



DENSO Corporation
Environmental Report
1999

Technology
For the
World

Corporate Profile

Corporate Name: DENSO CORPORATION
Date of Establishment: December 16, 1949
Capitalization: ¥165.9 billion
Number of Employees: 40,300

Note: Figures for capitalization and number of employees are as of March 31, 1999; yen values under ¥100 million have been rounded down.

Financial Results (Nonconsolidated)

Net Sales: ¥1,329.0 billion
Net Income: ¥37.0 billion

Financial Results (Consolidated)

Net Sales: ¥1,758.8 billion
Net Income: ¥58.9 billion

Note: Figures for net sales and net income are as of March 31, 1999; values under ¥100 million have been rounded down.

Principal Businesses

Automotive Components Business:
Air conditioners and heaters, electrical automotive and electronic control products, fuel management systems, radiators, meters, filters, and other

New Business Domains:
Wireless telephones and other telecommunication equipment, factory automation (FA) systems, applied electronics, and environmental systems

Contents

A Message from the President.....	1
Environmental Management System	
Fundamental Thinking Regarding Environmental Protection Activities	2
Environmental Action Plan	3
Overview of DENSO's Environmental Management System...	4
Compliance with ISO 14001 International Standards	4
Environmental Costs	6
Environmental Education and Awareness Building	7
Product Division Activities	
Fundamental Thinking	8
Improving Automotive Fuel Efficiency.....	9
Reducing the Impact of Automotive Air Conditioners on Global Warming	10
Approach to End-of-Life Vehicles	12
Cleaning Automotive Exhaust Emissions	14
Reducing the Use of Hazardous Substances.....	16
Production Activities	
Fundamental Thinking	18
Energy Conservation	19
Reducing Companywide Waste	21
Reducing the Environmental Impact Generated by Production Processes.....	22
Reducing the Use of Ozone-Depleting Substances ...	24
Environmental Protection Activities of Subsidiaries and Affiliates	
Teamwork with Domestic Affiliates	26
Environmental Management of DENSO's Overseas Network	27
Social Contribution	28
Main Sites and Affiliates	29
Environmental Data by Plant	30



●Regarding DENSO's Environmental Symbol Mark

This environmental symbol was developed in July 1995 and is used on pamphlets and during exhibitions and events to introduce DENSO's environmental activities.

The design was created by an in-house designer and expresses the concept: "The earth has a heart and lives with vitality and vibrancy in harmony with humankind and nature."

A Message from the President

Over a century has passed since the advent of automobiles powered by internal combustion engines. These automobiles have played a pivotal role in moving products and people around the world as well as having contributed to the development of industry and the enhancement of people's lives. At the same time, gasoline and diesel vehicles create a burden on the environment in terms of global warming due in part to exhaust emissions as well as air pollution and waste-related problems, from their development to their usage and disposal.

DENSO is one of Japan's leading automotive component manufacturers and is keenly aware of these facts. We place top priority on attaining harmony between economic development and environmental protection. Reducing environmental impact is a focus in all our operations, particularly in product development and production processes.

We are contributing to the prevention of global warming through product development that creates smaller and lighter components as well as applies technologies that reduce fuel consumption by more efficient combustion. In line with this, we are making products easier to recycle to cut down on waste and developing products to clean exhaust emissions. DENSO is contributing to reducing harmful emissions while pursuing the necessary technologies for electric cars and other vehicles to run on alternative energy sources.

DENSO is promoting a range of activities in the manufacturing field as well. We are conserving energy by deploying cogeneration systems, reducing waste through the 3R

(Reduce, Reuse, and Recycle) Action Plan and implementing voluntary guidelines for water- and air-quality management that are stricter than those mandated by law.

Furthermore, we are engaged in the development of the Electronic Toll Collection System (ETC) and navigation systems for Intelligent Transport Systems (ITS). DENSO is also involved in areas of environmental protection that incorporate a wider view of the entire automotive transportation system.

DENSO will develop innovative technologies and systems and reduce the environmental impact of all its operations to help the automotive industry continue to grow as one of the world's major industries in the 21st century. We will contribute to the happiness of people worldwide and balance the needs of both economic prosperity and environmental protection.

DENSO has published its *Environmental Report 1999*, which introduces DENSO's activities with regard to environmental protection, particularly in fiscal 1998, ended March 31, 1999. Through this report, DENSO hopes to provide readers with an understanding of both its view on environmental protection and specific activities that it has been implementing. We would appreciate hearing your frank opinions regarding this report, as they are valuable in shaping our future activities.



Hiromu Okabe

Hiromu Okabe
President

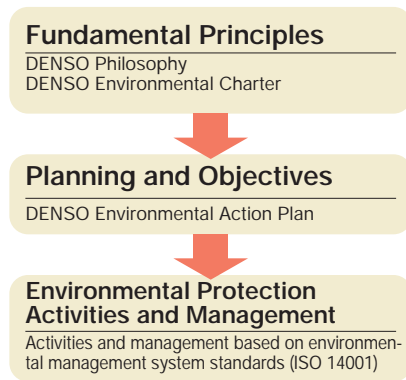
Environmental Management System

Fundamental Thinking Regarding Environmental Protection Activities

In the next century, various problems threaten to emerge, including rising prices for food and energy and the deterioration of the natural environment. We are taking action to prevent such problems. For example, by reducing exhaust emissions and upgrading energy efficiency, we can create an even better environment and promote even richer interaction

through a variety of avenues, such as automobiles as well as information and communications systems. DENSO would like to help create a society that fosters an even better environment to solve problems that are global in scale and facilitates even richer interaction among people everywhere.

Based on the DENSO Philosophy, we have formulated the DENSO Environmental Charter and the DENSO Environmental Action Plan to clarify our fundamental mind-set and have made definite steps toward realizing the goals of the Environmental Action Plan.



The DENSO Philosophy

Mission

Contributing to a better world by creating value together with a vision for the future

Management Principles

1. Customer satisfaction through high-quality products and services
2. Global growth through anticipation of change
3. Environmental preservation and harmony with society
4. Corporate vitality and respect for individuality

Individual Spirit

1. To be creative in thought and steady in action
2. To be cooperative and pioneering
3. To be trustworthy by improving ourselves

DENSO Environmental Charter (adopted in March 1993)

DENSO is profoundly aware that corporate activities deeply affect the earth's environment. Based on its fundamental policy to treasure nature and grow in harmony with the global community, DENSO seeks to meet the needs of both economic development and the environment and thus build a socioeconomic system that is in harmony with the environment. To this end, in all DENSO's worldwide activities, it seeks to 1) protect the global environment, 2) give full consideration to the preservation of the ecology and natural resources, and 3) improve the living environment in local communities and ensure the health and safety of both employees and local citizens. The following activities are designed to achieve these objectives.

1. Product Design and Production

Implement prior evaluations and undertake measures to remove deleterious influences in all operating activities, from the selection of plant locations to product design, manufacturing, and disposal

- (1) **Prevention of pollution** (air, water, waste, noise, vibration, etc.)
- (2) **Elimination of ozone-depleting substances** (specific CFCs, trichloroethane, etc.)
- (3) **Effective use of resources**
 1. Adopt production processes that reduce industrial waste through recycling
 2. Reduce the volume of paper used
- (4) **Reduction of energy consumption by raising efficiency and taking other measures**

2. Technological Development

Develop innovative technologies and systems that enable energy and resource conservation and recycling, thus contributing to resolving environmental problems

3. Public Relations, Awareness Building, and Coexistence with Society

DENSO is implementing public relations and awareness-building programs that target both its employees and society as a whole. By encouraging employees to proactively participate as members of local communities in volunteer activities and promoting communication at all levels of society, DENSO seeks to build a relationship with society for mutual prosperity.

4. Approach

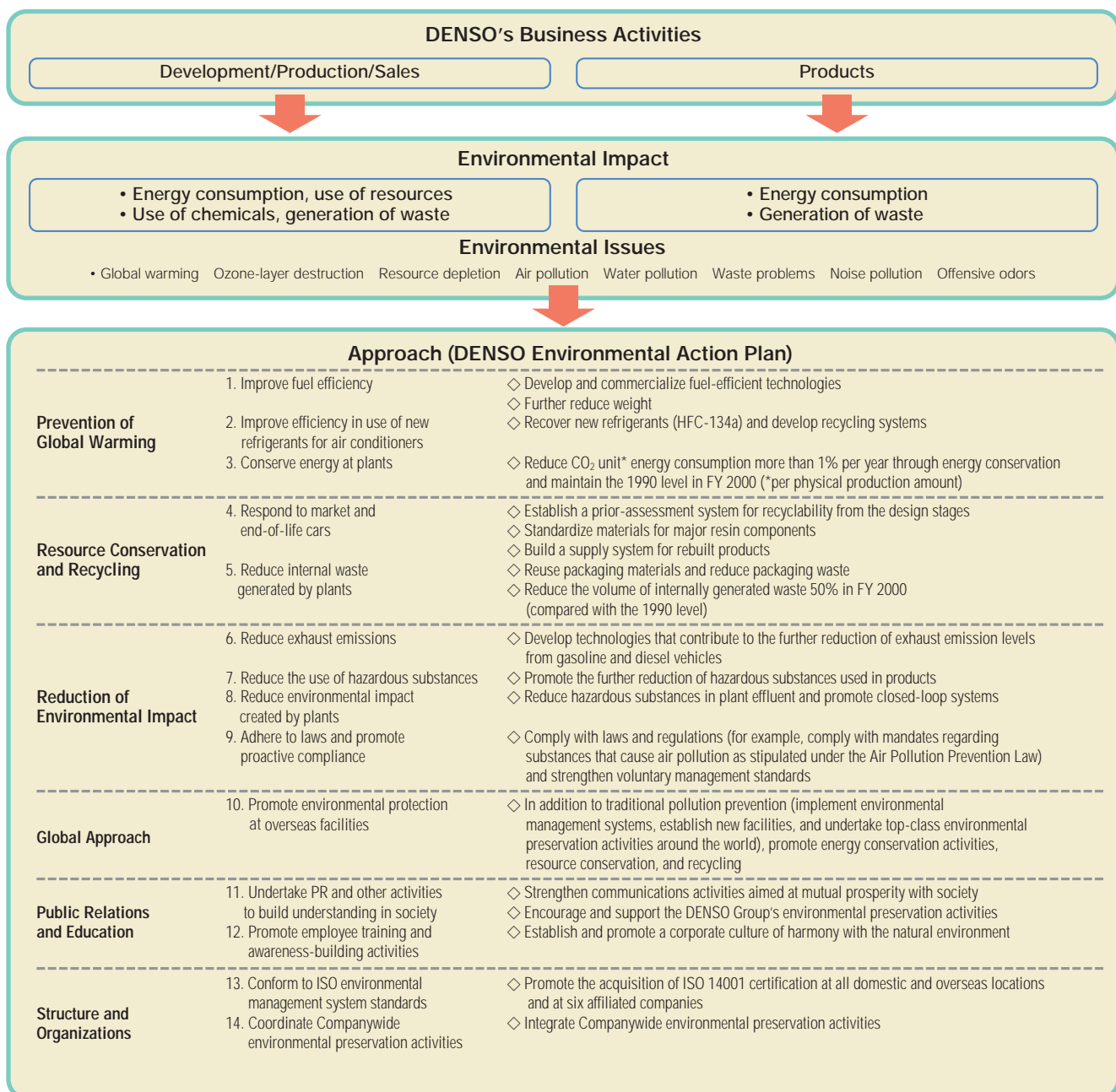
Our approach to such issues involves forming the Environment Committee in cooperation with affiliates around the world to promote environmental preservation activities and raise the level of environmental management.

Environmental Action Plan

DENSO uses natural resources and energy in its operations and impacts the environment in various ways. In recognition of this, the Company is enthusiastically promoting not only pollution prevention but also activities to conserve both energy and resources.

Following the Global Summit in June 1992, DENSO became even more aware of the importance of environmental preservation. To intensify its activities in this area, the Company undertook a thorough review of goals, plans, and action items

and formulated its Environmental Action Plan. By implementing this plan, DENSO will improve the efficiency of production and resource usage and create innovative products and new technologies that help make the recycling society a reality.



Overview of DENSO's Environmental Management System

Structure and Organization

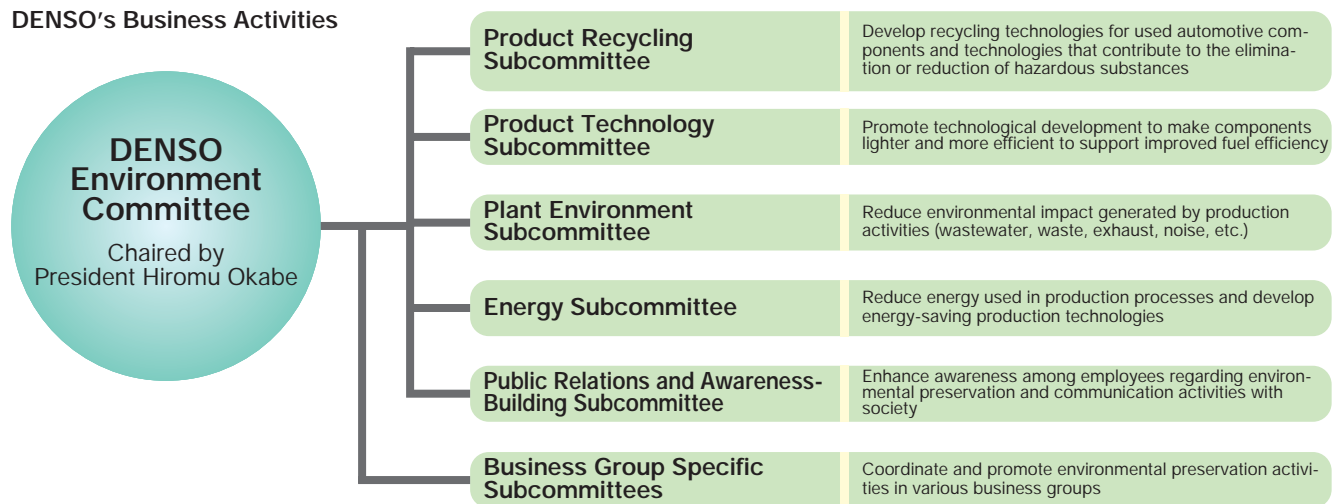
In December 1992, DENSO made environmental protection a top management priority and established the DENSO Environment Committee as a unified forum for evaluating its response to environmental protection, which previously was overseen independently by each business group. The committee discusses and sets policies, targets,

and initiatives concerning environmental preservation to reduce the environmental impact of its products throughout their life cycles, from development and design to manufacturing, usage, and disposal.

