main affiliates

- **Mitsubishi Automotive Bus Manufacturing Co., Ltd.**
  Large-sized Bus/Medium-sized Bus
- **Pabco Co., Ltd.**
  Heavy Truck/Medium Truck/ Light Truck
- **Pajero Manufacturing Co., Ltd.**
  PAJERO

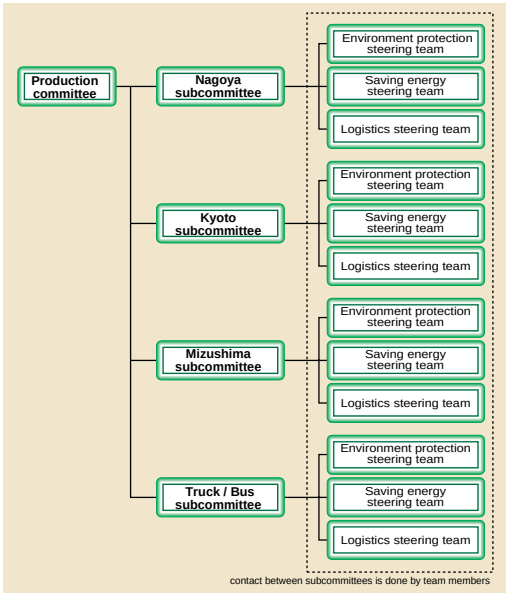
(2)Production

Automobile production activities have a bearing on everything from environmental problems at a local level to global environmental concerns. Recognizing this, MMC is taking concerted action to continuously reduce the impact on the environment.

Environmental protection at the production stage

The Production Committee of the Environmental Council has identified the following areas for proactive measures to prevent and reduce the impact on the environment.

- Protection of the plant environment
- Reduction of waste and effective use of the earth's resources
- Prevention of global warming through conservation of energy
- Improvement of logistics
- Improvement of production processes
- Compliance with PRTR system
- Concern for the environment when locating and building new facilities
- Cooperation with affiliates in Japan and overseas, etc.



Steering organization of Production Committee in the Environmental Council

■ MMC plants

MMC produces all kinds of vehicles, including passenger cars, commercial vehicles, minicars, and trucks and buses of all sizes, at four plants in Japan.

Engines, transmissions and main body parts are manufactured internally, while other components are supplied by specialist makers for assembly.

A number of production processes take place at plants, including casting, forging, machining, heat treating, resin forming, stamping, welding, painting and assembly.

plant		main products	production process	Note
Nagoya Plant	Oye	passenger car, commercial vehicle, small-size bus	machining, resin forming, stamping, welding, painting, assembling	Passenger car line to be closed at the end of September 2001
	Okazaki	passenger car	stamping, welding, painting, assembling	
Kyoto Plant	Kyoto	passenger car engine and transmission, industrial engine	casting, machining, assembling	
	Shiga	passenger car engines, industrial engine	machining, assembling	
	Yagi	passenger car transmission(CVT)	machining, assembling	New CVT plant to come on stream April 2000
Mizushima Plant		passenger car, commercial vehicle, mini-sized car, mini-sized car engine and transmission	casting, forging, machining, stamping, welding, painting, assembling	
Truck and Bus Production Office	Kawasaki	large-sized truck, medium-sized truck, small-sized truck, special large-size truck, engine for truck and bus	casting, machining, stamping, welding, painting, assembling	
	Maruko	transmission for truck and bus	machining, assembling	Plants closed May 2001
	Nakatsu	Truck transmission, gear-related parts	machining	

Item	Effect
Reduction in power expenses	26% reduction in steam use (control temperature: 43˚C→35˚C)
Reductio of byproducts	30% reduction in chemical sludge
Reduction in subsidiary materials	10% reduction in use of chemicals

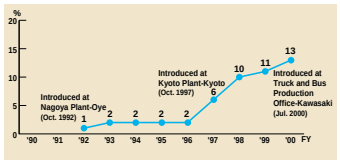
1) Cogeneration system

Cogeneration of heat and electricity by gas turbine.



Cogeneration system (Kawasaki Plant)

Nagoya Plant-Oye	92/10
Kyoto Plant-Kyoto	97/10
Truck and Bus Production Office -Kawasaki	00/07

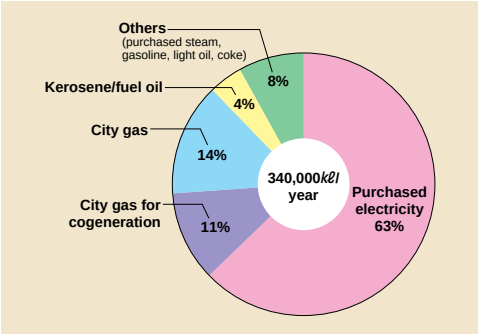


Percentage of total electricity output generated by cogeneration
(whole company)

State of main measures

■ Development of more environmentally friendly production technology

MMC has developed low temperature, low sludge type chemicals for painting pretreatment, and sought to conserve resources and energy and reduce the generation of byproducts.



Breakdown of energy consumption, FY2000

■ Resource and energy conservation

Various sources of energy, such as electricity, city gas, oil and coke, are used to meet the energy demands of the production processes outlined above and power facilities such as compressors and boilers.

The goal is "to keep total CO_2 emissions in FY2000 at the level they were at in FY1990". Energy conservation teams were established at each of MMC's plants, and they led the way in promoting energy conservation in each division.

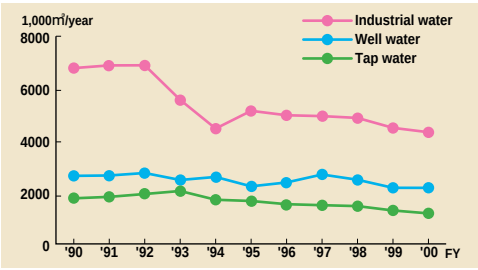
Up until now, MMC has promoted energy conservation through a broad range of measures covering facilities, production processes and management. These have included the introduction and expansion of the use of cogeneration systems,[1)] insulation of industrial furnaces, use of energy-saving raw materials, and lowering of processing (base) temperatures.

In order to deal with the decline in unit output, MMC is also rationalizing production by, for example, merging and closing production lines, and revising their modes of operation.

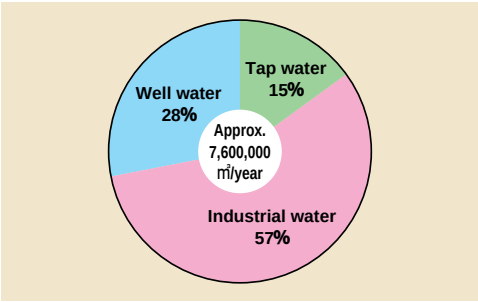
CO_2 emissions in FY2000 were down 12% from their FY1990 level. However, as sales are declining, energy use per unit sales is increasing.

The water used during the production process is of various kinds, such as groundwater, water for industrial use, and tap water. As part of moves to save resources, MMC has long sought to rationalize water use to conserve water by, for example, adopting the multistage use of water, changing production methods, and recycling with the aid of chilled and air-conditioner water cooling towers.

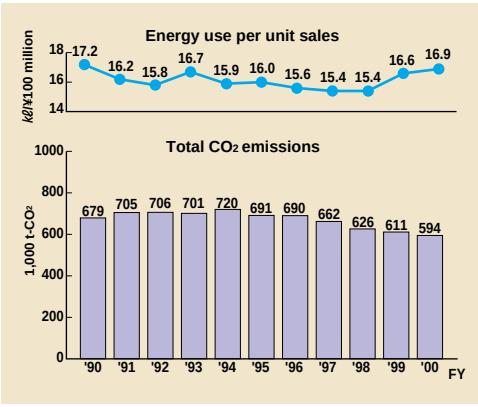
In addition, MMC also reuses treated plant wastewater to supply some of the sprinkler systems for watering the greenery around plants.



Trend in volume of water use



Proportion of use of water in FY2000



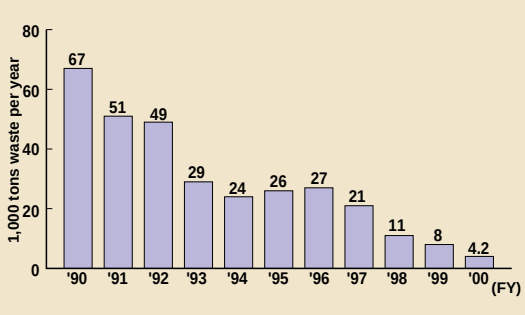
Trends in energy consumption

■ Reduction of waste emissions (Measures to eliminate landfill waste)

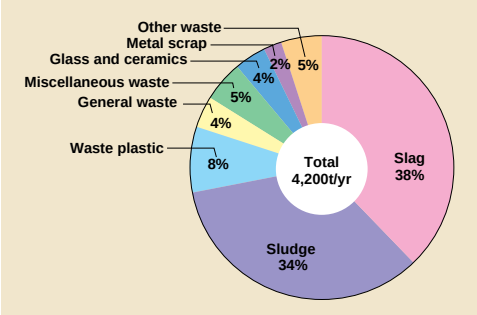
A priority in relation to waste disposal at the production stage is reduction of landfill waste through "development of production processes that minimize the amount of waste generated", and "greater recycling and reuse of resources."

The sort of waste generated during production includes things such as scrap metal, slag (waste casting sand, etc.), sludge and waste plastic. The first step is to reduce the amount generated in the first place by improving processes and extraction of materials. Waste that is still generated should then be recycled and reused as much as possible. Where this is not feasible, the volume should be reduced through intermediate treatment methods, such as incineration and dehydration, and the remainder disposed of in landfills.

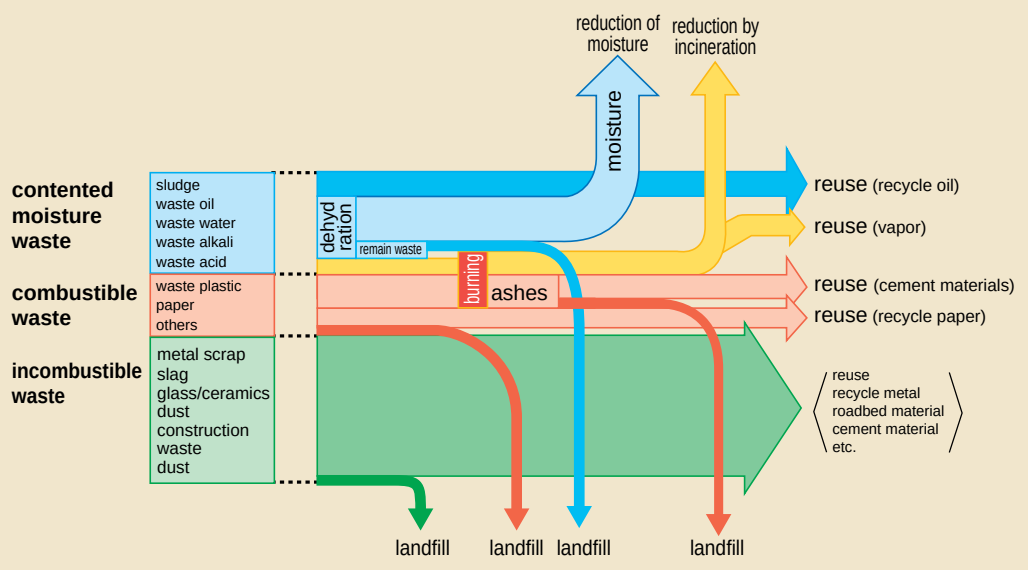
MMC's goal is to reduce landfill waste emissions in FY 2000 by 80% compared with FY 1990. Landfill waste emissions in FY 2000 were reduced by 4,000 tons from the previous year to 4,200 tons by increasing use of waste casting sand, cinders and fireproof materials as adjustment materials for blast furnaces, and expanding their reuse for roadbeds. This is equivalent to a 94% reduction from the level in FY 1990.