Under the Environment Committee, five subcommittees were established to consider major issues. The subcommittees

include the Product Recycling Subcommittee, the Product Technology Subcommittee, the Plant Environment Subcommittee, the Energy Subcommittee, and the Public Relations and Awareness-Building Subcommittee. In addition, Business Group Specific Subcommittees were established to discuss product-specific issues.

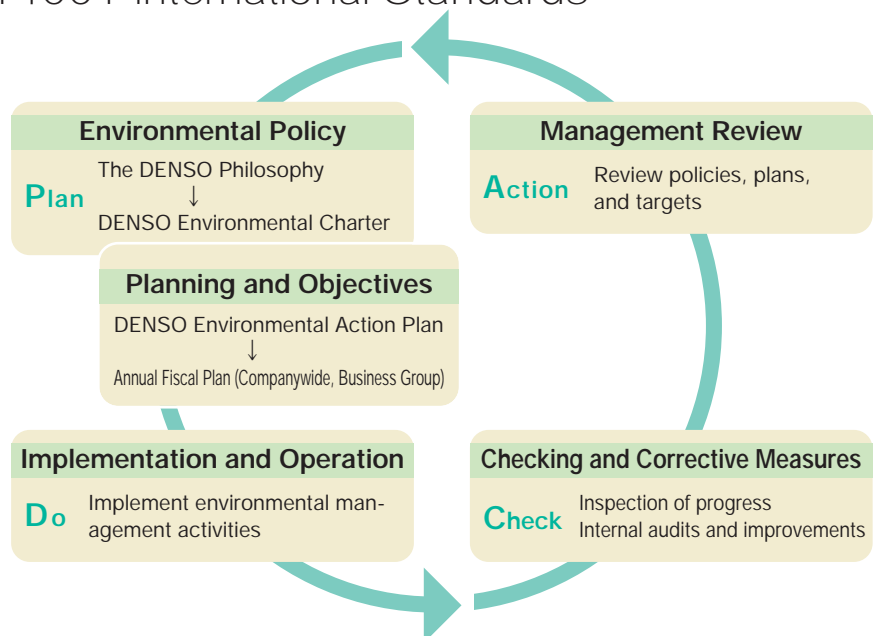
DENSO's Business Activities



Compliance with ISO 14001 International Standards

DENSO is aggressively promoting the acquisition of ISO 14001 certification, the international standards for environmental management systems, to strengthen its own environmental management system and increase the transparency of its activities to external parties.

Following the Ikeda Plant's ISO 14001 certification—the first facility in the Japanese automotive component industry to receive such certification—in October 1996, all 14 of DENSO's operating units in Japan were certified by the end of fiscal 1998. Looking at its overseas production network, 15 of the 25 major facilities obtained ISO 14001 certification (as of January 1997), and the remaining 10 facilities are making the necessary efforts to become certified.



Environmental Audits

DENSO conducts audits to ensure that its environmental activities are in accordance with the rules outlined in its environmental manuals. The Company carries out both internal and external audits. External audits involve the verification of ISO 14001 compliance by inspection and registration organizations outside DENSO.

Internal audits are conducted by in-house auditors who use an audit check sheet covering 660 items in 24 categories. The results of such audits are reported to senior executives for review.

In fiscal 1998, the internal auditors confirmed that there were no issues raised in terms of accidents, complaints, or lawsuits concerning DENSO's environmental preservation efforts. In addition, no major problems were pointed out in the external assessments.


Approach to Life-Cycle Assessment (LCA)

Products affect the environment in a variety of ways—including global warming and water pollution—throughout their life cycles, from procurement to materials processing, product manufacturing, usage, and disposal.

Environmental protection measures that focus on merely one stage of this cycle may indeed worsen the burden on the environment. The impact that products exert on the environment must be viewed holistically, and technologies that can evaluate the effectiveness of environmental protection must be developed comprehensively.

ISO 14001 Certified DENSO Facilities in Japan (completed at all facilities)

Location	Date of Registration	Inspection and Registration Organization
Headquarters and Kariya Plant	11.9.98	JARI
Ikeda Plant	10.9.96	J E T
Anjo Plant	12.26.96	JARI
Nishio Plant	12.26.97	J E T
Takatana Plant	1.16.98	JARI
Daian Plant	3.26.98	JARI
Kota Plant	10.22.97	J E T
Toyohashi Plant	11.19.97	JARI
Agui Plant	7.28.97	JARI
Kitakyushu Plant	12.18.97	JARI
Zenmyo Plant	3.20.99	J E T
Hiroshima Plant	4.17.98	J E T
Nukata Testing Center	5.25.98	J E T
DENSO Research Laboratories	1.26.98	J E T



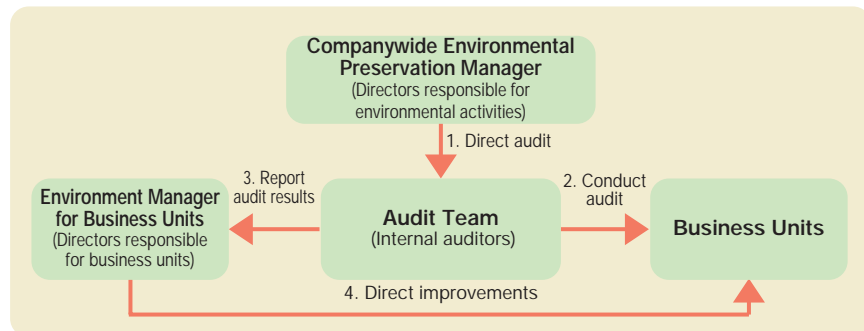
ISO 14001 CERTIFICATE

JARI: Japan Automobile Research Institute
JET: Japan Electrical Testing Laboratory

ISO 14001 Certified DENSO Overseas Facilities

Region	Country	Company	Date of Registration	Inspection and Registration Organization
North America	United States	DENSO MANUFACTURING MICHIGAN, INC.	6.11.98	DNV
		DENSO MANUFACTURING TENNESSEE, INC.	6.18.98	AWM
		DENSO SALES CALIFORNIA, INC.	3.18.99	DNV
		AMERICAN INDUSTRIAL MANUFACTURING SERVICES, INC.	4.2.99	UL
		ASSOCIATED FUEL PUMP SYSTEMS CORPORATION	5.13.99	DNV
Europe	United Kingdom	DENSO MANUFACTURING UK LTD.	12.2.96	LRQA
		DENSO MARSTON LTD.	4.3.97	LRQA
	Spain	DENSO BARCELONA S.A.	12.2.98	LRQA
Oceania	Australia	AUSTRALIAN AUTOMOTIVE AIR PTY. LTD.	12.14.97	LRQA
		DENSO MANUFACTURING AUSTRALIA PTY. LTD.	3.1.99	QAS
Asia	Thailand	DENSO (THAILAND) CO., LTD.	1.22.98	TISI
	Taiwan	DENSO TAIWAN CORP.	4.8.98	UL
	Philippines	PHILIPPINES AUTO COMPONENTS, INC.	8.24.98	AJA
	Indonesia	P.T. DENSO INDONESIA CORP.	12.8.98	KEMA
	China	YANTAI SHOUGANG DENSO CO., LTD.	4.23.99	CCEMS

Internal Audit Organizations



LCA methodologies arose from this need. Today, LCA is being actively studied around the world. DENSO is working on building an LCA system

for automotive components in the near future.

Environmental Costs

Environmental accounting is designed to assess the costs and benefits of environmental preservation. At present, the principles of environmental accounting are not well established in considering which items should be compiled to calculate the costs of environmental protection and how avoidable costs—that may contribute to profitability—should be estimated.

DENSO has recently formed a working group to study environmental accounting in an effort to define its approach to environmental accounting and to build a cost-calculation system. As such, the Company is not yet in a position to release accurate data on environmental costs. However, DENSO believes that disclosing environmental costs is an obligation of all companies and has included such data to the extent possible in this report.

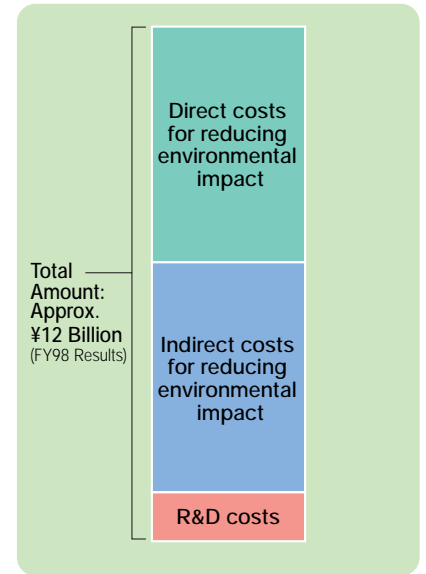
Environmental Costs Covered in this *Environmental Report*

In this report, environmental costs were estimated in accordance with the Environmental Agency's *Environmental Accounting Guidelines* published in March 1999, which stipulate the following categories: Direct Costs for the

Reduction of Environmental Impact, Indirect Costs for the Reduction of Environmental Impact, and R&D Costs for the Reduction of Environmental Impact.

Regarding direct costs for the reduction of environmental impact, DENSO has compiled capital expenditures targeted primarily at environmental preservation, expenses incurred for operating pollution-prevention equipment, and processing costs for industrial waste. In addition, the Company included a portion of capital investments for facilities that serve both environmental protection and other purposes according to a certain standard; for example, the portion of investment in a production line that contributes to reducing environmental impact was included.

Indirect costs for the reduction of environmental impact (administrative costs for environmental issues) include the portion related to environmental protection of investment in production facilities for products that contribute to environmental preservation; expenditures for employees' environment-related training; expenses for building and operating environmental management systems and obtaining certification for those systems as well as



personnel expenses for the environmental committees.

R&D costs for the reduction of environmental impact include costs incurred for R&D and the design of products and production processes to improve automobile fuel efficiency and to clean exhaust emissions.

The aggregate total of all such expenditures during fiscal 1998 was approximately ¥12 billion, about 0.9% of net sales.



●The Zenmyo Plant Biotope

Combining "bio" for living things and "tope" for place, a biotope is a natural ecosystem where a wide variety of life can coexist. DENSO's Zenmyo Plant created a biotope "to recreate a country hillside to provide respite to the community."

Environmental Education and Awareness Building

To realize successful environmental preservation, all managers and employees must clearly understand its objectives and proactively participate in its relevant activities. To enhance employees' knowledge regarding environmental issues and to translate that knowledge into better understanding, DENSO is promoting environmental education and sponsoring environmental exhibitions on an ongoing basis.

● Environmental Education

DENSO built an environmental education system—tailored to employees according to their positions, from new employees to managers—that enables the reinforcement of the learning process throughout an employee's career. In fiscal 1998, employees at the ranks listed in the table on the right received training on the importance of environmental preservation and their roles.

● Environmental Exhibitions

DENSO held exhibitions to introduce its environmental preservation activities in a readily comprehensible manner and thus encouraged employees' understanding of environmental issues and promoted their participation in environmental activities. An exhibition held from July 14 to 16, 1998, attracted more than 1,700 employees and managers. The exhibition was well received, and subsequent exhibitions were held in each business unit. In the future, DENSO will regularly hold such exhibitions to further enhance awareness of environmental issues.

Environmental Education System

Rank	Content	
New Employees	Basic environmental issues; DENSO environmental policies; Environmental policy in the workplace; Fundamental knowledge of environmental preservation	
Newly Promoted	Team Leaders	Basic environmental issues; Status of environmental preservation at DENSO; Responsibilities of team leaders
	Assistant Managers	Basic environmental issues; Process for environmental management
	Managers	Basic environmental issues
	Department Managers Plant Managers	Environmental management (responsibilities and authority)
Managers (technical staff)	Environmental preservation technologies	
Environmental Workers*	Overview of facilities; Operation and inspection; Maintenance; Taking measures for irregularities and emergencies	
All Employees	Key points of environmental management system	

*Environmental workers: Employees that DENSO determines to be involved in the operation and maintenance of critical facilities in terms of potential impact on the environment, including production engineers, employees working in safety, health, and environment-related roles, and employees responsible for power generation facilities

● Environmental Exhibition

This exhibition, held for the promotion of DENSO environmental protection efforts, comprised an array of booths and displays covering a range of issues.

- Status of environmental destruction and DENSO's approach
- Prevention of global warming
- Reduction of industrial waste
- Prevention of environmental pollution
- Business groups' environmental preservation activities: The life of an automotive air conditioner
- ISO environmental management systems and others



Product Division Activities

Fundamental Thinking

DENSO's fundamental thinking with regard to product development is "to develop innovative technologies and systems that enable energy conservation, resource conservation, and recycling and thus contribute to the resolution of global environmental problems caused by the use and disposal of automobiles."

The Company approaches environmental issues in line with the following five goals: 1) improve automobile fuel

efficiency, 2) reduce the impact of automotive air conditioners on global warming, 3) find a solution to deal with end-of-life vehicles, 4) clean automotive exhaust emissions, and 5) reduce the use of hazardous substances.

To achieve these goals, DENSO develops a range of technologies, products, and systems, including products that improve engine efficiency, Intelligent Transport Systems (ITS) products to facilitate traffic

flow, refrigerant technologies to reduce the impact of automotive air conditioners on global warming, and products and systems that reduce power consumption. To solve the problem posed by end-of-life vehicles, DENSO is also developing products that are easy to recycle. Moreover, the Company is developing control technologies and purifiers to clean exhaust emissions and is actively working to reduce the use of products that burden the environment.

Activity Objectives and Results

Goal	Item	Activity Objectives	Activity Results
Prevention of Global Warming	1. Improve automobile fuel efficiency	Develop products that improve engine efficiency Develop products to facilitate traffic flow	Mass production of Continuously Variable Valve Timing Mechanism and equipment for hybrid cars Commercialization of ETC (Electronic Toll Collection) system in the ITS field
	2. Reduce the impact of automotive air conditioners on global warming	Develop products to reduce the impact of refrigerants Develop energy-saving products	Mass production of leak-resistant hoses and joints Research into alternative refrigerants (CO ₂ , HC, etc.) Mass production of high-efficiency subcool condensers, high-efficiency compressors, and dual-layer units for external and internal air
Resource Conservation and Recycling	3. Find a solution to deal with end-of-life vehicles	Develop easy-to-recycle products Develop and diffuse equipment for environmental preservation	Material labelling of resins and rubber for separation Development and diffusion of refrigerant recovery technologies Development and diffusion of LLC concentration and separation equipment
Reduction of Environmental Impact	4. Clean automotive exhaust emissions	Develop products to clean exhaust emissions	Mass production of air-fuel (A/F) ratio sensors, hexagonal cell monoliths, and common rail systems
	5. Reduce the use of hazardous substances	Reduce the use of products that contain hazardous substances	89% reduction in lead usage (compared with the 1996 level)



Improving Automotive Fuel Efficiency

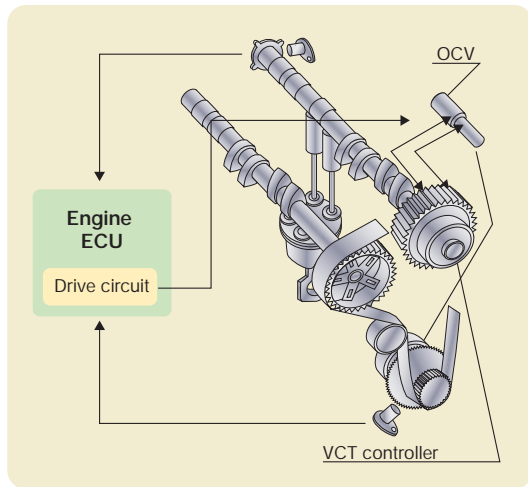
Contributing to the Improvement of Fuel Efficiency through New Technologies

As an automotive components manufacturer, DENSO cooperates with its customers, automobile manufacturers, to develop new technologies and supply components that create more efficient power trains and are necessary for the switch over to electric cars, hybrid cars, and cars running on alternative fuels.

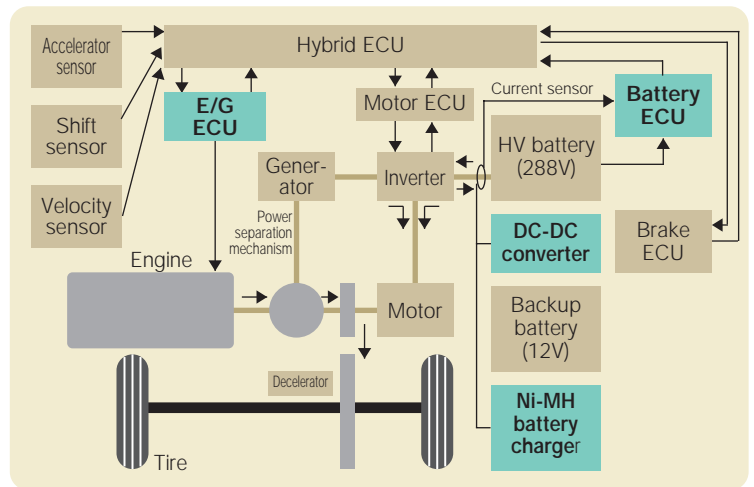
To cite just a few examples, for Toyota Motor Corp. in 1995 we developed the continuously variable valve timing mechanism, which optimizes the timing of the opening and closing of intake valves according to engine operating conditions. In 1996, Toyota adopted DENSO's high-pressure fuel pumps and high-pressure injectors for direct-injection gasoline engines. In 1997, DENSO's electronic

control units (ECUs) for batteries and DC-DC converters were adopted in Toyota's Prius, the world's first mass-produced hybrid vehicle. In 1998, our intake-exhaust continuously variable valve timing mechanism and other products were adopted in Toyota's Altessa.

Continuously Variable Valve Timing Mechanism



DENSO Products Used in Toyota Prius's Control System

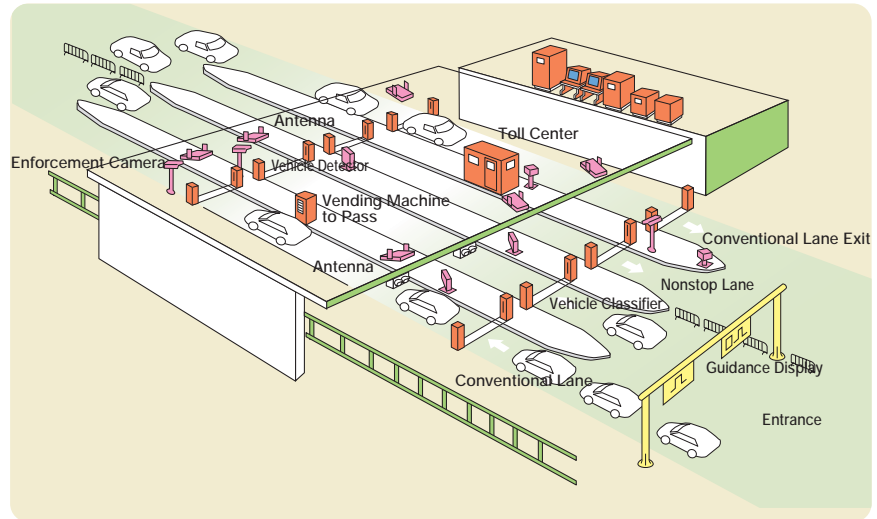


Improving Fuel Efficiency with ITS

Considering traffic flow as a whole, DENSO believes that promoting the advancement of ITS will help alleviate traffic congestion and smooth traffic flow, thereby improving fuel efficiency overall.

For the ITS field, DENSO is developing and marketing such products as the Electronic Toll Collection System (ETC) and navigation systems that support the Vehicle Information and Communication System (VICS) and the Advanced Vehicle Operation System (AVOS).

ETC System



(Based on images created by Japan Highway Public Corporation.)

Reducing the Impact of Automotive Air Conditioners on Global Warming

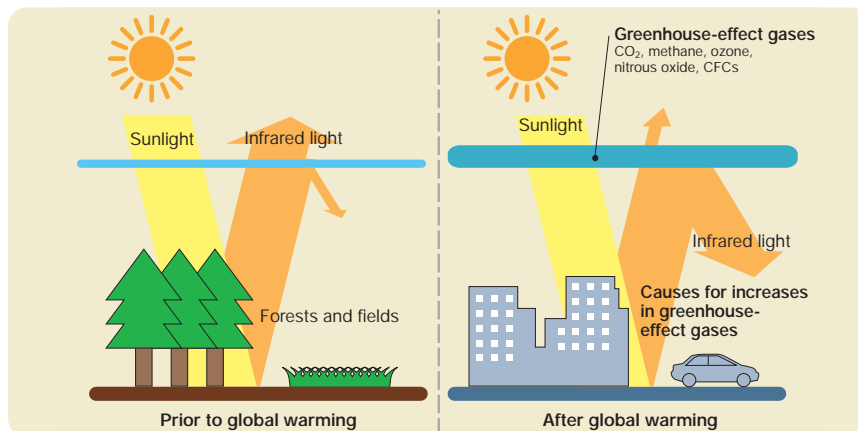
Reducing the Impact on Global Warming through New Technologies

DENSO has adopted measures to reduce the impact of its automotive air conditioners on global warming, well ahead of other manufacturers.

Automotive air conditioners impact global warming due to the greenhouse effect (caused by the high absorbency of infrared light) of the gas refrigerant from two major sources of CO₂ emissions: air conditioners themselves and the extra engine fuel consumed to power them. Total Equivalent Warming Impact (TEWI), which is calculated as the sum of these two factors, is an indicator of the impact of air conditioners on global warming. DENSO is working proactively to lower the TEWI values of its automotive air conditioners.

First, with regard to reducing refrigerant emissions, DENSO abolished the use of CFC-12 after it was identified as an ozone-depleting substance and completely converted to using HFC-134a, which does not harm the ozone layer, by the end of 1994. HFC-134a has a TEWI value less than one-sixth that of CFC-12. At the same

Mechanisms for Global Warming



$$\text{TEWI value} = \text{Increase in CO}_2 \text{ emissions from increased engine load due to running of air conditioners} + \text{Global warming index of refrigerant} \times \text{amount of leaked refrigerant}$$

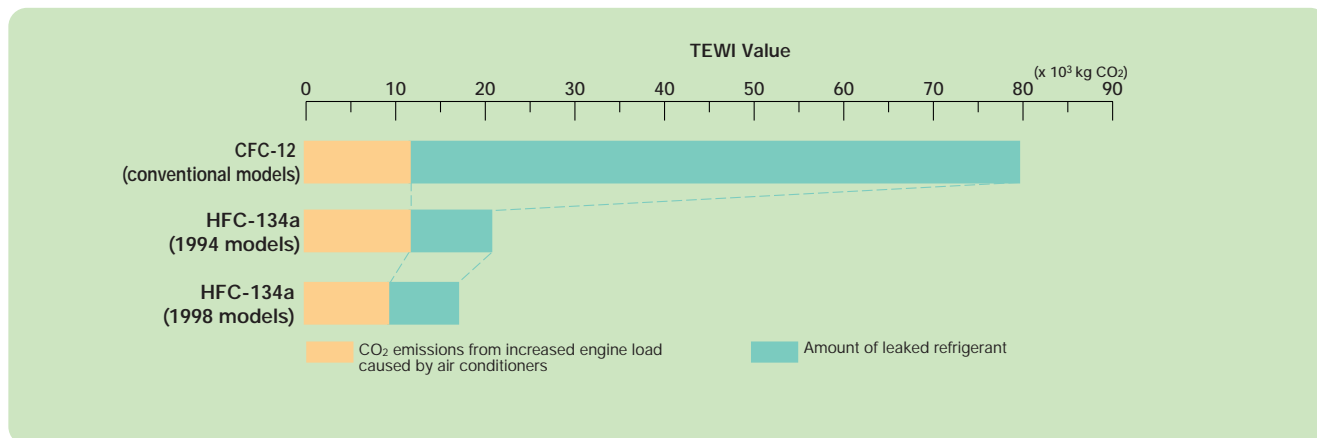
time, DENSO has realized a major reduction in the impact of its air conditioners on global warming by improving hose joints to minimize refrigerant leakage.

Regarding reducing the amount of engine fuel required to run air conditioners, DENSO has been improving the efficiency and reducing the weight of air conditioners and components. In 1998, DENSO achieved further reductions in the impact of its air

conditioners on global warming by commercializing such technologies as a high-efficiency subcool condenser, a high-efficiency compressor, and a dual-layer unit for external and internal air.

Looking to the future, DENSO is promoting R&D activities related to air conditioners that use natural refrigerants, such as CO₂ and HC, that have a minimal impact on global warming.

Reducing the Impact of Automotive Air Conditioners on Global Warming



High-Efficiency Subcool Condenser

The function of conventional condensers is to cool the gas refrigerant to make a saturated liquid refrigerant. For high-efficiency condensers, a mechanism for subcooling liquid refrigerant is created by using a gas-liquid separator (modulator tank) in the middle of the process. This enables greater efficiency in the refrigeration cycle, resulting in a 10% savings in power consumption, a 100-gram reduction in refrigerant usage, and a decrease in weight of roughly 350 grams.

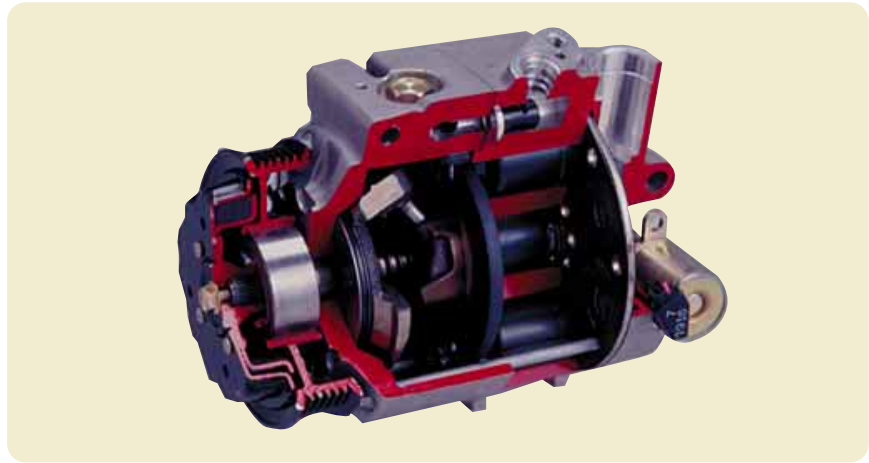
High-Efficiency Subcool Condenser



High-Efficiency Compressor

DENSO reduced the amount of engine fuel necessary to power air conditioners through a mechanism using an internal magnetic valve to electrically and continuously change the displacement value of a compressor from 100% to 0%. Zero displacement obviates the need for cutoff by a magnetic clutch and enables a major reduction in overall size and weight.

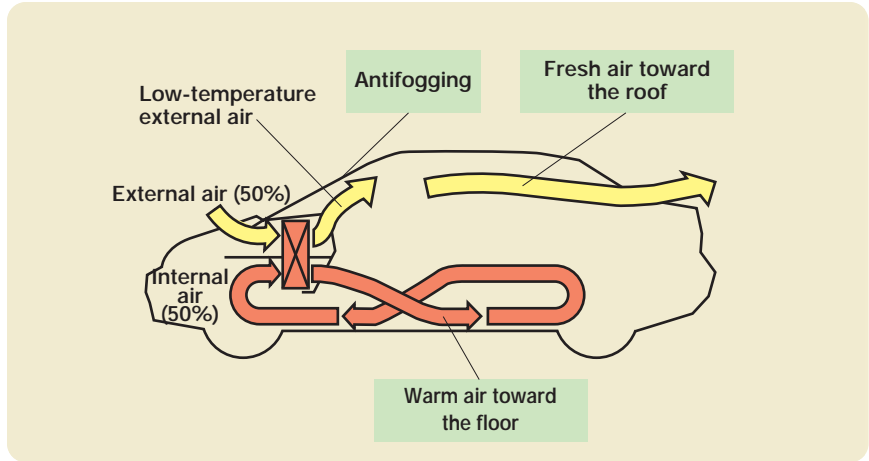
High-Efficiency Externally Controlled Variable Compressor



Dual-Layer Unit for External and Internal Air

In automobiles, external air is introduced into the vehicle interior to prevent the windows from fogging (fresh mode) when the heater is used. During this process, the same amount of warm air is ventilated to the outside, which results in a ventilation loss that accounts for roughly 70% of the heating load. DENSO's dual-layer unit for external and internal air introduces external air only to the top part of the cabin while circulating internal air to the floor area, thus cutting ventilation loss in half.

Dual-Layer Unit for External and Internal Air (for heating)



In summer, the system trims ventilation loss from the air conditioner to half and achieves approximately 40% in power consumption savings.