Amount of landfill waste generated per year, FY 1990~2000



Breakdown of waste for landfill, FY 2000



Waste disposal process

■ Recycling

MMC is promoting recycling of waste casting sand for cement materials, compacting of paint sludge, and compacting and recycling of waste paper generated by MMC offices.

MMC is also making increasing use of thermal recycling by recovering energy from combustibles, such as paper and wood waste, that are incinerated in waste heat boilers to generate steam for use at plants.

generate source	kinds of waste	recycle case
casting shop	waste casting sand	roadbed material, iron material
stamping shop	metal scrap	casting material
painting line	chemical sludge	cement material
	paint sludge	oil absorption material, fuel
	washing thinner	recycle thinner, fuel
whole plants	waste oil	recycle oil, fuel
	plastic waste	plastic material, fuel
	glass and ceramic waste	roadbed material
	dust	cement material
	grinding sludge	cement material
	incineration ash	roadbed material
office	paper	recycle paper

■ Measures to eliminate landfill waste

It is expected to become increasingly difficult in the future to find suitable landfill sites. MMC is therefore taking steps to limit emissions of waste, increase reuse, and compact waste as to eliminate the quantity of waste requiring landfill disposal.

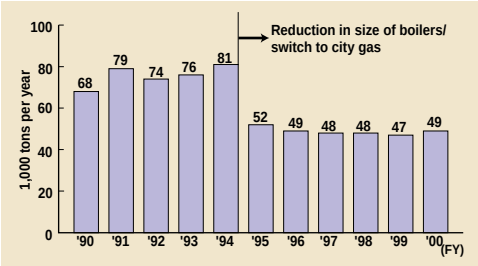
At the model Nagoya Plant, which is leading the way toward achieving the target of eliminating landfill waste by the end of FY2001, the generation of landfill waste was eliminated (including the recycling of incineration ash) by the end of March 2001.

The Kyoto Plant also has achieved the in-house guidelines for eliminating landfill waste.

■ Prevention of air pollution

Sulfur oxides (SOx)

The shift since the seventies to use cleaner energy sources containing less sulfur, such as kerosene and city gas, for use as fuels for combustion facilities, such as boilers and industrial furnaces, has enabled SOx emissions to be kept extraordinarily low. MMC will continue to take steps to reduce SOx emissions by reducing fuel consumption through energy-saving measures in the future.



Trend in SOx emissions

Nitrogen oxides (NOx)

We have made every effort in the past to minimize NOx emissions, such as installing low NOx boilers, and using low NOx burners, and will continue taking active steps to conserve energy and cut fuel use and NOx emissions in the future too.

At some of our plants, NOx emissions are constantly monitored and continuous data on emissions are regularly transmitted to the municipal authorities.

Dust

We are working to cut emissions of dust generated by casting facilities, boilers and waste incinerators, etc by capturing dust with high-performance dust collectors such as bug filters and removing it using afterburners, and also limit emissions by proper maintenance and control of combustion.

1) VOC

Volatile organic compounds

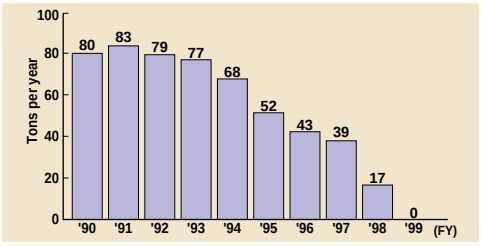
VOC [1)]

Use of solvents in the body painting process is being reduced by the improvement of production processes, such as the use of equipment that applies paint more effectively, the use of new painting methods, and the use of cleaning methods requiring less solvent to clean paint guns when changing colors.

We are also reducing emissions of solvents by fitting ovens with waste gas treatment systems and increasing the use of thinner recovered from the cleaning process. At the machine component painting stage, use is made of water-based and powdered paints using practically no solvents, and used paint is recovered and reused, thus dramatically reducing waste emissions.

Chlorine-based cleaning agents

Tetrachloroethylene and dichloromethane used to be used for cleaning parts, but water-based cleaning agents were introduced and cleaning methods altered so as to eliminate their use altogether by March 2000. As a result, use of these substances was totally halted ahead of schedule by March 1999.



Use of chlorine-based cleaning agents

2) CFC

Chlorofluorocarbon

3) COD

Chemical oxygen demand

4) Eutrophication

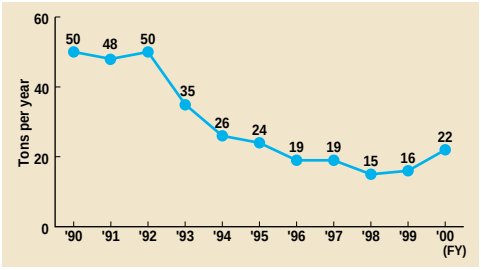
Oversupply of nutrients such as nitrogen and phosphorus in enclosed bodies of water such as lakes, marshes and bays results in an abnormal proliferation of plankton and the occurrence of red and blue tide, which harms the fishing industry and reduces water quality by causing it to smell.

■ Protection of the ozone layer

MMC formerly used two CFCs considered to be harmful to the ozone layer. CFCs [2)] were used in the urethane product foaming process, and 1.1.1-trichloroethane was used for washing products such as plastic bumpers and heat treated parts. However, use of both was entirely halted in 1995.

■ Prevention of water pollution

Sources of water pollution at plants include process wastewater generated during production processes such as painting, and domestic-grade wastewater from cafeterias and toilets. As the pollution load varies depending on the process, the wastewater from each process is first put through appropriate primary and secondary treatment before going through advanced wastewater treatment (such as activated carbon filtration) in a general wastewater treatment facility.



Change in COD

The quality of water discharged into public bodies of water is controlled in accordance with voluntary standards that are stricter than legal requirements. The quality of discharges is constantly monitored using colored carp and goldfish and by automatically measuring COD.[3)] We have also taken every possible precaution to deal with emergencies, such as installing emergency water tanks.



Colored carp raised on plant wastewater are given to elementary schools every year.

■ Action to prevent eutrophication [4)]

In order to cut discharges of nitrogen and phosphorus, which are a cause of eutrophication, we use nitrogen and phosphorus-free subsidiary materials and denitrify wastewater in our wastewater treatment systems.

■ Prevention of noise and vibrations

In order to reduce the impact on localities around plants from main sources of noise and vibrations, such as stamping, compressors, blowers and engine test sites, we are making increasing use of quiet, non-vibrating equipment, improving layout and improving sound insulation of buildings, and soundproofing and vibration-proofing of production facilities.

When establishing new facilities, we also conduct simulations of noise and vibration levels off-site to enable appropriate countermeasures.



Wastewater treatment plant

■ **Reduction of bad odors**

Casting shops, painting lines, wastewater treatment facilities and waste incinerators etc. are all sources of bad odors. These smells are dealt with in various ways depending on their individual properties. Solutions include activated carbon adsorption, afterburning (direct and catalytic combustion) and deodorization by chemical dosing.

■ **Dioxins**

• Measures to limit emissions from waste incinerators:

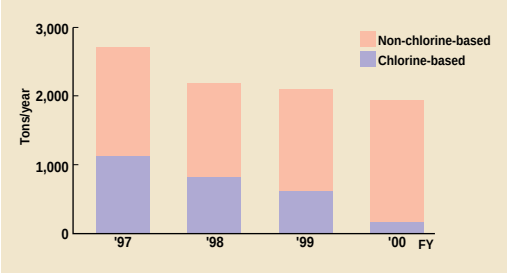
We are working to limit emissions of dioxins by taking comprehensive action to, for example, improve waste incinerator facilities and ensure proper combustion control and disposal of incinerated substances (e.g. by sorting waste containing chlorine and compacting incinerated materials). One drastic means of reducing dioxin emissions being considered by MMC is the scrapping of some waste incinerators.

• Measures to make machining cutting lubricant chlorine free:

Working teams have been established throughout the company in order to make existing machining lines chlorine free by the end of FY2000. As a result, the Truck and Bus Production Office, Kawasaki, is now "chlorine free".

Chlorine-based oils made up 8.5% of the total quantity of oils used as of the end of FY2000. MMC will continue with its efforts to make itself completely chlorine free.

Kyoto Yagi (CVT) Plant's machining line, which came on stream in April 2000, started up chlorine free from the word go.



Trend in use of cutting oil

1) PRTR
Pollutant release and transfer register

PRTR is a system whereby businesses monitor release and transfer of certain chemical substances from plants and offices themselves, and report their findings to the authorities, who then aggregate and publish them along with data on harmfulness.

2) MSDS
(material safety data sheet)

Sheet for entering details concerning the handling and content of chemical products.

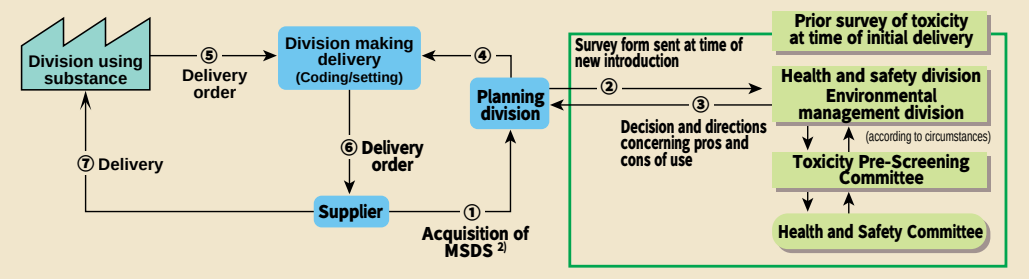
■ Chemical substances management

Two of MMC's plants have been involved in the Environmental Agency's pilot PRTR [1)] project since FY1997, and all plants have been involved in Keidanren's voluntary PRTR program. MMC is currently developing a database of chemical components, and is monitoring emissions and movements of chemical substances.

As well as examining the pros and cons of the use of chemical substances before their actual introduction under a "system of screening for toxicity of chemical substances" as in the past, MMC is also taking positive action to control chemical substances by, for example, limiting emissions of harmful chemical substances.

The PRTR survey results for FY1999 were as shown in the table below.

Of the 354 substances covered by Keidanren's PRTR survey program, 22 are handled by MMC. A breakdown of the release and transfer of pollutant shows that 36% of the amount used is emitted into the environment, 1% is moved as waste, and the remaining 63% is recycled, consumed or eliminated.