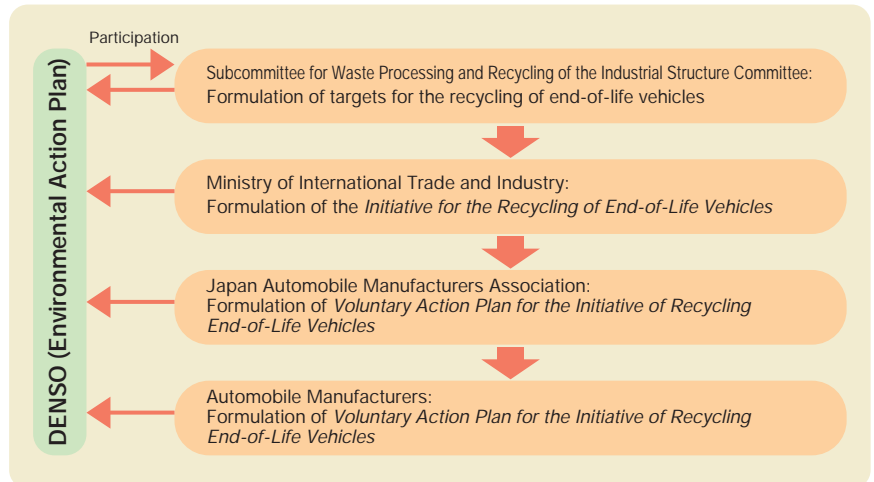
Approach to End-of-Life Vehicles

Overall Approach

In Japan, approximately five million vehicles are scrapped every year, a number that is significant in terms of the effective reuse of parts and the appropriate disposal of waste.

Following the initiative of the Ministry of International Trade and Industry (MITI), the automobile industry and automakers have been formulating and publicizing voluntary action plans to deal with this problem. As an automotive components manufacturer, DENSO takes a Companywide approach to fulfill its objectives as described in MITI's initiative.

Relationships with External Organizations



Overview of Quantitative Measures in the MITI Recycling Initiative

Item	Recycling ratio after 2002	Recycling ratio after 2015
End-of-life vehicles (weight)	Recycle more than 85%	Raise recyclability to more than 95%
Landfill processing (volume)	Less than 60% of the 1996 level	Less than 20% of the 1996 level
New vehicles	Raise recyclability to more than 90%	--
Usage of deleterious substances	By the end of 2000	By the end of 2005
Lead usage (weight) (except for batteries)	Less than 50% of the 1996 level	Less than 1/3 of the 1996 level

Specific Activities

DENSO is striving to improve the recyclability of used automotive components. Activities toward this end include 1) investigating

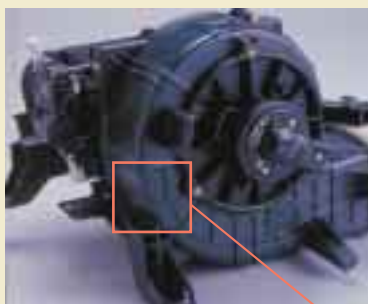
easy-to-disassemble structures and developing easy-to-recycle products through materials labelling and other methods; 2) developing and promoting the use of equipment to recover

refrigerants and long-life coolants (LLCs) from end-of-life vehicles as well as LLC concentration and separation equipment; and 3) reusing components for repairs.

Activity	Content	Solution
Development of Easy-to-Recycle Products	Easy-to-disassemble structures (under investigation)	
	Materials labelling for the separation of plastic and rubber products (in progress)	Solution I
	Prior evaluation of the recyclability of products during the design stages (under investigation)	
Development and Diffusion of Environmental Preservation Equipment	Development and diffusion of refrigerant recovery equipment	Solution II
	Development and diffusion of LLC concentration and separation equipment (jointly developed with Toyota Motor Corp.)	Solution III
Reuse of Components for Repairs	Relevant products: starters, alternators, compressors, diesel injection pumps, engine electronic control units (ECUs), navigation systems, and others	Solution IV

Solution I Materials Labelling for the Separation of Components

Since 1992, DENSO has been using a materials labelling system for plastic and rubber components that is compliant with international standards. This system is based on materials labelling guidelines stipulated by the Japan Automobile Manufacturers Association (JAMA) and labelling is applied to all plastic and rubber parts weighing more than 100 grams. The Company is also working



on labelling parts that weigh less than 100 grams.



Marking on a car air-conditioner part

Solution II Development and Diffusion of Refrigerant Recovery Equipment

At DENSO service stations and automobile retailers, in cooperation with automotive manufacturers, DENSO has installed 13,000 in-house-developed refrigerant recovery units that recover the ozone-depleting substance CFC-12 and 3,000 units that can also be used to recover HFC-134a, an alternative to CFCs, which

exacerbate the greenhouse effect. Furthermore, the Company actively participates, as a manufacturer of car air conditioners, in JAMA's nationwide program to build and operate systems to recover and destroy refrigerants.



Refrigerant recovery equipment

Solution III Development and Diffusion of LLC Concentration and Separation Equipment

In collaboration with Toyota Motor Corp., DENSO developed a system to concentrate and separate LLCs. Approximately 400 units are installed at automotive retailers through the cooperation of car manufacturers. Waste LLCs totaling approximately 150,000 kiloliters per year are major factors in deteriorating water quality in Japan's rivers. This equipment concentrates LLCs to more than 90% of their original density, and the product can be used as a fuel in waste-oil stores and boilers. The separated water conforms to national water quality standards (biochemical oxygen demand (BOD) values of less than 120 milligrams per liter) and can be disposed of as normal wastewater or released safely into rivers.



LLC concentration and separation equipment

Solution IV Reuse of Components for Repairs

DENSO operates approximately 800 service stations nationwide for the inspection and repair of the Company's automotive components. When components are repaired, only those parts deformed through abrasion and wear are replaced with new products. Reused products are installed in all other possible circumstances, thus contributing to the efficient use of resources.



Repair of a compressor

Major Components Reused for Repairs in FY 1998

Components	Repairs in FY 1998 (average reuse rate (relative weight))
Starters	approx. 200,000 units (approx. 85%)
Alternators	approx. 230,000 units (approx. 85%)
Compressors	approx. 110,000 units (approx. 80%)
Diesel injection pumps	approx. 50,000 units (approx. 90%)

Cleaning Automotive Exhaust Emissions

Contributing to Cleaning Exhaust Emissions through New Technologies

As an automotive components manufacturer, DENSO is cooperating with

its customers to proactively develop technologies and supply components for cleaning the exhaust emissions generated by automotive engines.

Air-Fuel (A/F) Ratio Sensor

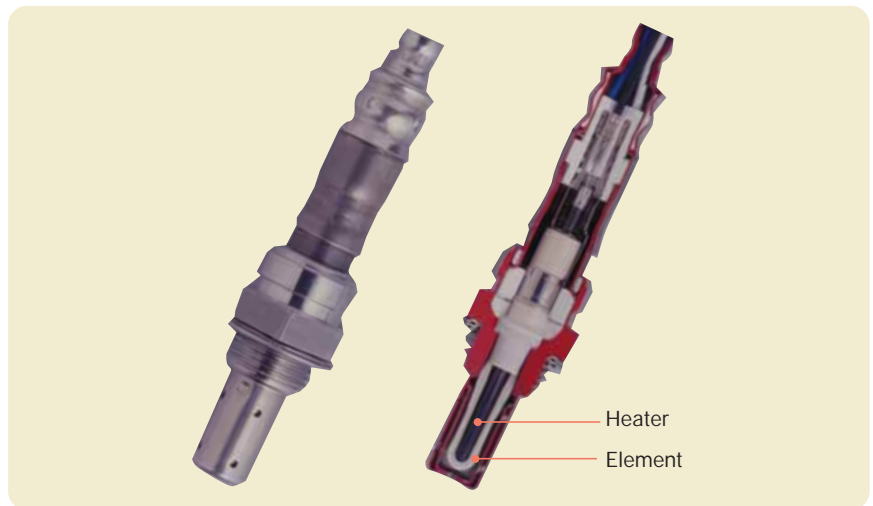
When fuel is burned within an engine, such harmful substances as nitrogen oxide (NO_x), hydrocarbon (HC), carbon monoxide (CO), and smoke are generated and emitted. The engine management systems in gasoline engines measure a broad range of A/F ratios (ratio of air intake volume to fuel) and precisely control the catalyst-cleaning rate to optimal levels. Thus, these systems can reduce the amount of HC and NO_x emitted.

Conventional oxygen sensors measure only A/F ratios close to their theoretical ranges ($A/F=14.5$). DENSO successfully developed an A/F ratio sensor that measures a wider range of A/F ratios soon after the engine starts. In 1996, Toyota became the first company in the world to adopt DENSO's A/F sensor technology in its vehicles. The A/F ratio sensor is currently used by automotive manufacturers worldwide for precision control of the A/F ratio.

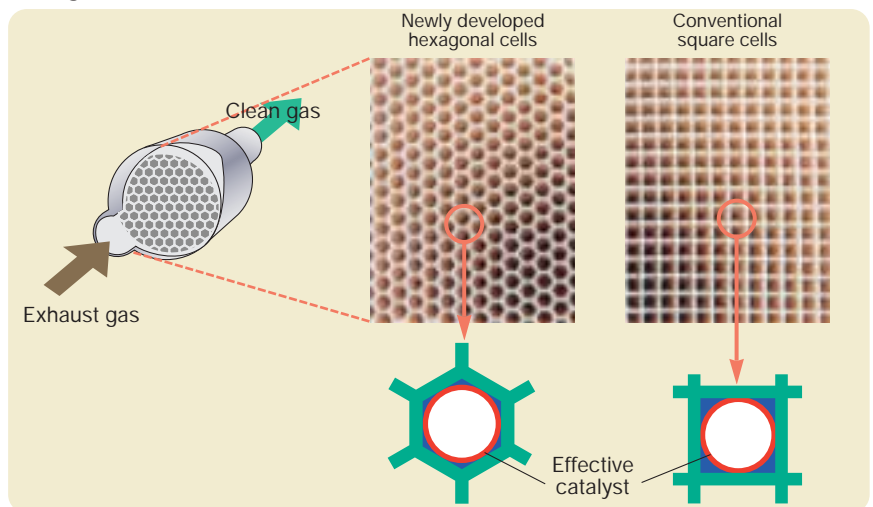
Hexagonal Cell Monolithic Carrier

In 1998, DENSO developed the world's first ceramic monolithic carrier of catalysts for cleaning car exhaust emissions using hexagonal pores instead of square pores. This configuration improves cleaning performance and has been adopted in Toyota vehicles. The monolithic carrier comprises several thousand pores one millimeter in diameter, each of which is separated by thin ceramic walls 0.1 millimeter to 0.2 millimeter thick.

Air-Fuel (A/F) Ratio Sensor



Hexagonal Cell Monolithic Carrier



Catalysts carried in the pores clean NO_x , HC, CO, and other gases when engine exhaust emissions pass through. Using hexagonal pores enables a more uniform thickness of the catalyst compared with square pores. As a result, the effective volume of catalysts is

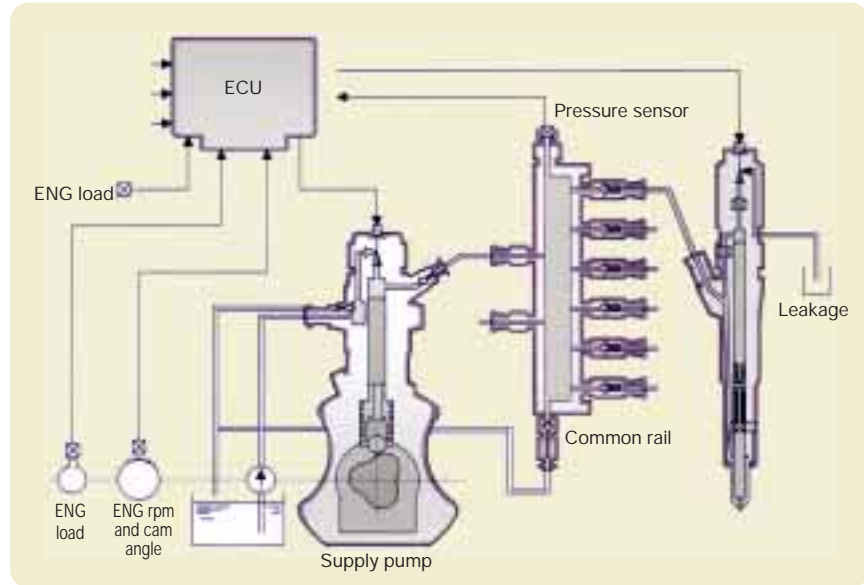
increased approximately 20%, thus improving the carrier's cleaning performance.

Electronically Controlled Fuel-Injection System for Diesel Engines

Conventional fuel injection systems for diesel engines are mechanically controlled and therefore rely on engine speed to determine injection pressure, volume, and timing. They do not generate sufficient injection pressure when the engine starts or when the engine speed is slow. The lack of injection pressure makes the cleaning of car exhaust emissions difficult.

DENSO developed a pressure-storage technology to electronically control injection volume and timing, independent of mechanical control, by using an electromagnetic valve. In 1996, the Company was the first to commercialize this breakthrough in its ECD-U2 common rail system, which reduces NO_x emissions and smoke.

Common Rail System (ECD-U2)



Furthermore, in 1998 DENSO's ECD-V4 electronically controlled injection pump for compact trucks was adopted in Toyota's Land Cruiser and has contributed to reducing smoke in this vehicle's exhaust emissions to an undetectable level.



Reducing the Use of Hazardous Substances

Overall Approach

DENSO's Product Recycling Subcommittee directs DENSO's efforts to eliminate the use of substances that impact human health and the ecosystem, such as asbestos, cadmium, hexavalent chromium, mercury, and lead.

There are various chemical compounds that can be hazardous to the environment. DENSO not only complies with environmental regulations in Japan and overseas but also takes a holistic approach covering materials procurement, design, and manufacturing. The Company is also working to reduce the use of other hazardous substances that are not regulated.

Hazardous substances that DENSO has reduced or eliminated its use of include asbestos, cadmium, hexavalent chromium, mercury, and lead. Asbestos, which has been labeled a carcinogen, had been used in plastic products as a reinforcer, but DENSO has not used this substance since the late 1980s.

In addition, cadmium was used in relay contact points. With a few exceptions, it has been replaced with alternative substances. We are now replacing its use in all areas.

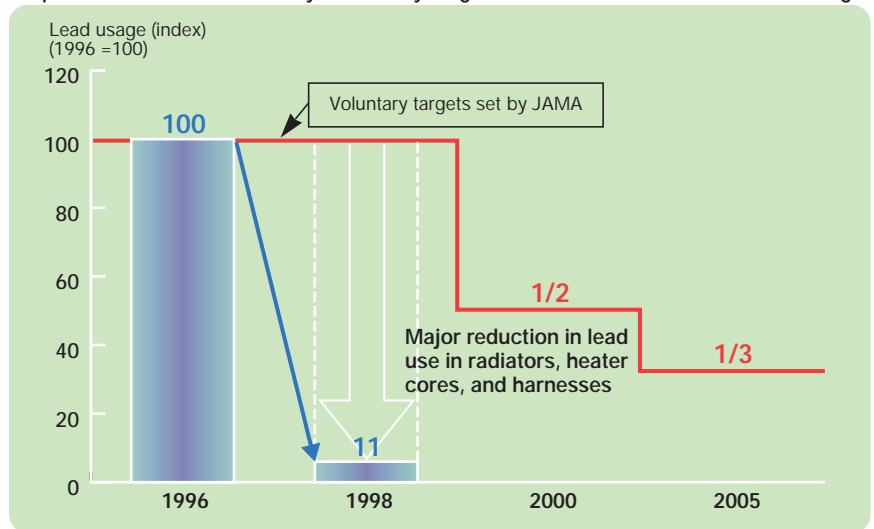
Hexavalent chromium is used as a plating material in finishing processes and mercury as a backlight for automotive meters. DENSO is currently

developing safe alternatives to replace these substances.