System for pre-screening of toxicity of chemical substances

PRTR data (FY1999)

Substance	Name of chemical substance	Quantity used	Emissions			Movements	Other		
			Air	Water	Soil	Waste	Recycled	Consumed	Eliminated
1	Water-soluble zinc compounds	43.9	0.0	1.1	0.0	8.8	0.0	34.0	0.0
9	Adipate (diethylhexyl)	34.3	0.0	0.0	0.0	1.0	0.0	33.3	0.0
16	2-aminoethanol, monoethanol	19.5	0.0	10.3	0.0	1.4	5.7	0.0	2.0
30	Bisphenol A epoxy resins	12.3	0.0	0.0	0.0	0.3	0.0	12.0	0.0
40	Ethly benzene	93.1	0.1	0.0	0.0	0.0	0.0	92.9	0.0
43	Ethly glycolate	2,259.1	0.0	0.0	0.0	0.0	0.0	2,259.1	0.0
63	Xylene	3,107.7	2,121.9	0.0	0.0	18.7	351.4	486.3	129.4
68	Chrome and trivalent chromium compounds	87.4	0.0	0.0	0.0	0.2	0.0	87.3	0.0
101	Ethylene glycol monoethyl acetate 2-ethoxyethyl acetate	8.0	7.4	0.0	0.0	0.0	0.3	0.0	0.2
132	HFC-141b (1-dichloro-1-1 fluoroethane)	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0
224	1,3,5-trimethylbenzene	1.3	0.0	0.0	0.0	0.0	0.0	0.0	1.3
227	Toluene	2,731.4	960.3	0.0	0.0	30.3	386.8	1,073.8	280.2
230	Lead and lead compounds	19.2	0.0	0.0	0.0	1.0	0.0	18.2	0.0
232	Nickel compounds	12.0	0.0	1.2	0.0	6.8	0.0	4.0	0.0
266	Phenol	22.4	1.9	0.0	0.0	0.0	0.0	20.5	0.0
272	Diethylhexyl phthalate	2.1	0.0	0.0	0.0	0.1	0.0	2.0	0.0
283	Hydrogen fluoride and water-soluble salts	5.6	0.0	4.5	0.0	1.1	0.0	0.0	0.0
299	Benzene	63.3	0.4	0.0	0.0	0.0	0.0	62.9	0.0
309	Poly(oxyethylene)nonylphenyl ether	4.1	0.0	3.1	0.0	0.0	1.1	0.0	0.0
310	Formaldehyde (unintentional products)	21.4	15.3	0.0	0.0	0.0	0.0	0.0	6.1
311	Manganese and manganese compounds	95.3	0.0	1.4	0.0	8.7	0.0	85.2	0.0
Total		8,644.9	3,108.9	21.6	0.0	78.3	745.3	4,271.6	419.2
179	Dioxins	2.4	1.7	0.0	0.0	0.6	0.0	0.0	0.0

Notes:
1. Substance number indicates the government ordinance number of each PRTR Law type 1 designated chemical substance.
2. Units: t/year (unit for dioxins: g-TEQ/year)
3. Emissions and movements at the time of the survey are classified according to the definitions for voluntary measures laid down by Keidanren.

1)PCBs
Polychlorinated biphenyls

■ Storage of PCBs [1)]

The PCBs used as insulating oil for sealing transformers and condensers are kept properly as required by law.

The total number of used transformer and condensers in storage at the end of FY2000 was 954.

Cooperation with affiliates

■ Domestic affiliates

The Mitsubishi Motors Group Plant Environment Liaison Council, comprising representatives of the five main members of the Mitsubishi Motors Group, meets twice a year, and MMC uses these occasions to share information with its affiliates regarding legislative developments and urge them to take environmental action on a par with its own.

A newsletter entitled "MMC Plant Environment Topics" is published twice a year for 110 suppliers in order to keep them up to date with legislative developments and other trends, and to provide a variety of information on environmental issues.

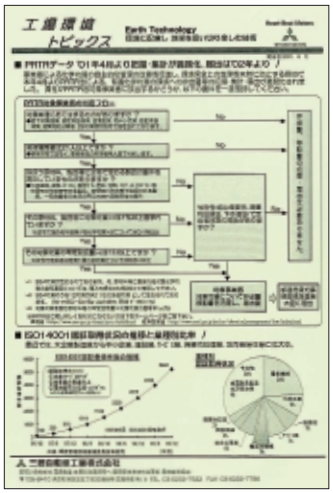
■ Measures at overseas plants

The Production Committee of MMC's Environmental Council engages in regular (biannual) cooperation with seven major overseas plants in order to help keep track of the state of environmental protection at overseas plants.

In the future, MMC will actively promote exchanges with overseas plants as part of global action to protect the environment.

Track is kept of the following at overseas plants:

① Energy use
② ISO14001 compliance
③ Handling of chemicals
④ Trends in local legislation
⑤ Relations with local communities
⑥ Compliance with standards and controls
⑦ State of waste disposal and treatment
⑧ State of establishment of specific facilities



Plant Environment Topics

TOPICS

Campaign to eliminate waste

Space for landfill sites is becoming increasingly scarce in Japan, creating a major social problem. We have therefore since long taken steps to reduce emissions of waste for landfill waste throughout the company, as a result of which emissions of landfill waste from the Nagoya and Kyoto Plants were eliminated by March 2001. Below we look at how this was achieved at the Nagoya Plant.

Step 1: Disassembly and sorting of mixed waste

◆Strongly rejected by employees

There was initially strong opposition from employees.

- ●Just how far do you expect waste to be sorted?
- ●We don't have the time! Tell us how many man-hours it will take!
- ●Make a sorting list for each part. We won't do it without one!

There was also a lack of awareness on the part of managers.

- ●We'll mention it to the people concerned.



Waste collection site at the outset

◆Change in thinking (from "Is that possible?" to "Let's try!")

- ●If the company is thought of as being like an ordinary household, there is no reason why it should not be possible.
- ●"Mixed waste is landfill waste, sorted waste is a resource."
- ●One's work extends to disassembling and sorting the waste one produces oneself.

[Measure 1]

In order to change everyone's way of thinking, each division was instructed to designate inspection days, and the groups responsible for the environment and members of the power facility sections provided on-the-spot guidance on disassembly and sorting on 40 occasions. By thus working together, those involved learnt the methods of disassembling and sorting waste by trial and error.

[Measure 2]

In order to change the management's way of thinking and enable them to lead the way, a total of 64 employees in management positions (section chiefs) were given prior training in the task of disassembling and sorting waste.



Sorting

◆Awareness raising

As the results became apparent, everyone's awareness rose further.

- ●We didn't think waste would be reduced so much!
- ●I want to recycle this somehow!



Carefully sorted waste collection site

◆From awareness raising to implementation

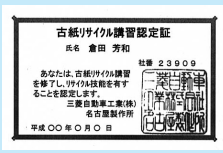
In order to ensure that waste is thoroughly sorted, the following measures were adopted.

[Measure 1]

Introduction of a wastepaper sorting certification system and use of certifiers (approx. 1,500)

[Measure 2]

Information sharing ⇨ Provision of information regarding e.g. attainment levels in the elimination of waste through the use of in-house newsletters and factory PA systems.



古紙リサイクル講習認定証

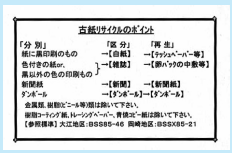
氏名　倉田　芳和

社番　２３９０９

あなたは、古紙リサイクル講習を修了し、リサイクル技術を有することを認定します。

三菱自動車工業(株)
名古屋製作所

平成 ○○ 年 ○ 月 ○ 日



古紙リサイクルのポイント

「分別」　「区分」　「再生」

紙に黒印刷のもの　→【白紙】　→【ラッシュペーパー等】

色付きの紙or、黒以外の色の印刷もの　→【雑誌】　→【新ﾊﾟｯｸの中敷等】

新聞紙　→【新聞】　→【新聞紙】

ダンボール　→【ダンボール】→【ダンボール】

金属類、樹脂などゴミ等類は除いて下さい。

樹脂コーティング紙、トレーシングペーパー、青焼コピー紙は除いて下さい。

【事務局等】大江地区：BBSBS-46　岡崎地区：BBSXBS-21

TOPICS

Step 2: Finding more recycling uses for waste

◆Negotiations were conducted with a random selection of potential specialist contractors regarding the recycling of sorted waste (sorted into 46 categories for reuse). However, the specifications (regarding e.g. the properties, composition, quantity and continuousness of supply) generally did not match those required, and a process of trial and error was repeated.

◆At the present stage, combustible waste that cannot be used as a resource is thermally recycled in order to help save energy.

◆Paint and chemical sludge and machine grinding powder that used to be disposed of by landfill are used in cement, and grinding whetstones are recycled in roadbeds. Recycled roadbed materials were used in the construction of the employees' parking lot.


Paint and chemical sludge


Machine grinding powder


Grinding whetstones


Construction of parking lot

◆As a result of trial and error, the incineration ash that is left over is melted and solidified for use in roadbeds. Despite it being more expensive to do so, MMC does this because of the need for recycling and the shortage of landfill sites.


Incineration ash


Heated to 1,600°C and melted in an electric furnace.


The product forms stony slag when cooled, which is crushed to form roadbed materials.


Roadbed materials used to make roads

Goal of eliminating landfill waste achieved!

Step 3: Future action

◆Development of uses for recycled resources and continuation of education and personal improvement
◆Reduction of emissions of manufacturing byproducts and reduction of ordinary waste
◆Reduction of total cost

Environmental data on individual plants

Emission levels and main indices for air and water pollution at each plant are as follows.
(Ceiling indicates the strictest limits as required by law, ordinance or the Antipollution Agreement. Figures for atmospheric emissions indicate maximums.)

COD: Chemical Oxygen Demand BOD: Biochemical Oxygen Demand NOx: Nitrogen oxides
SOx : Sulfur oxides

Oye



Employees: 2,119 (March 2001)

Nagoya Plant - Oye

The air

Substances	Equipment	Unit	Regulation	Actual value
NOx	Boiler	ppm	64	60
	Oven	ppm	37	36
	Incinerator	ppm	74	70
	Gas Turbine	ppm	39	36
Dust	Boiler	g/Nm^3	0.2	0.003
	Oven	g/Nm^3	0.2	0.000
	Incinerator	g/Nm^3	0.4	0.132
	Gas Turbine	g/Nm^3	0.04	0.000
Sulfur oxide (sulfur rate in fuel)		wt %	0.05	0.004

The water

Substances	Unit	Regulation	Max.	Min.	Average
BOD	mg/l	20	17.0	1.0	5.3
SS	mg/l	20	17.0	3.0	7.8
Oil	mg/l	5	2.1	0.5	0.6
Total nitrogen	mg/l	60	5.30	0.2	3.9
Total phosphate	mg/l	8	0.85	0.03	0.39
Copper	mg/l	1	ND	ND	ND
Total chrome	mg/l	2	0.1	0.04	0.07
Lead	mg/l	0.1	ND	ND	ND
Manganese	mg/l	10	0.20	0.10	0.15

Okazaki



Employees: 1,829 (March 2001)

Nagoya Plant - Okazaki

The air

Substances	Equipment	Unit	Regulation	Actual value
NOx	Small boiler	ppm	120	42
	Boiler	ppm	100	68
	Oven	ppm	250	140
	Incinerator	ppm	200	170
Dust	Small boiler	g/Nm^3	0.1	0.003
	Boiler	g/Nm^3	0.1	0.01
	Oven	g/Nm^3	0.1	0.005
	Incinerator	g/Nm^3	0.1	0.1
Sulfur oxide (sulfur rate in fuel)		wt %	1	0.006