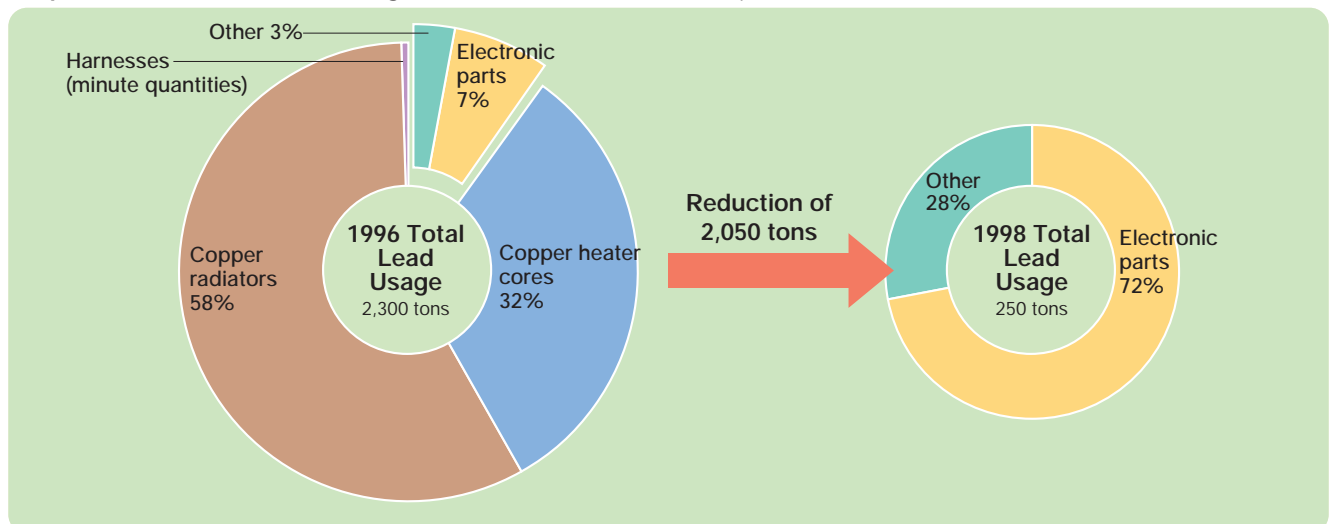
Reducing the Use of Lead

Lead has been drawing the most attention among substances that impact the environment. In January 1998, the Japan Automobile Manufacturers Association (JAMA) published its *Voluntary Action*

Graph 1: The Automotive Industry's Voluntary Targets and DENSO's Reduction in Lead Usage



Graph 2: Breakdown of Lead Usage at DENSO (lead and lead compounds)



Plan for the Initiative of Recycling End-of-Life Automobiles, which includes voluntary targets for the industry to “reduce the amount of lead used in new vehicles to roughly less than half the 1996 level by the end of 2000 and to roughly less than a third of the 1996 level by the end of 2005.” (See Graph 1, page 16.)

DENSO automotive components that contain lead included copper radiators, copper heater cores, and printed wiring boards. (See Graph 2, page 16, and Figure 1 below.) Regarding copper radiators and heater cores, the Company has replaced the body material with aluminum (see photograph below) and replaced lead solder with a lead-free wax material, thus reducing lead usage 2,050 tons per year. In addition, DENSO had used lead compounds as a stabilizer for the polyvinyl chloride that goes into the

insulation covering of its harnesses but now uses alternative materials in cooperation with its suppliers.

By applying such technologies, DENSO has significantly exceeded industrywide targets and will continue to achieve its own stricter objectives.

Future Approach

DENSO will keep close surveillance on the chemicals it uses and will work on chemical restrictions ahead of the introduction of legal regulations. In particular, the Company commits itself to the ongoing development of alternatives to lead.

Products that still contain lead include solder for printed wiring boards, which are automotive components that require exceptionally high standards for reliability. In the search for a replacement for lead solder in automotive

printed wiring boards, DENSO evaluated tin, silver, copper, zinc, bismuth, and other alloys for their wettability and strength.

As a result, the Company determined that Sn-Ag-X (Cu and other) compounds are suitable for automotive applications and is proceeding with technological development using these compounds.

Figure 1: Use of Lead Parts in DENSO Products and Status of Reduction

Part Name		1996	1998
Copper Radiators		In use	Completely eliminated
Copper Heater Cores		In use	Completely eliminated
Printed Wiring Boards		In use	Developing technologies
Harnesses		In use	Completely eliminated
Others	Electrodeposition Coating	In use	Developing technologies
	Steel	In use	Developing technologies
	Electrical Parts	In use	Under consideration
	Other Parts	In use	Under consideration

Lead-Free Aluminum Radiator



Production Activities

Fundamental Thinking

DENSO's basic policy is to protect the environment from a global perspective and achieve clean factory operations in each business group. In addition to preventing environmental pollution in compliance with concerned regulations, the Company is working in line with the following objectives to minimize energy and resource consumption in production processes: 1) conserve energy in production processes, 2) reduce the

in-house waste generated by production processes, 3) reduce the environmental impact generated by production processes, and 4) completely eliminate the use of ozone-depleting substances.

In fiscal 1998, DENSO attained a CO₂ unit usage level of 96.4 (Index: 1990 = 100) by reducing crude-oil consumption to the equivalent of 23,000 kiloliters and is thus contributing to the prevention of

global warming. In addition, by following the principles of the 3R (Reduce, Reuse, and Recycle) Action Plan, the Company reduced the amount of industrial waste generated to 59% of the 1990 level and attained its goal for the year. In efforts to reduce the environmental impact of its production processes, DENSO realized its targets for reducing nitrogen, phosphorus, cyanide, and chromium in its effluent.

Activity Objectives and Results

Goal	Item	Activity Objectives	Results
Prevention of Global Warming	1. Conserve energy in production processes	CO ₂ unit value to be below 100 (Index: 1990 = 100)	CO ₂ unit value of 96.4 Implementation of measures to reduce energy consumption 23,000 kiloliters (crude-oil basis)
Resource Conservation and Recycling	2. Reduce the in-house waste generated by production processes	Volume of industrial waste to be less than 12.5 kilotons (less than 59% of the 1990 level)	12.5 kilotons (less than 59% of the 1990 level)
Reduction of Environmental Impact	3. Reduce the environmental impact generated by production processes	Reduction of nitrogen and phosphorus in effluent	Component-cleaning processes without using nitric acid Reduction of ammonia water use in semiconductor processes Installation of denitrogenization and dephosphorization effluent processing
		Reduction of cyanide and chromium in effluent	Elimination of cyanide and chromium use with alternative reagents Implementation of closed-loop system for chromium effluent
	4. Completely eliminate the use of ozone-depleting substances	Complete elimination of HCFC-225 by the end of fiscal 1999	In progress



4,000kW gas turbine cogeneration system (Nishio Plant)

Energy Conservation

Responding to increasingly important global environmental issues, in 1994 DENSO introduced a strategy for energy conservation targeting 2000 based on three basic objectives: 1) protect the global environment,

2) reduce energy costs, and 3) ensure the stable worldwide supply of energy. The DENSO Environmental Action Plan, revised in 1996, set a goal to lower CO₂ exhaust emission levels to the 1990 level by 2000, mainly through

energy conservation. To achieve this goal, DENSO has forged ahead with proactive energy conservation activities.

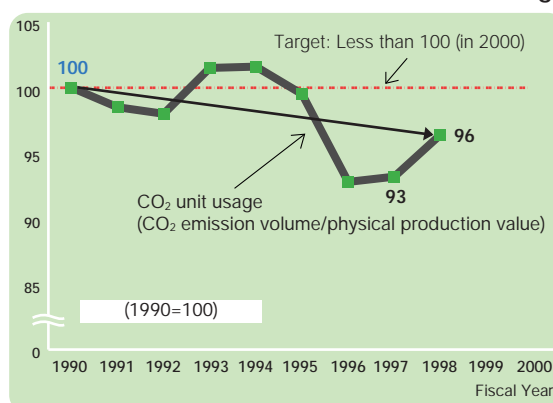
Environmental Action Plan

In fiscal 1998, the unit output of CO₂ at all DENSO facilities was 4% lower than the 1990 level, due to aggressive energy conservation activities. Since 1991, DENSO has introduced cogeneration (electricity and heat supply) systems in all its plants, which has lowered energy consumption during nonoperating hours, and carried out other activities aimed at more efficient production that requires less energy. The Company also introduced the new "Energy Expense System," which directly charges each department for its energy consumption.

This new system has served to heighten the energy consciousness of each department.

Despite the success of these activities, in fiscal 1998 a rise in basic energy demands corresponding to the establishment of new facilities and a lower production volume due to the sluggish economy caused a 3% increase in the unit output of CO₂ compared with the 1997 level.

Trends in CO₂ Unit Usage



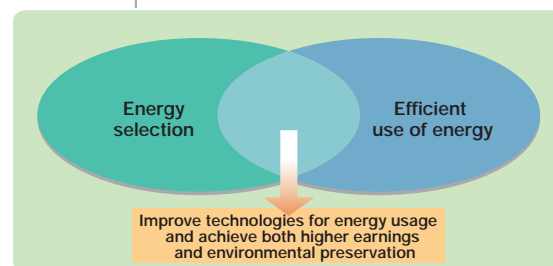
In response, DENSO is making every effort to reach its target.

Approach to the Prevention of Global Warming

DENSO carefully chooses and uses energy, taking the efficiency of its use into consideration, throughout the entire production process. For instance, it considers suitability and efficiency in choosing such primary energy sources as electricity, city gas, oil,

and kerosene and such secondary energy sources as steam and air generated by cogeneration systems, compressors, and boilers. Thus, the Company promotes activities that protect the global environment and improve the Company's profitability.

Concept for Energy Strategy



Example of DENSO's Energy Conservation

● Cogeneration System Development

As one of the Company's main activities for energy conservation, since 1991 DENSO has implemented its cogeneration system, which reduces CO₂ emission levels by increasing energy efficiency. Seven gas turbine

cogeneration systems were in operation as of July 1999.

Cogeneration systems greatly contribute to the prevention of global warming with an approximately 40% reduction in CO₂ emissions, compared with conventional systems. Moreover, in April 1997 a fuel cell, developed as

part of a highly acclaimed advanced cogeneration system, underwent on-site testing at a gas supply facility.

● Development and Introduction of the Energy Control System, “ECO OPERATOR”

Since 1994, DENSO has been working to cut energy consumption during nonoperating hours. In 1998, the Company developed the ECO OPERATOR, a control system that automatically shuts off equipment not in use, which reduced energy consumption in production lines 60%. The Company is in the process of equipping all production lines with the ECO OPERATOR.

The ECO OPERATOR automatically shuts down equipment that is not in

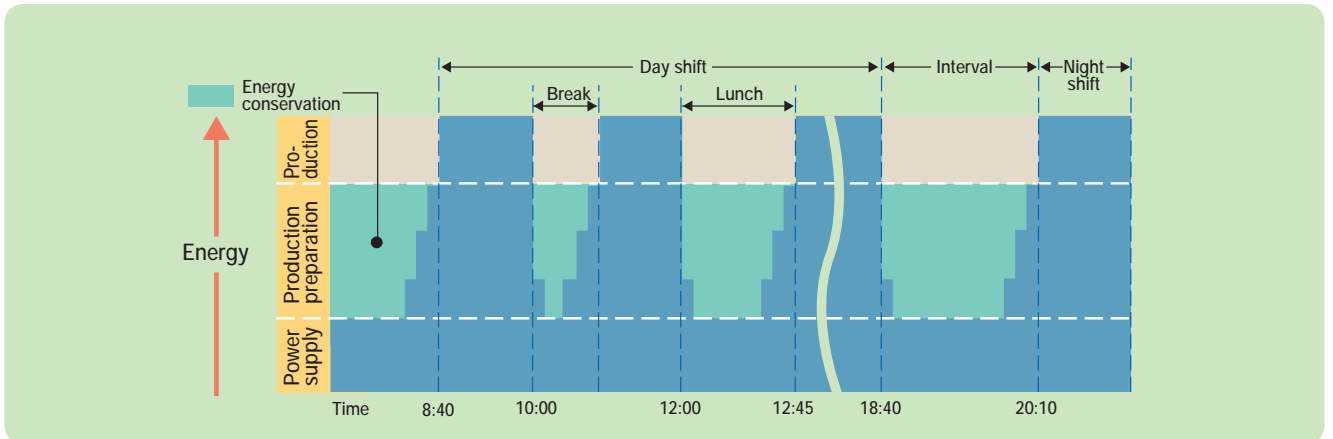
use, such as during lunch hours and break times, and automatically restarts the equipment when the next shift begins. The ECO OPERATOR can also be easily adapted to changes in work schedules with just the touch of a mode switch.

Energy-control equipment (Nishio Plant)



ECO OPERATOR

Pattern of energy consumption when using automated ECO OPERATOR energy-saving equipment



● Activities to Raise Air-Blower Efficiency

For use on the production line or in improving water drainage, air-blower usage has been increasing in tandem with the rationalization of manufacturing facilities.

To effectively curb the rise in energy used to power air blowers, since 1996 DENSO has worked to improve facilities and heighten employees’

cost-consciousness under the theme of air conservation. Specifically, the Company 1) created and established equipment at each production line that enables employees to easily regulate the amount of air used, 2) enhances air-blower efficiency by employing an energy-saving air nozzle, 3) created air index display panels that show air leaks and are used for employee training on air conservation, and 4) monitors the level of air usage in the

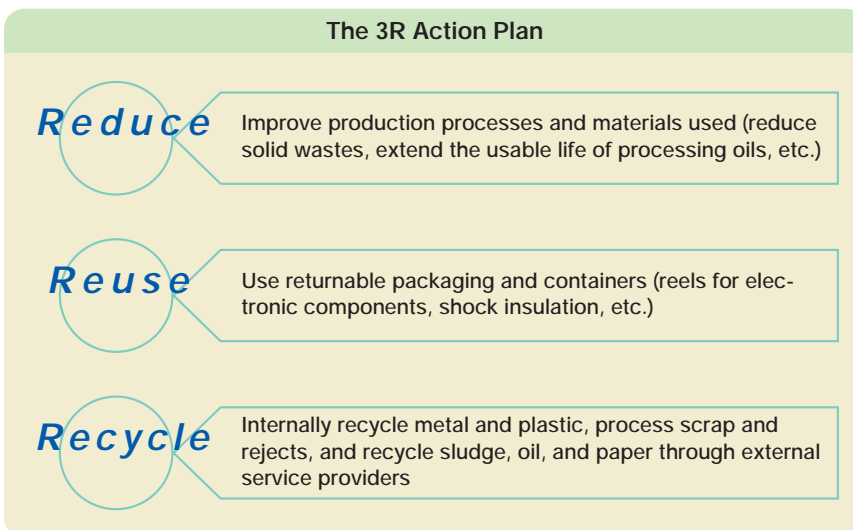
Training using a panel to explain air leakage



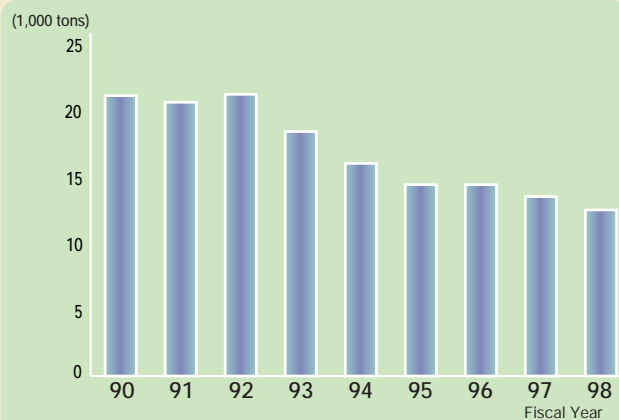
production process. Through these activities, DENSO has been able to increase air-blower efficiency 8%.

Reducing Companywide Waste

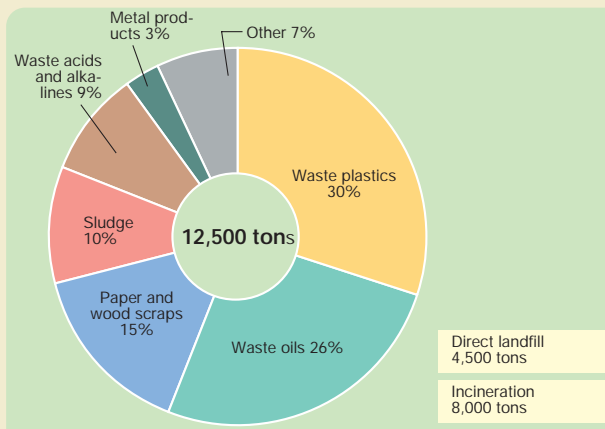
Various waste is generated from the Company's production processes, including that of plastics, oils, and paper. DENSO has implemented a program to reduce waste at its production facilities to less than 50% of the 1990 level by 2000. Key to this program is the realization of the 3R Action Plan. In fiscal 1998, the amount of waste produced was 12,500 tons, which is approximately 59% of the 1990 level.



Amount of Industrial Waste Generated



Type of Waste and Processing Method (FY 98)



Reducing the Use of Disposable Cartons

The replacement of disposable cartons with returnable packaging for exported products enabled DENSO to reduce the amount of cartons used from 28,000 tons in 1990 to 12,500 tons in 1998.

Waste Disposal Charging System

To draw attention to waste levels and intensify employees' efforts to reduce waste, in October 1997 DENSO initiated a waste disposal charging system whereby the Company charges each production department waste-disposal costs according to the volume of waste generated.

Waste collection truck with automatic scale



Reducing the Environmental Impact Generated by Production Processes

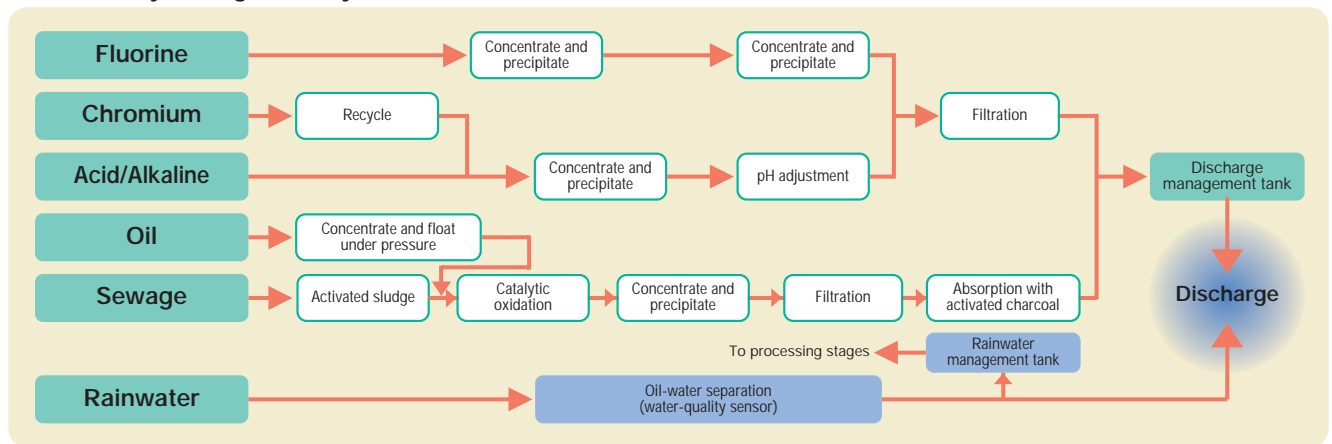
Water Quality Management

Production processes that cause water pollution include thermal processing, plating, and machining that generates process effluent. Sewage from cafeterias and sanitary facilities is another source of pollution. This

effluent is processed and released into rivers only after meeting water quality standards determined by DENSO's voluntary guidelines defined in consultation with local communities, which are stricter than those mandated by law. In addition, to prevent effluent

that does not meet these standards from being released into rivers, all business units are equipped with DENSO's proprietary Discharge Management System. The Rainwater Management System is also installed at the discharge point for rainwater.

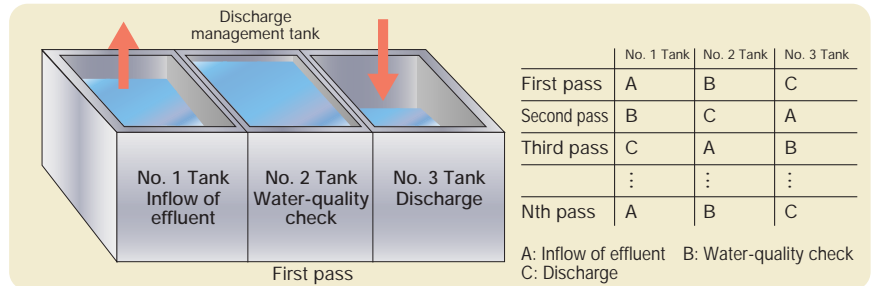
Water Quality Management System



Discharge Management System

Water that has been purified in DENSO's effluent processing facilities is temporarily stored in discharge control tanks, checked for its water quality, and discharged. The tanks' functions are interdependent to allow successive changeovers and continuous processing. In the case of unsatisfactory water quality, the water is returned to the effluent processing facilities for additional processing.

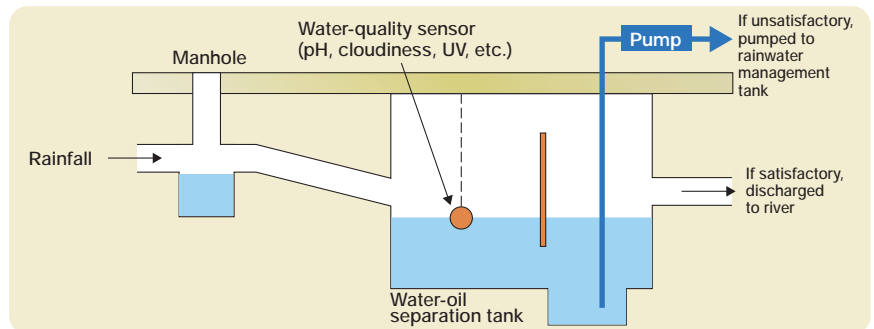
Discharge Management System



Rainwater Management System

Rain that falls on DENSO grounds has its oil content removed in a water-oil separation tank, which is under constant surveillance by water quality sensors. When even a small amount of deterioration in water quality is detected, the rainwater is passed automatically through the Company's effluent processing systems and purified before being released.

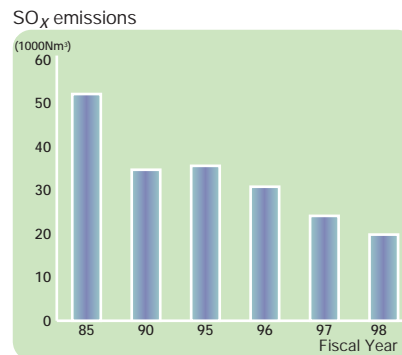
Rainwater Management System



Air-Quality Management

Boilers and melting furnaces emit NO_x (nitrogen oxide), SO_x (sulfur oxide), and particulate matter (PM), which pollute the air. To clean these gases before they are emitted, DENSO

installs dust collectors and uses high-quality fuels. In particular, the Company has reduced SO_x emissions by replacing heavy oil with city gas and using low-sulfur fuels.



● Reduction in the Use of Hazardous Substances

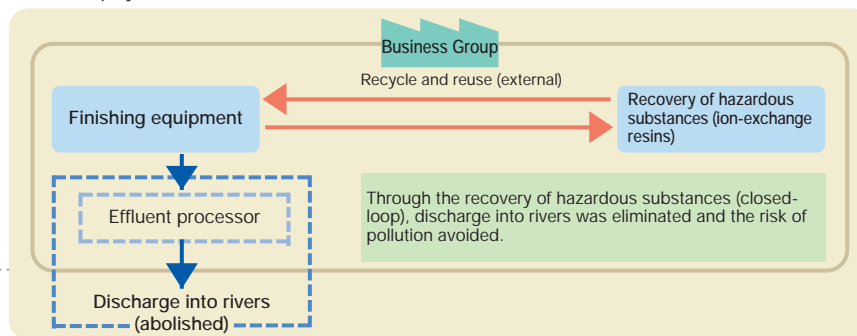
DENSO introduced a prior evaluation system to determine the impact of equipment, raw materials, and semifinished products that may contain hazardous chemicals before using them. In fiscal 1998, the Company implemented prior evaluations on approximately 600 chemical compounds and 3,000 pieces of equipment. In particular, the Company evaluates the amount of chemical compounds that are contained in semifinished products and used during production processes and at discharging points to conform with Pollutant Release and Transfer Register (PRTR) guidelines. The results of these evaluations are used to devise ways for reducing the use of hazardous substances, facilitating appropriate handling, and ultimately

● Reduction of Cyanide and Chromium Levels in Effluent

Business groups that are engaged in the plating of finishing processes use cyanide and chromium. DENSO purifies the effluent created by these processes with effluent cleaning

facilities. Moreover, the Company is doing its utmost to prevent pollution by using finishing methods that do not use cyanide or chromium and establishing a closed-loop system for chromium effluent in undercoat painting processes.

Closed-loop system for effluent



preventing deterioration in air, water, and soil quality.

● Reduction of Nitrogen and Phosphorous Levels in Effluent

DENSO's approach to preventing the overnitration of rivers and closed areas of water (Ise Bay, Mikawa Bay, and others) includes reducing the use of chemicals containing nitrogen and phosphorus and using alternatives. Solving the problem of excess nitrogen is one of the Company's top priorities. DENSO is switching from nitric acid to sulphuric acid in cleaning processes for aluminum parts and reducing the

concentration of ammonia water in semiconductor wafer-cleaning processes. In addition, certain business groups installed effluent processing facilities to remove nitrogen and phosphorus to lower the impact of their processes on the environment.

from effluent processing contains almost no chlorine, which is a cause of dioxin emissions. In addition, maintaining furnace operations at more than 800°C prevents dioxin emissions. The Company is already in compliance with emissions standards (10ng-TEQ/Nm³) for furnaces with processing capacities of 200 kilograms to 2 tons per hour that will come into effect from December 2002.

● Conformity with Regulations for Furnaces

DENSO operates furnaces to reduce the volume of sludge that is generated during effluent processing. Sludge

Reducing the Use of Ozone-Depleting Substances

Completely Eliminating the Use of CFCs for Cleaning

In the past, DENSO had used CFC-113 and 1,1,1-trichloroethane as cleaning agents in its manufacturing of electronic components and processing of machine parts. In 1987, the Company established the Task Force for Responding to CFC Regulations, in advance of international measures to protect the ozone layer (*Montreal Protocol*), to promote efforts to completely eliminate the use of these substances in DENSO's production processes.

The Company developed deactivated flux* and a low-pollutant water-soluble cleaning agent** for machining processes and thus eliminated the use of CFC-113 and 1,1,1-trichloroethane in December 1994 and August 1995, respectively.

Furthermore, HCFC-225 had been used as a cleaning agent for automotive IC parts, but DENSO is working to eliminate the use of this substance by the end of fiscal 1999, which is in advance of guidelines established under the *Montreal Protocol*.

*Deactivated flux: This substance was developed in conjunction with automobile manufacturers as a flux to be used in solder pastes used for automotive electronic components. By converting halogen in the activated agent into a covalent substance through a deactivation reaction, a high level of reliability is secured, including high insulation resistance even without cleaning.

** Low-pollutant water-soluble cleaning agents: This cleaning agent was developed in conjunction with a cleaning-agent maker as an alternative to conventional methods that clean aluminum brazing parts. The cleaning agent offers low COD, is phosphate-free, and contains an oil-separating agent. In comparison with conventional alkali cleaning agents, it significantly reduces the burden of processing waste liquids after use.