The water

Substances	Unit	Regulation	Max.	Min.	Average
BOD	mg/l	10	6.8	0.9	2.6
COD	mg/l	10	7.6	2.9	4.6
SS	mg/l	10	3.0	0.5	0.9
Oil	mg/l	2	1.0	0.5	0.5
Total nitrogen	mg/l	60	9.6	2.0	6.1
Total phosphate	mg/l	8	0.08	0.02	0.05
Copper	mg/l	0.5	0.01	0.01	0.01
Manganese	mg/l	3	0.4	0.1	0.14
Total chrome	mg/l	0.1	0.02	0.01	0.015
Lead	mg/l	0.1	0.005	0.005	0.005

Kyoto



Employees: 2,872 (March 2001)

Kyoto Plant - Kyoto

The air

Substances	Equipment	Unit	Regulation	Actual value
NOx	Boiler	ppm	150	47
	Melting furnace	ppm	200	41
	Heating furnace	ppm	180	60
	Oven	ppm	230	17
	Incinerator	ppm	250	100
	Gas Turbine	ppm	70	44
Dust	Boiler	g/Nm^3	0.1	0.002
	Melting furnace	g/Nm^3	0.1	0.004
	Heating furnace	g/Nm^3	0.2	0.009
	Oven	g/Nm^3	0.2	0.026
	Incinerator	g/Nm^3	0.5	0.070
Sulfur oxide (sulfur rate in fuel)		wt %	0.5	0.101

The water

Substances	単位	Unit	Max.	Min.	Average
BOD	mg/l	20	3.5	3	3.5
COD	mg/l	20	2.6	1	1.2
SS	mg/l	70	15.8	2	4.1
Oil	mg/l	5	1.9	1	1
Total nitrogen	mg/l	60	16.2	0.2	0.55
Total phosphate	mg/l	8	0.31	0.07	0.53
Copper	mg/l	3	0.04	0.04	0.04
Zinc	mg/l	5	0.05	0.04	0.04
Manganese	mg/l	10	<0.02	<0.02	<0.02
Total chrome	mg/l	2	<0.02	<0.02	<0.02

Shiga



Employees: 509 (March 2001)

Kyoto Plant - Shiga

The air

Substances	Equipment	Unit	Regulation	Actual value
NOx	Boiler	ppm	150	42
Dust	Boiler	g/Nm^3	0.1	0.004

The water

Substances	Unit	Regulation	Max.	Min.	Average
BOD	mg/l	20	6.5	1	3.3
COD	mg/l	20	7.1	0.7	4.4
SS	mg/l	20	8.6	0.5	2.6
Oil	mg/l	5	0.8	0.5	0.6
Total nitrogen	mg/l	8	3.1	0.5	1.8
Total phosphate	mg/l	0.6	0.3	0.1	0.14
Copper	mg/l	1	<0.01	<0.01	<0.01
Zinc	mg/l	1	0.07	0.06	0.06
Manganese	mg/l	10	<0.01	<0.01	<0.01
Total chrome	mg/l	0.1	<0.01	<0.01	<0.01

Yagi



Employees: 150 (March 2001)

Kyoto Plant-Yagi

The air

Substances	Equipment	Unit	Regulation	Actual value
NOx	Boiler	ppm	150	79
	Heating furnace	g/Nm^3	180	83
Dust	Boiler	g/Nm^3	0.1	0.001
	Heating furnace	g/Nm^3	0.2	0.003

The water

Substances	Unit	Regulation	Max.	Min.	Average
BOD	mg/l	10	2.5	1.5	1.9
COD	mg/l	20	1.1	0.6	0.95
SS	mg/l	20	1	0.5	0.68
Oil	mg/l	2.5	0.6	0.5	0.53
Total nitrogen	mg/l	60	10.1	5.4	6.85
Total phosphate	mg/l	8	0.1	0.1	0.1
Copper	mg/l	1.5	0.01	0.01	0.01
Zinc	mg/l	2.5	0.05	0.05	0.05
Manganese	mg/l	5	<0.1	<0.1	<0.1
Total chrome	mg/l	1	<0.01	<0.01	<0.01

Mizushima



Employees: 4,899 (March 2001)

Mizushima Plant

The air

Substances	Equipment	Unit	Regulation	Actual value
NOx	Boiler	ppm	150	71.6
	Oven	ppm	230	81.3
	Incinerator	ppm	250	84
Dust	Boiler	g/Nm^3	0.1	0.009
	Oven	g/Nm^3	0.1	0.001
	Incinerator	g/Nm^3	0.1	0.021
Sulfur oxide (sulfur rate in fuel)		wt %	0.5	0.31

The water

Substances	Unit	Regulation	Max.	Min.	Average
BOD	mg/l	20	19	3	10.5
COD	mg/l	20	19	2.5	10.5
SS	mg/l	20	7	0.7	2.9
Oil	mg/l	1	0.9	0.2	0.5
Total nitrogen	mg/l	60	9.2	5.8	7.5
Total phosphate	mg/l	8	7.2	1.3	4.7
Copper	mg/l	3	ND	ND	ND
Zinc	mg/l	5	0.04	0.04	0.04
Manganese	mg/l	10	0.16	0.16	0.16
Total chrome	mg/l	0.5	ND	ND	ND
Lead	mg/l	0.1	0.01	0.01	0.01

ND: Not Detectable

Kawasaki



Employees: 3,400 (March 2001)

Truck and Bus Production Office-Kawasaki

The air

Substances	Equipment	Unit	Regulation	Actual value
NOx	Boiler	ppm	130	45
	Heating system	ppm	150	73
	Oven	ppm	250	15
	Gas turbine	ppm	100	5
Dust	Boiler	g/Nm^3	0.05	0.002
	Heating system	g/Nm^3	0.05	0.002
	Oven	g/Nm^3	0.2	0.005
	Incinerator	g/h	1564•506	487•74
	Gas turbine	g/Nm^3	0.05	0.001

The water

Substances	Unit	Regulation	Max.	Min.	Average
BOD	mg/l	300	80	0.5	24
SS	mg/l	300	70	0.1	11
Oil	mg/l	5	1.8	0.5	1.2
Total nitrogen	mg/l	150	8.9	7.2	7.7
Total phosphate	mg/l	20	4.6	0.1	2
Copper	mg/l	3	ND	ND	ND
Zinc	mg/l	3	0.41	0.09	0.17
Manganese	mg/l	1	0.27	ND	0.18

Note: Discharged into sewerage system

Maruko



Employees: N/A

Truck and Bus Production Office-Maruko (closed May 2001)

The air

Substances	Equipment	Unit	Regulation	Actual value
NOx	Boiler	ppm	150	29
Dust	Boiler	g/Nm^3	0.2	0.004

The water

Substances	Unit	Regulation	Max.	Min.	Average
BOD	mg/l	300	15	0.9	8.7
SS	mg/l	300	14.5	1	7
Oil	mg/l	5	3.9	0.9	2.6
Total nitrogen	mg/l	150	13	8	11
Total phosphate	mg/l	20	0.47	0.08	0.28
Copper	mg/l	3	ND	ND	ND
Zinc	mg/l	3	ND	ND	ND
Manganese	mg/l	1	ND	ND	ND

Note: Discharged into sewerage system

Nakatsu



Employees: 200 (March 2001)

Truck and Bus Production Office-Nakatsu

The air

Substances	Equipment	Unit	Regulation	Actual value
NOx	Boiler	ppm	250	73
Dust	Boiler	g/Nm^3	0.3	0.1

The water

Substances	Unit	Regulation	Max.	Min.	Average
BOD	mg/l	300	0.6	0.1	0.3
SS	mg/l	300	4	0.1	1.3
Oil	mg/l	5	4.7	0.1	1.8
Total nitrogen	mg/l	150	7	0.5	3.8
Total phosphate	mg/l	20	ND	ND	ND
Copper	mg/l	3	ND	ND	ND
Zinc	mg/l	3	ND	ND	ND
Manganese	mg/l	1	ND	ND	ND

Note: Discharged into sewerage system

2-4. Logistics

MMC recognizes the importance of cutting use of packing materials and improving transport efficiency at the production, distribution and servicing stages in order to combat global warming and protect the environment, and is actively developing a low environmental impact logistics system.

Measures to increase transport efficiency (reduction of CO_2 emissions)

As a result of active steps to reduce emissions of CO_2, which is one cause of global warming, the amount of CO_2 emitted per vehicle during the transport of passenger cars in Japan in FY 2000 was reduced by 2% from FY 1999 to 45.7kg/vehicle (CO_2 weight equivalent).

One major reason for the fall was the increased use of marine transport, and measures such as this are being further expanded in FY 2001.

■ Modal shift

In order to develop an efficient transport system utilizing multiple means of transport-trucks, ships and rail we are promoting the switch from a mainly land-based transport system to a marine one [2)]. Transport policy has been already changed, so that 100% of passenger cars that can be transported by sea are now transported by sea.

Marine transport is being used more for trucks, too, and in the case of land transport of small-sized trucks, we are switching from the existing system of transporting the trucks to a system of using transporters just like passenger cars.

Rail transport [3)], meanwhile, is starting to be used in certain regions where improvements in efficiency can thus be obtained.

■ Use of trailers and more efficient routes

In viewing the transportation equipment, Mitsubishi promotes the loading of vehicles over the top of car transporter tractor units in accordance with relaxations, in order to improve loading efficiency. The introduction of full trailers is an additional measure taken to improve transportation efficiency by increasing the number of vehicles loaded per trailer.

■ Promotion of idling-stop and eco-driving

MMC is pursuing steps to encourage eco-driving by, for example, giving advice on driving at economical speeds, and prohibiting sudden starting, acceleration and unnecessary idling. Loading tractors are in addition equipped with digital tachographs [4)] in order to help raise the efficiency of control of operations and promote eco-driving.

1) CO_2 emissions

Until last fiscal year, CO_2 emissions were expressed as emissions per unit of the total transported cars.

2) Marine transport



3) Rail transport



4) Digital tachographs

Detailed information on crew operations (times, speed, distance, engine speed, etc.) is collected in the form of digital data so that it can be analyzed by computer and used to raise operating efficiency.

Measures to cut use of packing and packaging materials

In order to reduce the use of packing and packaging materials used in transporting parts for production and other supplies to affiliated producers and distributors overseas, we are taking a variety of steps, such as making greater use of returnable steel racks and returnable boxes, simplifying packing specifications, using stretch film packing, and replacing wooden packing cases with steel ones.

■ Introduction of returnable steel racks and returnable boxes

Packing for products bound for North America (MMMA), the Netherlands (NedCar) and Italy (IPF) used to be made from wood and plywood and disposed of at the destination by incineration. However, we are now phasing out the use of such packing materials, and introducing returnable steel racks in their place.

Returnable plastic boxes are in addition used for shipments to MMC's new affiliate in Thailand (MSC).

We are also switching to the use of returnable racks for shipments of supplies to Europe (MMSE), the Middle East (MMGF) and North America (MFTA).

Because of the energy and cost savings generated by the transition to returnable racks and boxes, increasing use will be made of them in the future.

■ Reduction of use of wooden packing cases

By promoting the use of steel cases and simplifying packing, the amount of wooden packing cases used per unit sales in FY 2000 was reduced by 19% from FY 1999.