Major Controlled Substances and Regulations under the *Montreal Protocol*

Annex A

Group	Substance	Regulations
I	CFC-11	Completely eliminated beginning 1996
	CFC-12	
	CFC-113	
	CFC-114	
	CFC-115	
	Halon-1211	
II	Halon-1301	Completely eliminated beginning 1994
	Halon-2402	

Annex B

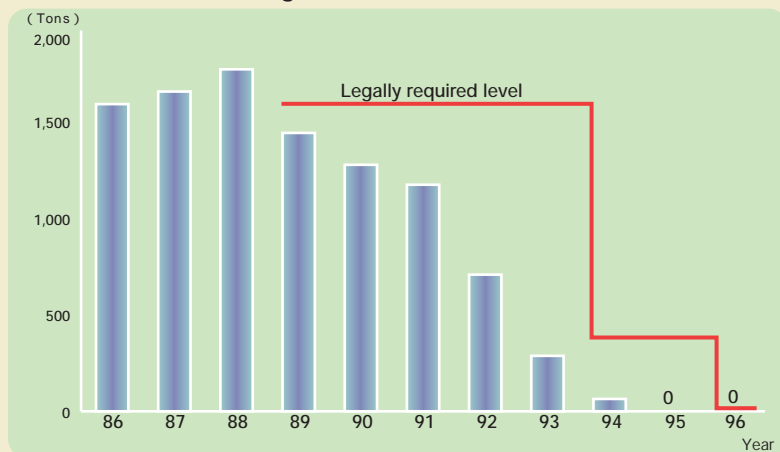
Group	Substance	Regulations
I	CFC-13	Completely eliminated beginning 1996
	CFC-111	
	CFC-112	
	CFC-211	
	CFC-212	
	CFC-213	
	⋮	
II	Carbon tetrachloride	Completely eliminated beginning 1996
III	1,1,1-Trichloroethane	

Annex C

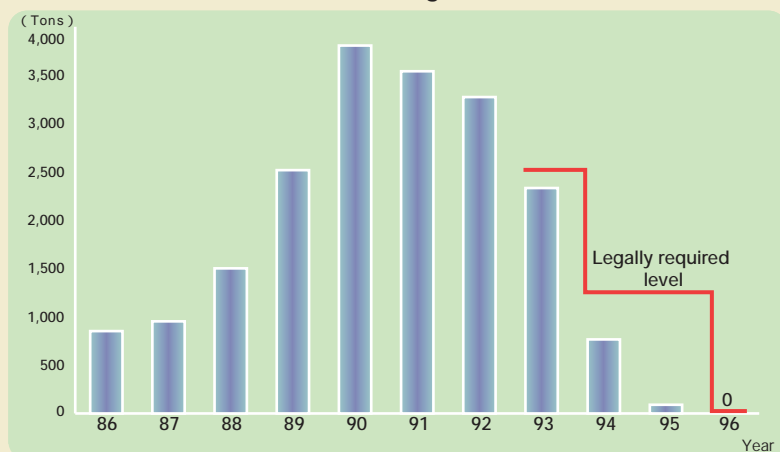
Group	Substance	Regulations
I	HCFC-21	Completely eliminated beginning 2020
	HCFC-22	
	HCFC-31	
	HCFC-121	
	HCFC-122	
	HCFC-123	
	HCFC-124	
	HCFC-131	
	HCFC-132	
	HCFC-133	
	HCFC-141	
	HCFC-142	
	HCFC-151	
	HCFC-221	
	HCFC-222	
	HCFC-223	
	HCFC-224	
	HCFC-225	
	HCFC-226	
	⋮	



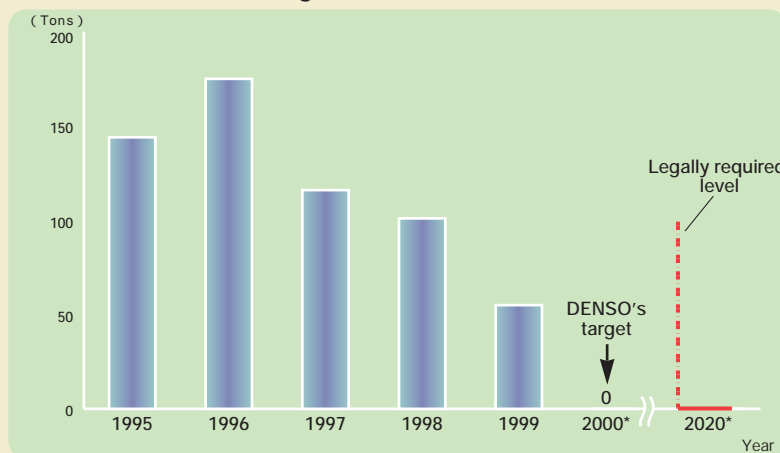
Volume of CFC-113 Usage



Volume of 1,1,1-Trichloroethane Usage



Volume of HCFC-225 Usage



Support of External Parties

DENSO procures a large number of parts from external suppliers. The Company's engineers cooperated with suppliers in improving their cleaning processes and worked proactively toward the complete elimination of CFC-113 and 1,1,1-trichloroethane use. As a result, these substances have not been used in the worldwide DENSO Group since the end of 1995.

DENSO is also supporting the activities of the Japan Industrial Conference for Ozone Layer Protection (JICOP). As a representative of the Japan Automotive Components Industrial Association, DENSO plays an active role in such activities as creating manuals on the topic of the reduction and elimination of ozone-depleting substances and speaking at related seminars.

* Usage amounts after 1999 are estimates

Environmental Protection Activities of Subsidiaries and Affiliates

Teamwork with Domestic Affiliates

DENSO organized committees with its affiliates and other companies working on DENSO premises to enhance the level of environmental management among all companies through research, audits, information sharing, and events.

Committees	Overview	Main Events
<p>DENSO Group Safety and Environment Conference 22 member companies</p>	<p>Comprising DENSO Group companies, the Conference is designed to promote swift and complete information disclosure, prevent environmental problems in local communities, and make a contribution to both society and the environment.</p>	<p>Safety and Environment Conference (April)</p>
<p>DENSO Cooperative Association Committee for the Promotion of Safety, Health, and Environmental Management 70 member companies</p>	<p>Comprising suppliers to DENSO, the Committee's mission is to enhance the levels of safety, health, and environmental management in member companies. In particular, peer audits are conducted every year regarding management systems and pollution prevention activities to improve members' systems in these areas.</p>	<p>Peer Audits (November and December) Seminars and Training (April, June, and October) Executive Training (July)</p>
<p>DENSO Premises Safety, Health, and Environment Association 210 member companies</p>	<p>Comprising affiliates engaged in the construction, renovation, and moving of facilities and equipment on DENSO premises, the Association has 11 divisions and one section and strives to prevent damage and pollution on DENSO premises through educational programs, patrols, and meetings.</p>	<p>Safety, Health, and Environmental Conference (July) Executive Training (December) Patrols (as needed)</p>



Environmental Management of DENSO's Overseas Network

As part of DENSO's global approach, maintaining and improving environmental management systems is indispensable to establishing businesses in overseas subsidiaries. To this end, DENSO is not only operating in compliance with

local regulations but is proactively supporting the establishment of top-level management systems.

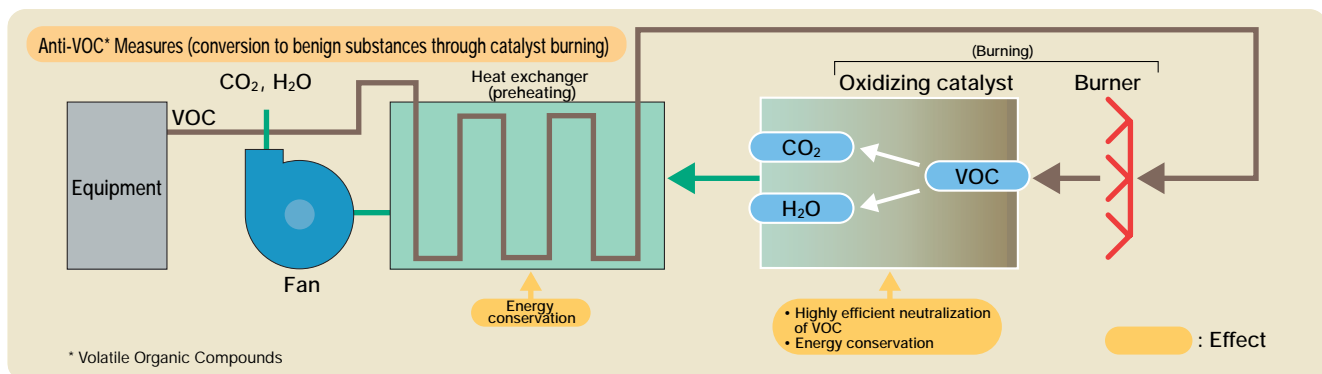
Overview of Major Activities

Major Activities	1991	1992	1993	1994	1995	1996	1997	1998
Audits of safety, health, and environmental issues by Companywide environmental preservation managers		Asia	Australia	North America/Asia	Europe/North America	Australia/Asia	Europe/North America	
Diffusion of DENSO Safety Standards (DSS)		Formulation		Publication	Implementation and Enhancement (100 Standards)			
Activities to reduce the use of hazardous substances				Complete elimination of specific CFCs		Complete elimination of chlorine solvents		
Establishment of environmental management system and acquisition of ISO 14001 certification							Planning	Promotion
Training in Japan for overseas environmental staff		Implementation						

Environment-Related Awards and Prizes Received (as of December 31, 1998)

Date	Company (location)	Award	Awarding Organization
1.94	DENSO MARSTON LTD. (UNITED KINGDOM)	Environment Protection Excellent Company Award	Organization for Protection of the Natural Environment
3.94	DENSO MANUFACTURING TENNESSEE, INC. (UNITED STATES)	1994 Environmental Pretreatment Excellence Award	U.S. Water Quality Authority
10.95	DENSO MANUFACTURING AUSTRALIA PTY. LTD. (AUSTRALIA)	1995 Excellence and Innovation Award	State of Victoria
11.95	AUSTRALIAN AUTOMOTIVE AIR PTY. LTD. (AUSTRALIA)	Environment Protection Excellent Company Award	State of Victoria
11.95	DENSO MANUFACTURING UK LTD. (UNITED KINGDOM)	1995 British Environmental Management System	British Industrial Organization
2.97	AMERICAN INDUSTRIAL MANUFACTURING SERVICES, INC. (UNITED STATES)	California Water Environment Association Award	Association for the Protection of Water Quality State of California
7.98	AUSTRALIAN AUTOMOTIVE AIR PTY. LTD. (AUSTRALIA)	EPA Cleaner Production Award	State of Victoria
12.98	DENSO MANUFACTURING MICHIGAN, INC. (UNITED STATES)	C3 Clean Corporate Citizen Award	State of Michigan

DENSO MANUFACTURING TENNESSEE's Solution Activities



Social Contribution

Recognizing that protecting the global environment is a shared responsibility for all humankind, DENSO is supporting various organizations involved in environmental activities and encouraging its employees to contribute to environmental protection through voluntary conservation and recycling.

Type of Activity	Fundamental Concept	Activities
Support of Environmental Organizations	To protect the environment in developing countries, DENSO supports NGOs that are active on a global scale.	Supports OISCA and the Keidanren (Japan Federation of Economic Organizations) environmental protection fund
Regional Environmental Protection	To protect the natural environment on earth, DENSO is working to conserve the ecology surrounding its business operations.	Notable activities include the conservation of Heigen Genjibotaru no Sato in Nishio, the protection of wild rabbit-eared irises in the Kozutsumi-Nishi Pond in Kariya, cleanup activities at the Hieda River in Anjo, and zero-waste activities.
Recycling	To realize a recycling society, DENSO is approaching environmental protection from fields close to its everyday activities.	Sponsors flea markets, collects clothing for donation to the needy, etc.

Examples of DENSO's Social Contribution Activities

●Protection of Heigen Genjibotaru no Sato

Since 1995, the Nishio Plant has been helping to protect Genji fireflies, which are rare throughout Japan. During fiscal 1998, DENSO volunteers cut grass in areas inhabited by fireflies and helped direct car parking for observers of the fireflies in April, June, October, and December.



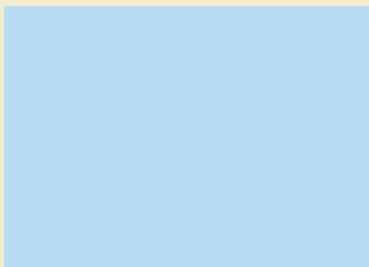
●Protection of Irises in Kozutsumi-Nishi Pond

The wild rabbit-eared irises in Kozutsumi-Nishi Pond in northern Kariya have been named a national treasure, and the Association to Protect the Rabbit-Eared Irises is working to protect them. DENSO has been supporting the association's activities since 1996 when the Company learned of the shortage of volunteers in the association. During fiscal 1998, many DENSO volunteers participated in grass cutting and the cleanup of bamboo thickets in the protected area in April, August, and December.



●Planting Trees at Wild Life Park

In 1990, DENSO Marston offered adjacent land for establishing Wild Life Park, a public park. Local schoolchildren planted 400 trees there that today are mature and flourishing. Each year, people from the Company and the local community are involved in the cleanup of the riverbank in the Wild Life Park area.



Main Sites and Affiliates

Domestic Plants, Branches, Sales Offices, and Others

Site	Location
Headquarters	1-1, Showa-cho, Kariya, Aichi 448-8661 Tel: +81-566-25-5511 (reception)
Tokyo Branch	2-15-13, Shoto, Shibuya-ku, Tokyo 150-0046 Tel: +81-3-5478-7711 (reception)
Sapporo Branch	7-2-27, Nijo Yamanote, Nishi-ku, Sapporo 063-0002 Tel: +81-11-614-3511 (reception)
Sendai Branch	2-6-1, Nigatake, Miyagino-ku, Sendai 983-0036 Tel: +81-22-238-9911 (reception)
Nagoya Branch	4-30, Hosyo-cho, Minami-ku, Nagoya 457-0828 Tel: +81-52-619-1777 (reception)
Osaka Branch	1-7-19, Higashitenma, Kita-ku, Osaka 530-0044 Tel: +81-6-6355-2211 (reception)
Hiroshima Branch	4-16, Higashihiratsuka-cho, Naka-ku, Hiroshima 730-0025 Tel: +81-82-242-5200 (reception)
Fukuoka Branch	2-6-35, Sannou, Hakata-ku, Fukuoka 812-0015 Tel: +81-92-412-1177 (reception)
14 Others	

Site	Location	Business Operation or Products	Site Area (1,000m ²)	Building Floor Space (1,000m ²)	Number of Employees
Headquarters and Kariya Plant	1-1, Showa-cho, Kariya, Aichi 448-8661	Monolithic carriers, integrated circuit wafers, and applied electronic products	258	352	11,100
Ikeda Plant	5-1 Ikeda-cho, Kariya, Aichi 448-0044	Radiators and oil coolers	103	84	800
Anjo Plant	2-1, Nagane, Sato-cho, Anjo, Aichi 466-8511	Starters and alternators	407	239	2,900
Nishio Plant	1, Sumisaki, Shimohasumi-cho, Nishio, Aichi 445-8502	Air conditioners and heaters, radiators, radiator fans, fuel-injection pumps, and electronic fuel-injection components	1,267	566	8,300
Takatana Plant	1, Shinmichi, Takatana-cho, Anjo, Aichi 446-8507	Meters, oil filters, portable cellular phones	363	232	3,000
Daian Plant	1530, Monzen, Daian-cho, Inabe-gun, Mie 511-0296	Ignition devices, safety-related equipment, oxygen sensors, various other actuators, sensors, and hydraulic solenoids	741	319	4,200
Kota Plant	5, Maruyama, Ashinoya, Kota-cho, Nukata-gun, Aichi 444-0193	Integrated circuits and electronic control components	283	217	3,700
Toyohashi Plant	3-23, Akemi-cho, Toyohashi, Aichi 444-8074	Air-conditioner compressors, magnetic clutches, and car-heater blowers	174	141	1,300
Agui Plant	1, Yoshiike, Kusaki, Agui-cho, Chita-gun, Aichi 470-2298	Machinery, tools, and robots	283	66	1,100
Kitakyushu Plant	5-4-1, Honjo Nishi-ku, Yahata, Kitakyushu, Fukuoka 807-0801	Air conditioners	156	22	200
Zenmyo Plant	100 Ipponmatsu, Zenmyo-cho, Nishio, Aichi 445-0034	Electronically controlled injection pumps (ECD-V4, ECD-U2P) and IC cards	32	77	300
Hiroshima Plant	2-5-1, Kamisenominami, Aki-ku, Hiroshima 739-0302	Radiators and radiator fans	33	14	200
Nukata Testing Center	1-2 Obou, Kiriyama, Nukata-cho, Nukata-gun, Aichi 444-3431	Performance of various evaluations of automotive components	1,004	30	37
DENSO Research Laboratories	500-1, Minamiyama, Komenoki-cho, Nisshin, Aichi 470-0111	Basic research in semiconductors, information and communications systems, and micromachining; development of display technologies	81	43	500

Subsidiaries and Affiliates in Japan (66 total)

Asmo Co., Ltd.; Anden Co., Ltd.; Hamanako DENSO Co., Ltd.; Daishinseiki Co., Ltd.; Kyosandenki Co., Ltd.; GAC Co., Ltd.; et al.