2-5. Sales: Support for environmental activities of dealers

Dealers have an important contribution to make to environmental protection by disposing of industrial waste and ELVs properly and recovering and recycling parts. MMC works alongside with dealers to productively protect the environment.

Environmental protection by dealers

With the help of the Mitsubishi Motors Dealers' Association, MMC has drawn up a policy for environmental action by dealers that incorporate ISO14001 methods. In accordance with this policy, all passenger car, Fuso and parts dealers [1)] have established internal systems for corporate-wide action based on an inter-departmental structure that clarifies the person in charge under the leadership of the top management.

1) Dealers nationwide (as of end March 2001)

Passenger car dealers (Galant and Plaza dealers)	234
Fuso dealers	36
Parts dealers	13
Total	283

■ Areas of action:

- Disposal of waste oil and parts
- Collection of replaced bumpers for recycling
- Treatment of wastewater from repair shops
- Disposal of ELVs
- Recovery of air-conditioner refrigerant
- Proper disposal of airbags
- Disposal of ordinary commercial waste

Through the action in each of these areas, dealers will raise the environmental awareness of their employees, and act more positively in order to continually make their activities more environmentally friendly.

The liability of the dealers was further increased by the amendment of the Law on Waste Disposal and Cleaning that went into effect from April 2001. As a result of the above activities, however, MMC's dealers are fully compliant.

Internal dealer system

1. Declaration of environmental action by top management (dealers' presidents)
2. Development of setup for environmental action and designation of persons responsible
3. Tracking of current state and formulation of plans for action.

■ State of action by passenger car dealers

Further improvements are being pursued, such as proper storage of replaced bumpers and greater sorting of waste.

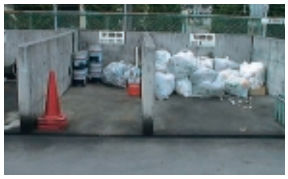




■ State of action by Fuso dealers

Because of the bulk of waste, particular care is paid to the location and method of storage.





■ State of action by parts dealers

As no industrial waste is generated directly, the emphasis is placed on offices, where activities to protect the environment are now underway.





Comparison of greenhouse effects (CO_2 = 1)

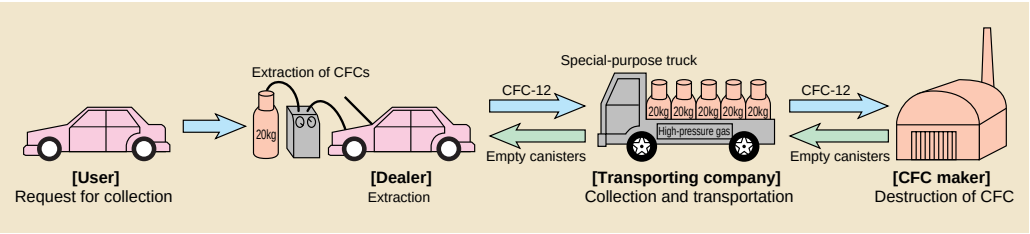
CO_2	1
Methane	21
N_2O	310
CFC substitute (HFC-134a)	1,300
CFC (CFC-12)	7,100

Source: IPPC report (1995)

■ Collection and destruction of CFC-12 for air conditioners

As CFC-12 causes destruction of the ozone layer, its use in MMC vehicles was completely stopped by January 1994. MMC has provided all dealers with equipment to extract and recycle CFC-12, and has promoted its collection and reuse. As a result of the spread of vehicles using new HFC134a refrigerant, demand for recycled CFC-12 has declined, creating a considerable surplus of CFC-12. In order to properly destroy and dispose of this excess supply of CFC-12, we developed a CFC-12 collection and destruction system in collaboration with other firms in related industries, and this system was in place nationwide by October 1998.

Although HFC-134a does not destroy the ozone layer, it is a greenhouse gas. Thus in order to combat global warming, we are fitting our cars with air conditioners designed to minimize use of refrigerants, and are encouraging dealers to collect HFC-134a just like older types of refrigerant by introducing HFC-134a extracting equipment as well as CFC-12 to further improve appropriate disposal of refrigerant.

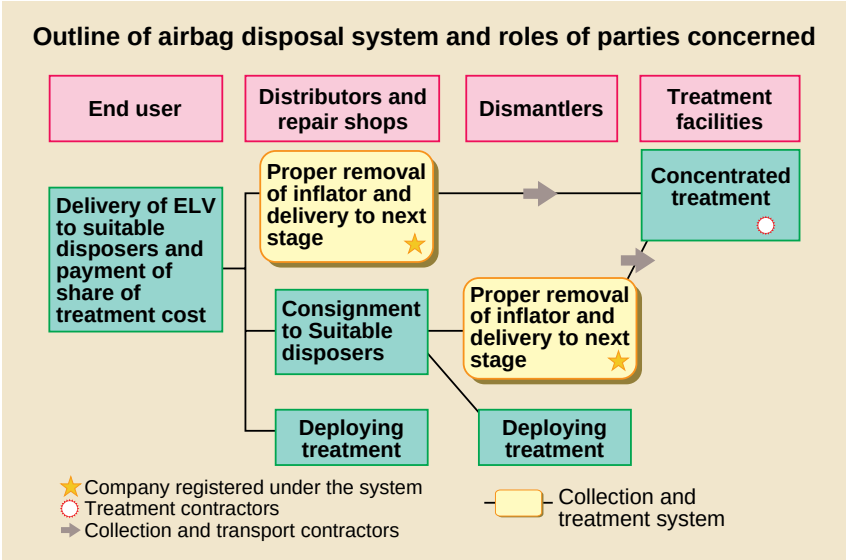


CFC-12 collection/destruction system

■ Disposal of airbags

By 2000, almost all passenger cars were fitted with airbags, and from 2005, more than half of ELVs are expected to have airbags.

In 1996, in order to ensure the safe disposal of ELV, the Japan Automobile Manufacturers' Association drew up a manual stipulating that airbags should be deployed prior to disposal, and this was distributed to service shops and used car dealers. In order to increase the quantity recovered and improve the safety of disposal work, the joint development and testing of a system for removal, retrieval and processing launched in 1999 in association with the Parts Industry Association, and MMC too is providing assistance for this project.



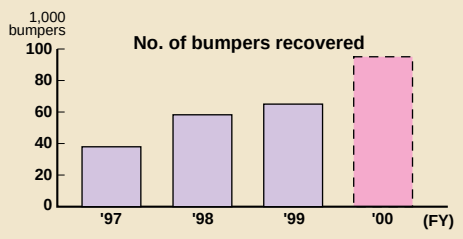
Collection and reuse of parts

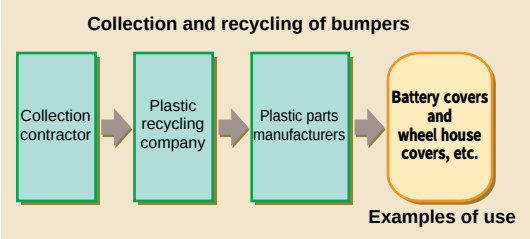
Recycling of plastics

Material recycling is the commonest method of recycling for use as raw materials. Thermal recycling refers to reuse as a source of heat. There also exists a method, known as chemical recycling, for breaking down plastics into chemical raw materials. Although this method is technologically feasible, however, it is too costly at present to be economically viable.

■ Collection and recycling of used bumpers

Since May 1997, MMC has been collecting and material recycling used polypropylene bumpers replaced by dealers. Bumpers replaced when cars are repaired were in the past disposed of in landfills. Collecting and recycling them, however, reduces the amount of waste generated by dealers, and also enables more effective use of resources. Up until the summer of 1999, old bumpers (numbering around 4,000 a month) had only been collected in the Kanto, Chubu and Kinki regions. The expansion of the system to cover the entire nation in the autumn of 1999 increased the number of bumpers recovered per year to 61,600, though, and 68,000 were collected in FY 2000. After foreign substances such as metal brackets have been removed, the bumpers are made into pellets by plastic recycling companies and recycled into auto parts by parts manufacturers. Parts such as battery covers of passenger cars and wheelcovers and underseals of trucks using recycled materials are currently in production. We are also looking into the production of bumpers (replacement parts) along with low-cost paint stripping methods.





■ Use of recycled parts

Some parts such as engines, transmissions and power steering gearboxes that have been replaced by dealers are rebuilt to make them as good as new and then sold. In the future, we plan to expand the range of parts to include drive shafts, and are considering expanding the scheme to cover other parts to reduce the amount of waste generated by dealers further and meet customer needs.

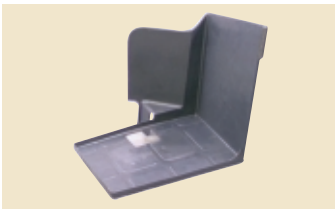
■ Launch of sale of used parts

As part of its efforts to promote the effective use of resources, MMC has launched a pilot scheme for selling reusable parts recovered from ELVs produced around the country in cooperation with major parts recycling network.

If requested by customers, dealers in the region covered by the pilot project (Tokyo, Kanagawa, Chiba and part of Ibaraki) search for recycled parts through the parts recycling network and, if the desired part is found, use it for making repairs.

As a result of the success of the pilot project, the area covered by the scheme is to be expanded.

Example of reuse for passenger car parts



Battery cover



Under seal

Example of reuse for truck parts



Wheel house cover



Air cleaner case

Development of technology and systems for disposal of ELVs

■ ELV recycling system in Japan

The recycling of vehicles has until now been undertaken funded by the returns from the sale of valuable materials, and has revolved principally around the recycling of iron and steel. Because of the additional need to recover CFCs and dispose of airbags, combined with the recent slump in the market price of scrap iron and steel and the increase in the cost of disposal due to the shortage of facilities for disposing of automobile shredder residue, however, it is no longer possible to cover the entire cost of disposal from the proceeds of sale of recovered materials alone. The conventional system of recycling vehicles has thus run into a number of problems. In order to rectify these problems (for example, by facilitating the flow of expenses), related parties have begun studying a new recycling system.[1)] In this scheme, automakers are pursuing proper recycling by, for example, taking back ASR [2)], and studies into means of solving the problem of ASR are in progress.

■ Development of recycling technology

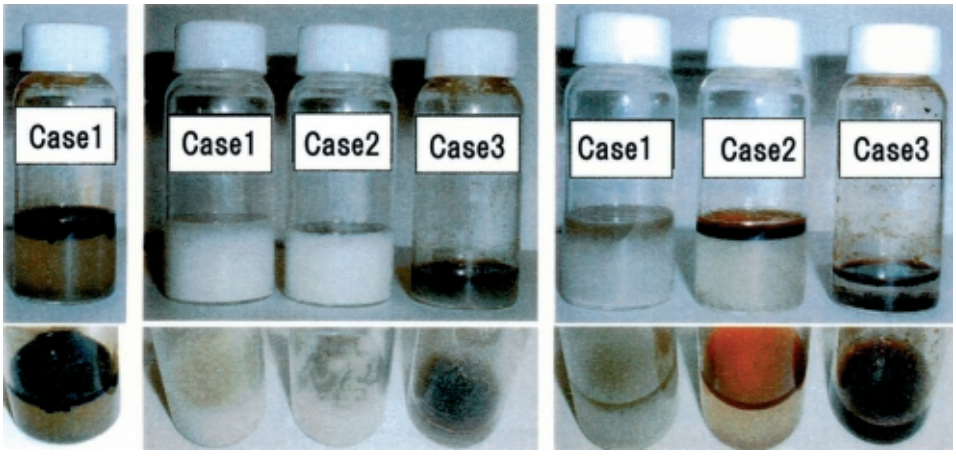
MMC considers use by smelting plants and cogeneration through pyrolytic gasification [3)] to be effective methods of recycling ASR. In order to increase the potential of recycling technology, however, MMC is also involved in basic research into recycling technologies based on other processes, such as material recycling and chemical recycling.

■ Super-critical water decomposition of waste urethane

One area of basic research being conducted by MMC into the recycling of waste urethane foam is in the area of technology for decomposing and reusing it using super-critical water.[4)] The first stage of research, lasting up to FY1999, was to find out the components generated by decomposition of urethane foam under sub-critical [5)] and super-critical conditions. The second stage consisted of a detailed study of methods of disposal of the polypropylene glycol generated by decomposition, which confirmed that use of super-critical water enables conversion to "non water-soluble" oily constituents non-soluble in water with a boiling point equivalent to that of light oil.

The aim of the third stage of research, conducted last fiscal year, was to increase the efficiency of oilification. A study was therefore made of the optimum conditions for the process, using as parameters the type of catalyst and temperature. (See the photos below.)

MMC will continue in the future with research designed to expand the potential of recycling technology.



Catalyst A　　Catalyst B　　Catalyst C (best)

1) New recycling system in Japan

A setup for improving the flow of work and expenses and clarifying the roles of the parties involved in order to ensure that ELVs are properly recycled whether they are recovered for a fee or receive the fee.

2) ASR (Automobile shredder residue)

Mixture consisting of waste plastic (including waste urethane) left after vehicles have been crushed and almost iron, steel and nonferrous metals have been removed.

3) Pyrolytic gasification

A technique whereby waste is baked in a low-oxygen atmosphere in order to separate it into gas and solids (in the form of substances such as charcoal) while limiting the generation of dioxins. Gas can be use for energy while metals contained in the materials processed are recovered unoxidized, and can be recycled.

4) Super-critical water

Water at a temperature of 374°C and pressure of 22.1Mpa or more. Organic matter quickly dissolves in super-critical water, which is used to convert waste plastic chips to oil.

Plant technology and operating energy is required to maintain the necessary high temperature and pressure.

5) Sub-critical

A state at a temperature slightly lower than super-critical.

2-6. Promotion of ITS

In order to solve mounting traffic problems, such as traffic accidents, traffic congestion and the associated harm o the environment, R&D is underway both in Japan and overseas on intelligent traffic systems (ITS)[1)] utilizing the latest information technology (IT). In order to realize road transport that's safe, comfortable and environmentally friendly, MMC is forging ahead with R&D on ITS to improve in-car information systems and assist safe driving, and working to introduce such systems into the market and to make them widely deployed.

1) ITS(Intelligent Transport Systems)

2) ETC (Electronic Toll Collection)

3) VICS (Vehicle Information and Communication Systems)



ETC transponders
(Mitsubishi Electric)

The connection between traffic congestion and fuel efficiency

It is estimated that around 11% of automobile fuel consumption is due to traffic congestion. It is also known that if the average speed in traffic jams were increased from 10km/h to 20km/h an improvement of almost 60% in actual fuel efficiency would result.

Easing traffic conditions and eliminating congestion to a minimum can therefore make a major contribution to reducing CO_2 emissions.

4) ASV (Advanced Safety Vehicle)

R&D project led by the former Ministry of Transport to develop a safer vehicle using information technology.

The second phase of research was conducted between FY1996 and FY2000, and the third phase is scheduled to begin in FY2001.

5) AHS (Advanced cruise-assist Highway System)

R&D project conducted by the former Ministry of Construction to develop "smart" highways to assist safe driving through telecommunications between road and vehicle. The project began in FY1996 and is scheduled to last until FY2002.

■ Availability of road traffic information and Electronic Toll Collection (ETC) [2)]

Vehicle Information and Communication System (VICS) [3)] is a service for providing real-time traffic information (e.g. congestion and traffic restrictions) via car navigation systems so drivers can change routes to avoid traffic jams. MMC began equipping its vehicles with VICS-compatible navigation systems to coincide with the launch of VICS in 1996 and is actively expanding the range of vehicles fitted with such equipment. By the end of FY 2000, a total of 270,000 MMC vehicles had been shipped with VICS systems on-board.

Electronic Toll Collection (ETC) was also introduced at 63 toll booths in March 2001 to ease traffic congestion. MMC also offers in-car ETC transponders of various kinds as optional equipment. As the number of ETC-compliant tollbooths expands nationwide (630 locations by autumn 2001 and 900 locations by the end of 2002), the number of vehicles equipped with transponders is also expected to rise.

In this way, MMC seeks to encourage spread information services to help avoid and ease traffic congestion.

■ Smart Cruise 21-Demo2000

MMC is an active participant in the ASV [4)] and AHS [5)] projects' was involved in the production of three ASV passenger vehicles and one ASV large truck used for the "Smart Cruise 21-Demo2000" public trial launched by the then Ministries of Transport and Construction in November 2000. (See table and figure.)

These vehicles are equipped with a number of effective advanced safety features confirmed in test trials. These include "advanced preview distance control", which continuously detects the vehicle in front by radar and controls the brakes and accelerator in order to maintain a safe distance, "universal design cockpits", where the accelerator and brake are positioned near the steering wheel so that they can be quickly operated by hand by anyone, and "forward obstacle collision prevention systems" which transmit information to the vehicle about obstacles out of driver's view, automatically decelerating the vehicle. Some of these devices are already used in MMC vehicles, and their further deployment will be encouraged to improve the safety and smooth flow of road transport.





No.	Vehicles developed	Development concept
1	ITS-ASV	Advanced safety vehicle designed to suit an information society and promote safe driving while moving in harmony with surrounding vehicles
2	High-mobility ASV	Incorporation of universal design principles to make the vehicle easy to operate
3	Smart Cruise 21 ASV	Safe driving support using information from the road infrastructure
4	Large Truck ASV	Necessary safety information for long-distance driving and driver workload reduction.

MMC ASVs



ASV communicating with road infrastructure

2-7. Environmental protection in the office

MMC is also actively engaged in making its management and development divisions' offices more environmentally friendly by, for example, cutting use of paper and promoting green purchasing.

Measures to conserve energy and resources

MMC continually seeks to reduce paper use in order to save resources. By first and foremost minimizing paper use through, for example, office automation, maximum use is made of recycled paper and printing on both sides in order to save paper used for copiers and computers.

Materials such as paper are also actively recycled. In each office, paper is sorted by type for collection, and used for making recycled paper. In FY2000, approximately 750 tons of paper was recycled. MMC also works in cooperation with makers to increase recycling of stationery. In the head office, used Tepra cartridges are collected.

In order to save energy, lighting is switched off during breaks and air conditioners are operated at more suitable temperatures, while energy conservation patrols are conducted by managers to ensure that these measures are properly implemented.

Promotion of green purchasing

When purchasing supplies such as stationery, MMC endeavors to give priority to more environmentally friendly products. In the head office area, order lists for stationery and other supplies have markings indicating environmentally friendly products, and priority is given to purchasing such products. The order list is in addition progressively revised in order to add other environmentally friendly products.

Interest in the preferential purchase of environmentally friendly products is also increasing in society at large, reflected by the introduction of the Green Purchasing Law [1)] on April 1, 2001. MMC therefore participates in the Green Purchasing Network (GPN) [2)] in order to provide environmental information on its main models (concerning, for example, fuel efficiency, exhaust emissions, and recycling) in order to help customers make more environmentally conscious purchasing decisions.

Reduction in use of paper	• Campaign to replace paper by other media through e.g. office automation • Use of recycled paper and both sides of paper
Reuse of resources	• Sorted collection of unnecessary documents and use for recycled paper • Launch of collection of Tepra cartridges
Energy conservation	• Lights switched off during breaks • Operation of air conditioning at more appropriate temperatures • Energy conservation patrols by managers



Bins for collection of unnecessary documents, etc.



Collection box for Tepra cartridges

1) Green Purchasing Law

See p.16

2) Green Purchasing Network

An organization established to promote the spread of preferential purchasing of environmentally friendly products

3. Environmental accounting

When undertaking activities to protect the environment, it is important to analyze and assess these activities in order to determine that appropriate spending is allocated to each activity and that the commensurate effects are obtained. By introducing environmental accounting, MMC aims to further improve the sophistication and efficiency of its environmental protection activities.

MMC's approach to Environmental accounting

Environmental accounting is currently still at the developmental stage, and there do not exist any common standards regarding the scope and calculation of effects as in the case of financial accounting. For this reason, companies and organizations are developing their own methods of accounting by a process of trial and error.

Since publication of the 1999 Environmental Report, MMC has published environmental accounting data. The data is compiled and published based on Ministry of the Environment(MOE) Environmental Accounting Guidelines(2000 version). [1)] In order to improve the sophistication of our environmental accounting, we have included for the first time data on the "economic benefits accompanying environmental conservation measures".

(The following data are calculated on a non-consolidated basis for MMC alone excluding its subsidiaries and affiliates. The period covered is from April 2000 to March 2001.)

Environmental accounting in FY2000

■ Environmental conservation cost

Focusing principally on the cost of waste disposal and energy conservation measures at plants and the cost of R&D in the R&D division, the cost of activities leading to a reduction in the impact on the environment was calculated. The environment-related portion of combined costs-i.e. spending on activities designed to meet other objectives as well as protection of the environment-was calculated by differential costing (i.e. the deduction of costs not relating to environmental protection from the total), with estimates being used where this was not possible. The cost of capital investment was included in the form of depreciation costs.

As an automaker, MMC places a strong emphasis on reducing the environmental impact of the products themselves, and also on environmental action at the production stage. Related costs comprise the majority of environmental protection costs (R&D costs: 86%, business domain costs: 11%), and the increase in the total cost since FY1999 has been due largely to the increase in R&D costs. These costs account for 2.1% of sales.

Category [2)]		Value (¥ million)	YOY % change
(1) Business area costs		4,414	107.2%
Breakdown	① Pollution prevention	(2,109)	(91.7%)
	② Protection of the global environment	(122)	(89.3%)
	③ Resource recycling	(2,183)	(127.7%)
(2) Upstream/downstream costs		87	104.8%
(3) Management activity costs		942	88.2%
(4) R&D costs		35,605	110.1%
(5) Social activity costs		279	83.3%
(6) Environmental damage costs		66	120.0%
Total		41,393	108.9%

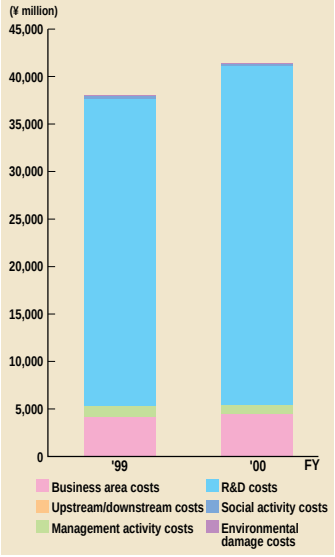
Environmental conservation costs

1) MOE Environmental Accounting Guidelines (2000 version)

The terms and table classifications used in this chapter are based on these guidelines.

2) Main categories of environmental conservation costs

(1) Costs on energy conservation, saving resources, and waste disposal, etc. at each plant.
(2) Costs on collection of used parts.
(3) Costs on environmental affairs departments, ISO14001 certification and employee education concerning the environment, etc.
(4) Costs on R&D related to improving fuel efficiency, reducing exhaust emissions, development of clean energy vehicles, and recycling, etc.
(5) Costs on donations and membership fees paid to external environmental organizations, and expenditures on maintaining areas of greenery, afforestation, etc.
(6) Costs on taxes and other charges paid to national and local governments.



1) Environmental conservation benefits

Defined by MOE guidelines as "the quantitative impact on the environment of an organization's operating activities and the increase or decrease therein".

2) Economic benefits accompanying environmental conservation measures

Defined by MOE guidelines as "the returns and the reduction and avoidance of costs to an organization arising from its environmental protection activities".

■ Environmental conservation benefits [1)]

As in last year's report, we have used quantitative data concerning the various measures to curb the impact on the environment during and after the use of products as well as at the point of production of products to calculate the environmental conservation benefits. For data other than those shown in the table below, see the appropriate pages in this report.

Additional items of data added for this report are:

- Water use
- Total CO_2 emissions during transit of passenger cars in Japan

■ Economic benefits accompanying environmental conservation measures [2)]

Changes on the previous fiscal year in the following costs were calculated to determine the economic benefits accompanying environmental conservation measures, which was adopted as a new measure for environmental accounting this year.

- Energy costs
- Waste disposal costs

The above represents only a fraction of the economic benefits, and there are possibly other benefits generated in a variety of other fields. However, only objective data are provided in this report, and no data on economic benefits based on hypothetical calculations are included (such as the benefits off avoidance of environmental risk).

The cost of waste disposal was reduced by approximately ¥430 million as a result of measures to reduce emissions. Energy costs, on the other hand, inevitably rose, despite a reduction in the amount of energy used, due to an increase in the unit price of energy.

Category	Environmental impact indices			Related page
	Item	FY2000	YOY % change	
(1) Business area benefits	• Energy consumption in production process(total CO_2 emissions) • Water use • Quantity of waste for final disposal	594,000t-CO_2 7,645,000m^3 4,200t	97.2% 96.4% 46.3%	P.24~36
(2) Upstream/ downstreamz benefits	• Total CO_2 emissions during transit of passenger cars in Japan • Number of old bumpers recovered	19,500t-CO_2 68,000	79.6% 110.5%	P.23 P.38~42
(3) Other environmental conservation benefits	• Average fuel efficiency by vehicle weight category (gasoline passenger cars) Class 1: ~702kg Class 2: 703~827kg Class 3: 828~1,015kg Class 4: 1,016~1,265kg Class 5: 1,266~1,515kg Class 6: 1,516~1,765kg Class 7: 1,766~2,015kg Class 8: 2,016~2,265kg	 23.0km/ℓ 18.9km/ℓ 15.7km/ℓ 16.1km/ℓ 12.8km/ℓ **11.1**km/ℓ 8.3km/ℓ 8.6km/ℓ	 107.5% 100.5% 100.6% 106.6% 99.2% 99.1% 100.0% 100.0%	P.12~22 P.43~44

Environmental conservation benefits

Item	Value (¥million)
• Energy consumption cost • Waste disposal/treatment cost	142 (increase) 430 (decrease)

Economic benefits accompanying environmental conservation measures

4. Social contribution activities/Communication activities

In its environmental guidelines, MMC declares that "as a good corporate citizen, we are committed to action to protect environment at the level of local communities and society as a whole".

In FY2000, MMC was involved in the following activities.

Social contribution activities

■ Activities at the local level

Category	Place
Street cleaning around company facilities	All plants
Tree planting on factory sites	All plants
Sorting and collection of general waste (empty cans, PET bottles, etc.)	All plants
Participation in flower planting and floral awareness campaigns	Kanagawa
Local environmental lectures and education, etc.	Kyoto, Mizushima



Provision of panelist for symposium during Environment Month in Kurashiki



Cleaning an overpass in the Kawasaki area



Cleaning a lane by the Main Bus and Truck Production Plant, Kawasaki

■ Participation in and contribution to environmental bodies

Item	Organization
Participation/ membership	• Membership of neighborhood associations nationwide • Tokachi Industrial Water Pollution Prevention Council • The Energy Conservation Center, Japan • Kyoto Environmental Control Research Association • Business Association for the Beautification of Omuro River and Tenjin River • Global Environment Forum Kansai • Kanagawa Industrial Waste Association • Kawasaki City Tree-Planting Council

Item	Organization
Donations, etc. (main items)	• Association for the Disposal of Abandoned Roadside Vehicles • Global Environment Forum • Japan Industrial Waste Management Foundation • The Pollution-Related Health Damage Compensation and Prevention Association • Kawasaki City Pollution-Related Health Damage Compensation Fund • Nagoya Port Authority • Meiji Yosui Land Improvement District • Kyoto City Waste Reduction Association

■ Cooperation for LEV and other affairs

MMC has exhibited various LEVs at fairs and exhibitions around the country to encourage their use.

Main events in FY2000	Organizer	Date	Place
LEV Fair 2000	Ministry of the Environment, etc.	6/10~11	Tokyo
Chiba Environment Fair	Chiba Prefecture	6/10~11	Chiba
Natural Gas Truck Explanatory Meeting and Exhibition	Japan Gas Association	6/23~24	Osaka
Osaka CEV Promotion Exhibition and Test-Drive Event	Chubu Transport Bureau, Toyoda City	7/21	Aichi
Kyushu Eco-Motor Show	Kita-Kyushu City	9/3	Fukuoka
LEV Fair in Osaka	Osaka City	9/22~23	Osaka
LEV Fair Nagoya 2000	Nagoya City	9/30~10/1	Aichi
Odawara City CEV Test-Drive Event	Odawara City	10/7	Kanagawa
NGV2000 International Exhibition	Japan Gas Association	10/17~19	Kanagawa
Chiba LEV Fair	Chiba City	10/22	Chiba
Eco-Energy Osaka	Osaka Prefecture	10/28~29	Osaka
Dynamic Local Government Fair	Toshi Mondai Kenkyukai	2/6~8	Osaka

Communication activities

To keep the public informed, MMC makes use of its environmental reports and environment website along with various pamphlets to keep the public informed.

In order to promote two-way communication with customers, local residents and other members of the public, MMC has also established customer advice centers, organizes plant tours, and participates in various events.

In addition, MMC organizes talks on environmental measures by employees at events such as regular meetings arranged by the Shiga Prefecture Konan Industrial Estate, meetings of the Business Association for the Beautification of Omuro River and Tenjin River, and the Kurashiki City Environment Month Symposium.



Environmental publications

5. A history of environmental protection at Mitsubishi Motors

Year	Development of products and technologies	Management and production operations, etc.
1966	●R&D on electric vehicles conducted in association with Tokyo Electric Power	
1969	●Gas turbine R&D begins	
1970		●Mitsubishi Motors spun off from Mitsubishi Heavy Industry
1971	●Limited production of light commercial electric vehicles ●Involvement in R&D on electric city buses, electric buses delivered to Kyoto and Kobe transportation bureaus	
1972	●Announcement of low-emission MCA engine	
1977	●Announcement of low-emission, high-efficiency MCA-JET engine	
1979	●R&D on methanol-powered car begins ●Development of prototype gas-turbine truck	
1980	●MCA-JET engine wins the Japan Society of Mechanical Engineers' (JSME) prize for technologye	
1982	●High-fuel efficiency Orion 1400MD engine announced	
1986	●Cyclone engine offering high combustion efficiency announced	
1987		●MMC wins the Minister of International Trade and Industry's award for tree planting at its Shiga plant
1988	●Announcement of world's first pre-stroke control fuel injection pump to reduce NOx emissions from diesel engines	
1989	●Eterna Sigma methanol car road tests begin	●Project team established to examine global nvironmental issues ●Diamond Star Motors (now Mitsubishi Motor Manufacturing of America) awarded the Prize for Outstanding Environmental Contribution by the U.S. Industrial Development Survey Association ●Nagoya plant-Okazaki awarded a special award by Aichi Prefecture for its greenification activities
1990	●Long-term tests of Gallant FFV (methanol car) conducted by Californian Energy Commission ●Pre-stroke control fuel injection pump wins JSME's prize for technology ●MMC participates in Japanese Ministry of International Trade and Industry's (MITI) Auto Ceramic Gas Turbine Project	
1991	●Announcement of MVV engine ●Joint development of Lancer electric car with Tokyo Electric Power	●Plastic parts weighing at least 100g marked with identifying code
1992	●MVV engine wins Automobile Technology Society's prize for technological development ●Announcement of MIVEC engine combining high fuel efficiency and high output ●Start of research into reducing particulate emissions from diesel trucks ●Awarded Japan Gas Turbine Society's prize for technology for development of ceramic turbine rotor	●Introduction of cogeneration system at Nagoya plant-Oye ●Mizushima Plant commended for contribution to the environment by Okayama Prefecture
1993	●Joint development of Libero electric vehicle with Tokyo Electric Power, delivery of 30 vehicles to Tokyo Electric Power and Tokyo government ●Light hybrid passenger car (ESR) exhibited at the 30th Tokyo Motor Show ●Start of road tests of methanol-powered Canter	●MMC Environmental Plan formulated and Basic Philosophy on the Environment established ●MMC Environmental Council established
1994	●Libero electric vehicle goes on general sale ●Start of model business for introduction of Gallant methanol-powered vehicle ●Sales of buses fitted with hydraulic hybrid systems (MBECS) start ●Start of trial sale of methanol-powered Gallant ●Development of Canter natural gas vehicle ●Elimination of CFC-12 coolant from air conditioners in all new models and switch to HFC-134a for all vehicles ●Launch of moves to reduce use of lead in new models ●Introduction of technology to strip paint from plastic parts in order to better greater recycling	●CFCs entirely eliminated from production processes

5. A history of environmental protection at Mitsubishi Motors

Year	Development of products and technologies	Management and production operations, etc.
1995	●Development and announcement of world's first high-fuel efficiency, high-output gasoline direct injection (GDI) engine	●Kyoto plant-Shiga awarded the Prime Minister's environmental contribution award for its contribution to tree-planting campaigns
	●Development of Mitsubishi HEV, tested by California Air Resource Board	●Elimination of 1.1.1-trichloroethene from all production processes
	●Announcement of MBECS-II (first diesel car to pass the 1999 exhaust controls)	
	●Canter HEV developed and exhibited at 31st Tokyo Motor Show	
	●Road tests start on city bus fitted with DPF system	
1996	●Announcement of vehicles powered by GDI engines (Gallant, Legnum)	●MMC Environmental Plan revised
	●GDI engine awarded the Minister of International Trade and Industry's award by the Energy Conservation Center	●Recycling Committee established in the MMC Environmental Council
	●Development of mechanical AT "INOMAT"	
	●MBECS-III offering improved high efficiency goes on sale	
	●First ever common-rail fuel injection system adopted for mass-produced tractor engine	
	●LPG Canter goes on sale	
	●DPF system for city buses enters commercial use, 30 vehicles delivered to Yokohama	
1997	●GDI engine wins JSME and Auto Technology Society prizes for technological development	●Launch of recovery and recycling of old bumpers replaced by dealers
	●MMC awarded the 1997 Environmental Contribution Award for the Prevention of Global Warming for developing and encouraging the wider use of GDI engines	●Introduction of cogeneration system at Kyoto Plant
		●Nagoya Plant-Okazaki and Tokyo Plant-Kawasaki take part in Environmental Agency's PRTR Pilot Project
	●CNG Canter goes on sale	●All eight plants take part in voluntary PRTR trials organized by Keidanren
	●Joint development of low-cost, high-performance lithium-ion battery with Japan Storage Battery	●Publication begins of "Plant Environmental Topics" for distribution to suppliers, etc.
	●Approximately 20% reduction in use of HFC-134a coolant in air conditioners for the Chariot Grandis	●Environmental Liaison Council established to liaise between main affiliates and members of the MMC Group
	●World-beating thermal efficiency achieved in MITI Auto Ceramic Gas Turbine Project	
1998	●MVV engine fitted as standard in all minicars built under the new minicar standards	●Announcement of MMC's voluntary ELV Recycling Action Plan
	●Low-emission Gallant, Legnum and Aspire go on sale	●Completion of nationwide system for recovery and destruction of CFC-12 coolant used in air conditioners
	●Development of parts made from waste paper and use in new Pajero model	
	●CNG Aerostar goes on sale	●Nagoya, Kyoto and Mizushima Plants acquire ISO14001 certification
	●Development of easy-to-recycle TEO weather strip suitable for all vehicles	●Abolition of use of tetrachloroethene and dichloromethane chlorine cleaning agents
1999	●Development of GDI Sigma series	●Replacement of Basic Philosophy on the Environment by new MMC Environmental Guidelines
	●New Pajero model fitted with direct injection diesel passenger car engine	●Establishment of Environmental Affairs Department
	●Development of Pistachio GDI-ASG vehicle	●Publication of first MMC Environmental Report
	●Establishment of project team to investigate ways of reducing vehicle weight	●Tokyo Plant acquires ISO14001 certification (all domestic works now ISO14001 compliant)
2000	●New Lancer Sedia fitted with GDI-CVT	●Launch of Green Procurement (suppliers requested to cooperate in environmental activities)
	●Pajero IO fitted with GDI turbo	●Development of environmental management systems for dealers
	●Hybrid electric drive system for large buses developed, and exhibited at Tokyo Motor Show	
2001 (to March)		●Emissions of waste for landfill disposal eliminated at the Nagoya and Kyoto Plants

6. Main business establishments and affiliates

■ Business establishments	Address	Telephone
Head office	5-33-8, Shiba, Minato-ku, Tokyo 108-8410, Japan	☎+81-3-3456-1111
Car Research & Development Office	1, Nakashinkiri, Hashime-cho, Okazaki, Aichi 444-8501, Japan	☎+81-564-31-3100
Tokachi Proving Ground	9-3 Otofuke-cho, Kato-gun, Hokkaido 080-0271, Japan	☎+81-155-32-7111
Tama Design Center	1-16-1, Karakida, Tama, Tokyo 206-0035, Japan	☎+81-423-89-7307
Truck & Bus Research & Development Office	10, Okura-cho, Nakahara-ku, Kawasaki, Kanagawa 211-8522, Japan	☎+81-44-588-1111
Kitsuregawa Proving Ground	4300, Washijuku, Kitsuregawa-cho, Shioya-gun, Tochigi 329-1411 Japan	☎+81-286-86-4711
Nagoya Plant		
Oye	2, Oye-cho, Minato-ku, Nagoya, Aichi 455-8501 Japan	☎+81-52-611-9100
Okazaki	1, Nakashinkiri, Hashime-cho, Okazaki, Aichi 444-8501 Japan	☎+81-564-31-3100
Kyoto Plant		
Kyoto	1, Uzumasa, Tatsumi-cho, Ukyo-ku, Kyoto 616-8501 Japan	☎+81-75-864-8000
Shiga	2-1, Kosunamachi, Kosei-cho, Koga-gun, Shiga 520-3212, Japan	☎+81-748-75-3131
Yagi	10-1, Oaza Murohashi Koaza Yamada, Yagi-cho, Funai-gun, Kyoto 629-0102, Japan	☎+81-771-43-2200
Mizushima Plant	1-1, Mizushima Kaigandori, Kurashiki, Okayama 712-8501, Japan	☎+81-86-444-4114
Truck & Bus Production Office		
Kawasaki	10, Okura-cho, Nakahara-ku, Kawasaki, Kanagawa 211-8522, Japan	☎+81-44-587-2000
Nakatsu	4001, Nakatsu Aza Sakuradai, Aikawa-cho, Aiko-gun, Kanagawa 243-0303, Japan	☎+81-462-86-8111

■Main affiliates	Location	Line of business	Ownership	Capital stock
Mitsubishi Automotive Engineering Co., Ltd.	Kawasaki City, Kanagawa	Development and design of vehicles and parts	100%	¥450m
MMC Computer Research ., Ltd.	Okazaki City, Aichi	Computer development related work	100%	¥30m
MMC IT Solution Co., Ltd.	Minato-ku, Tokyo	Computer systems development and software design and development	100%	¥3,240m
Mitsubishi Automotive Techno-Metal Corporation	Nihonmatsu City, Fukushima	Manufacture and machining of cast/forged products	100%	¥1,940m
Ryowa Sheet Metal Processing Co., Ltd.	Chiryu City, Aichi	Manufacture of sheet metal parts (doors, hoods, etc.)	100%	¥150m
Mizushima Industries Co., Ltd.	Kurashiki City,	Manufacture of light four-wheel drive special purpose vehicles and vehicle parts	43.75%	¥64m
Mitsubishi Motors Bus Manufacturing Co., Ltd.	Nei-gun, Toyama	Bus body mounting	100%	¥6,400m
Pabco Co., Ltd.	Ebina City, Kanagawa	Truck mounting (decks, van bodies, etc.)	100%	¥600m
Pajero Manufacturing Co., Ltd.	Kamo-gun, Gifu	Pajero production and manufacture of die-cast and sheet metal parts	66%	¥610m
Mitsubishi Motors Training Center Co., Ltd.	Okazaki City, Aichi	Center for car mechanic training and domestic and overseas repair and servicing skills training	100%	¥750m
Mitsubishi Automotive Techno-Service Co., Ltd.	Shinagawa-ku, Tokyo	Servicing of new passenger cars, diesel engine recycling	100%	¥400m
MMC Test and Drive Corporation	Okazaki City, Aichi	Test driving, measuring and servicing of test vehicles	100%	¥50m
Ralliart Inc.	Minato-ku, Tokyo	Participation in and support for motor sports	100%	¥54m
Mitsubishi Auto Credit-Lease Corporation	Minato-ku, Tokyo	Credit services, car rental, leasing	43%	¥960m
Mitsubishi Automotive Logistics Co., Ltd.	Minato-ku, Tokyo	Original contractor for transport of finished vehicles for domestic and export markets	75%	¥300m
MMC International Corporation	Minato-ku, Tokyo	Vehicle and parts export procedure agency and technical translation services	100%	¥40m
JIN, Inc.	Minato-ku, Tokyo	Education and training services relating to corporate personnel development	100%	¥11m
Mitsubishi Motor Manufacturing of America, Inc. (MMMA)	USA	Auto manufacture	97.11%	US$23.4m
Mitsubishi Motor Sales of America, Inc. (MMSA)	USA	Auto import, sale and related business	97.20%	US$51.6m
Mitsubishi Fuso Truck of America, Inc. (MFTA)	USA	Auto import and marketing	100%	US$10m
Mitsubishi Motors America, Inc. (MMA)	USA	Collection of vehicle data, etc	100%	US$5.7m
Netherlands Car B.V. (NedCar)	Netherlands	Auto manufacturing	85%	NLG 551m
Mitsubishi Motors Europe B.V. (MME)	Netherlands	Overall control of European facilities	100%	NLG 117m
Mitsubishi Motors Philippines Corp. (MMPC)	Philippines	Import, assembly and marketing of vehicles	51%	Pesos 1,464m
MMC Sittipol Co., Ltd.(MSC)	Thailand	Manufacture, import and marketing of vehicles	46.22%	Baht 834m
Mitsubishi Motors Australia Ltd., (MMAL)	Australia	Manufacture, import and marketing of vehicles	88%	A$279m

7. Glossary

Glossary	
A/T	Automatic Transmission
ACE Project	Advanced Clean Energy Vehicle Project
AHS	Advanced Cruise-Assist Highway Systems
ASG	Automatic Stop and Go
ASR	Automobile shredder Residue
ASV	Advanced Safety Vehicle
BOD	Biochemical Oxygen Demand
CAN	Controller Area Network
Cd	Coefficient of Drag
CFC	Chlorofluorocarbon
CNG	Compressed Natural Gas
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COD	Chemical Oxygen Demand
CVT	Continuous Variable Transmission
dB	Decibel
DOHC	Double OverHead Camshaft
DPF	Diesel Particulate Filter
ECU	Electronic Control Unit
EBS	Electronic Braking System
ECI	Electronic Control Injection
EGR	Exhaust Gas Recirculation
ELV	End of Life Vehicle
ETC	Electronic Toll Collection
EV	Electric Vehicle
GDI	Gasoline Direct Injection
GPN	Green Purchasing Network
HC	Hydrocarbon
HEV	Hybrid Electric Vehicle

Glossary

HFC	Hydrofluorocarbon
INOMAT	Intelligent and Innovative Mechanical Automatic Transmission
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
ISS	Idling Stop & Start System
ITS	Intelligent Transport Systems
LCA	Life Cycle Assessment
LCI	Life Cycle Inventory
LCIA	Life Cycle Impact Analysis
LEV	Low Emission Vehicle
LPG	Liquid Petroleum Gas
MCC Smart	Micro Compact Car Smart
M/T	Manual Transmission
MBECS	Motor Vehicle Brake Energy Conservation System
MIQCS	Mitsubishi Innovative Quiescent Combustion System
MPI	Multi Point Injection
MSDS	Material Safety Data Sheet
MVV	Mitsubishi Vertical Vortex
ND	Not Detectable
NOx	Nitrogen Oxide
OJT	On The Job Training
PCB	PolyChlorinated Biphenyls
PM	Particulate Matter
PP	Polypropylene
PRTR	Pollutant Release and Transfer Register
SOHC	Single OverHead Camshaft
SOx	Sulfur Oxide
SS	Suspended Solid

Glossary

SWS	**Smart Wiring System**
TEO	**Thermoplastic Elastomers Polyolefinic**
VG	**Variable Geometry**
VICS	**Vehicle Information and Communication Systems**
VOC	**Volatile Organic Compounds**

MITSUBISHI MOTORS CORPORATION
TOKYO, JAPAN

5-33-8 Shiba, Minato-ku, Tokyo 108-8410, Japan
Reference: Environmental & Technical Affairs Department
Fax: +81-3-5232-7641
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http://www.mitsubishi-motors.co.jp/ECO/

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