Overseas Subsidiaries and Affiliates (73 total)

Production Companies (55 companies)

North America: DENSO Manufacturing Michigan, Inc.; DENSO Manufacturing Tennessee, Inc.; et al.

South America: DENSO do Brazil Ltda.; et al.

Europe: DENSO Manufacturing UK Ltd.; DENSO Barcelona S.A.; et al.

Asia and Oceania: DENSO Manufacturing Australia Pty. Ltd.; DENSO (Thailand) Co., Ltd.; et al.

Regional Headquarters, Sales Companies, and Others (18 companies)

DENSO International America, Inc.; DENSO International Europe B.V.; DENSO International Australia Pty. Ltd.; DENSO International Singapore Pte. Ltd.; et al.

Environmental Data by Plant

Environmental data is provided for the major controlled substances at each operating facility. (There are slight differences among items due to variations in materials used in production processes at different facilities.)

Water Pollution Data

Plant	Substance* ¹	Control Value* ²	Actual Measurement* ³		
			Maximum	Minimum	Average
Headquarters and Kariya Plant	pH	5.8-8.6	7.6	6.3	6.9
	BOD (mg/l)	12.5	11.3	1.2	4.8
	COD (mg/l)	15	10.3	2.1	5.8
	SS (mg/l)	15	14.9	N.D.	1.1
	Oil (mg/l)	2.5	N.D.	N.D.	N.D.
	Phenol (mg/l)	1	0.10	0.01	0.01
	Copper (mg/l)	0.5	0.05	N.D.	0.02
	Zinc (mg/l)	2.5	1.08	0.01	0.10
	Soluble iron (mg/l)	2.5	0.1	N.D.	0.1
	Soluble manganese (mg/l)	2.5	N.D.	N.D.	N.D.
	Chromium (mg/l)	1	0.01	N.D.	0.01
	Fluorine (mg/l)	7.5	3.0	0.4	1.0
	Colon bacillus (#/cm ³)	1500	679	0	46
	Total nitrogen (mg/l)	60	14.4	5.9	10.1
Total phosphorus (mg/l)	8	3.10	0.58	1.09	
Cyanide (mg/l)	0.2	N.D.	N.D.	N.D.	
Hexavalent chromium (mg/l)	0.1	N.D.	N.D.	N.D.	
Ikeda Plant	pH	5.8-8.6	7.7	6.7	7.2
	BOD (mg/l)	12.5	10.7	0.7	2.3
	COD (mg/l)	15	4.3	1.8	2.9
	SS (mg/l)	15	3.9	N.D.	1.1
	Oil (mg/l)	2.5	N.D.	N.D.	N.D.
	Phenol (mg/l)	1	0.02	N.D.	0.01
	Copper (mg/l)	0.5	0.04	0.01	0.02
	Zinc (mg/l)	2.5	0.43	N.D.	0.13
	Soluble iron (mg/l)	2.5	0.1	N.D.	0.1
	Soluble manganese (mg/l)	2.5	0.1	N.D.	0.1
	Chromium (mg/l)	1	N.D.	N.D.	N.D.
	Fluorine (mg/l)	7.5	1.0	0.1	0.6
	Colon bacillus (#/cm ³)	1500	83	0	2
	Total nitrogen (mg/l)	60	8.8	0.9	3.1
Total phosphorus (mg/l)	8	1.11	N.D.	0.05	
Anjo Plant (Anjo Number 1)	pH	6.0-8.5	7.8	6.3	6.7
	BOD (mg/l)	12.5	3.7	0.6	1.8
	COD (mg/l)	15	14.3	0.8	8.2
	SS (mg/l)	15	1.4	N.D.	1.0
	Oil (mg/l)	2.5	1.0	N.D.	1.0
	Phenol (mg/l)	1	0.01	N.D.	0.01
	Copper (mg/l)	0.5	0.20	N.D.	0.06
	Zinc (mg/l)	2.5	0.80	0.14	0.48
	Soluble iron (mg/l)	2.5	0.1	N.D.	0.1
	Soluble manganese (mg/l)	2.5	0.1	N.D.	0.1
	Chromium (mg/l)	1	N.D.	N.D.	N.D.
	Fluorine (mg/l)	7.5	0.2	N.D.	0.1
	Colon bacillus (#/cm ³)	300	8	0	2
	Total nitrogen (mg/l)	60	9.2	4.2	7.3
Total phosphorus (mg/l)	8	0.10	N.D.	0.02	
Cyanide (mg/l)	0.2	N.D.	N.D.	N.D.	
Hexavalent chromium (mg/l)	0.1	N.D.	N.D.	N.D.	
Anjo Plant (Anjo Number 2)	pH	6.0-8.5	7.7	6.5	7.1
	BOD (mg/l)	10	4.9	0.5	2.1
	COD (mg/l)	10	7.5	2.5	4.8
	SS (mg/l)	10	2.0	N.D.	1.0
	Oil (mg/l)	2	1.0	N.D.	1.0
	Phenol (mg/l)	0.2	0.01	N.D.	0.01
	Copper (mg/l)	0.2	0.07	N.D.	0.01
	Zinc (mg/l)	2	0.61	0.02	0.26

Plant	Substance* ¹	Control Value* ²	Actual Measurement* ³		
			Maximum	Minimum	Average
Anjo Plant (Anjo Number 2) (cont.)	Soluble iron (mg/l)	2	0.4	N.D.	0.1
	Soluble manganese (mg/l)	2	N.D.	N.D.	N.D.
	Chromium (mg/l)	0.2	N.D.	N.D.	N.D.
	Fluorine (mg/l)	2	0.2	N.D.	0.1
	Colon bacillus (#/cm ³)	300	8	0	3
	Total nitrogen (mg/l)	60	13.1	6.6	8.5
	Total phosphorus (mg/l)	8	1.01	0.01	0.39
Nishio Plant	pH	5.8-8.3	7.5	5.8	6.7
	BOD (mg/l)	10	1.8	0.1	0.5
	COD (mg/l)	10	9.6	1.7	4.7
	SS (mg/l)	10	5.7	0.1	0.9
	Oil (mg/l)	2	N.D.	N.D.	N.D.
	Phenol (mg/l)	0.5	0.02	N.D.	0.01
	Copper (mg/l)	0.5	0.03	N.D.	0.02
	Zinc (mg/l)	1	0.41	0.02	0.15
	Soluble iron (mg/l)	3	0.2	N.D.	0.04
	Soluble manganese (mg/l)	3	0.3	N.D.	0.1
	Chromium (mg/l)	0.1	N.D.	N.D.	N.D.
	Fluorine (mg/l)	3	2.2	0.1	0.4
	Colon bacillus (#/cm ³)	300	286	0	9
	Total nitrogen (mg/l)	60	23.5	5.1	12.2
Total phosphorus (mg/l)	8	1.05	N.D.	0.32	
Hexavalent chromium (mg/l)	0.05	N.D.	N.D.	N.D.	
Takatana Plant	pH	6.5-8.5	7.8	6.7	7.4
	BOD (mg/l)	10	4.5	0.9	2.6
	COD (mg/l)	10	9	1.9	4.7
	SS (mg/l)	10	4.7	N.D.	2.0
	Oil (mg/l)	2	N.D.	N.D.	N.D.
	Phenol (mg/l)	0.2	0.02	N.D.	0.01
	Copper (mg/l)	0.2	0.05	N.D.	0.02
	Zinc (mg/l)	2	0.47	0.11	0.25
	Soluble iron (mg/l)	2	0.4	N.D.	0.1
	Soluble manganese (mg/l)	2	0.2	N.D.	0.1
	Chromium (mg/l)	0.2	0.01	N.D.	0.01
	Fluorine (mg/l)	2	0.2	0.1	0.1
	Colon bacillus (#/cm ³)	300	232	0	20
	Total nitrogen (mg/l)	60	10.8	1.9	6.1
Total phosphorus (mg/l)	8	1.23	N.D.	0.35	
Hexavalent chromium (mg/l)	0.05	N.D.	N.D.	N.D.	
Daian Plant	pH	5.8-8.6	7.7	6.2	6.9
	BOD (mg/l)	10	5.8	N.D.	1.2
	COD (mg/l)	15	9.5	0.6	5.1
	SS (mg/l)	10	3.6	N.D.	1.6
	Oil (mg/l)	2	1.9	N.D.	1.0
	Phenol (mg/l)	0.2	0.03	N.D.	0.01
	Copper (mg/l)	0.2	0.04	N.D.	0.01
	Zinc (mg/l)	2	0.30	N.D.	0.05
	Soluble iron (mg/l)	2	0.3	N.D.	0.1
	Soluble manganese (mg/l)	2	0.4	N.D.	0.1
	Chromium (mg/l)	0.4	0.02	N.D.	0.01
	Fluorine (mg/l)	3	2.6	N.D.	1.2
	Colon bacillus (#/cm ³)	300	29	0	1
	Total nitrogen (mg/l)	60	14.3	9.4	12.1
Total phosphorus (mg/l)	8	0.26	0.01	0.09	
Kota Plant	pH	5.8-8.3	7.9	6.3	7.1
	BOD (mg/l)	10	6.0	N.D.	2.0
	COD (mg/l)	10	10.0	1.0	3.8

Plant	Substance*1	Control Value*2	Actual Measurement*3		
			Maximum	Minimum	Average
Kota Plant (cont.)	SS (mg/l)	10	2.1	N.D.	1.1
	Oil (mg/l)	1	N.D.	N.D.	N.D.
	Phenol (mg/l)	0.25	0.06	N.D.	0.01
	Copper (mg/l)	0.5	0.01	N.D.	0.01
	Zinc (mg/l)	1	0.38	0.01	0.09
	Soluble iron (mg/l)	2.5	0.1	N.D.	0.1
	Soluble manganese (mg/l)	2.5	0.1	N.D.	0.1
	Chromium (mg/l)	0.1	N.D.	N.D.	N.D.
	Fluorine (mg/l)	5	4.4	0.8	2.5
	Colon bacillus (#/cm ³)	300	21	0	2
	Total nitrogen (mg/l)	60	45.6	17.7	28.9
	Total phosphorus (mg/l)	8	0.04	N.D.	0.02
	Toyohashi Plant	pH	6.0-8.5	7.9	6.5
BOD (mg/l)		10	5.2	0.1	0.5
COD (mg/l)		10	9.5	3.4	5.6
SS (mg/l)		10	1.5	0.1	0.2
Oil (mg/l)		1	N.D.	N.D.	N.D.
Phenol (mg/l)		0.25	0.01	N.D.	0.01
Copper (mg/l)		0.5	0.01	N.D.	0.01
Zinc (mg/l)		2.5	1.57	0.02	0.27
Soluble iron (mg/l)		2.5	0.2	N.D.	0.1
Soluble manganese (mg/l)		2.5	0.1	N.D.	0.03
Chromium (mg/l)		1	N.D.	N.D.	N.D.
Fluorine (mg/l)		7	4.9	0.3	1.3
Colon bacillus (#/cm ³)		1500	77	0	8
Total nitrogen (mg/l)		60	13.4	7.2	9.6
Total phosphorus (mg/l)		8	0.89	N.D.	0.26
Agui Plant	pH	5.8-8.6	8.0	6.4	7.2
	BOD (mg/l)	12.5	6.0	N.D.	1.8
	COD (mg/l)	15	9.4	1.5	3.9
	Oil (mg/l)	15	4.0	N.D.	1.1
	Oil (mg/l)	1	N.D.	N.D.	N.D.
	Phenol (mg/l)	0.5	0.02	N.D.	0.01
	Copper (mg/l)	0.5	0.01	N.D.	0.01
	Zinc (mg/l)	2.5	0.16	0.02	0.32
	Soluble iron (mg/l)	2.5	0.1	N.D.	0.1
	Soluble manganese (mg/l)	2.5	0.3	N.D.	0.1
	Chromium (mg/l)	1	N.D.	N.D.	N.D.
	Fluorine (mg/l)	7.5	0.4	N.D.	0.2
	Colon bacillus (#/cm ³)	1500	18	0	3
	Total nitrogen (mg/l)	60	43.2	12.6	22.5
	Hexavalent chromium (mg/l)	8	0.72	0.21	0.38
Kitakyushu Plant	pH	5.8-8.6	8.5	6.9	7.9
	BOD (mg/l)	70	6.4	0.9	3.4
	COD (mg/l)	70	11.0	1.5	4.2
	SS (mg/l)	20	12.0	N.D.	3.6
	Oil (mg/l)	5	N.D.	N.D.	N.D.
	Zinc (mg/l)	5	0.42	0.02	0.16
	Soluble iron (mg/l)	10	0.1	0.01	0.1
Zenmyo Plant	pH	5.8-8.3	8.2	6.7	7.3
	BOD (mg/l)	10	1.3	0.1	0.4
	COD (mg/l)	10	7.6	0.8	3.3
	SS (mg/l)	10	3.8	0.1	0.7
	Oil (mg/l)	1	N.D.	N.D.	N.D.
	Phenol (mg/l)	0.25	N.D.	N.D.	N.D.
	Copper (mg/l)	0.5	N.D.	N.D.	N.D.
Zinc (mg/l)	1	0.53	N.D.	0.23	

Plant	Substance*1	Control Value*2	Actual Measurement*3		
			Maximum	Minimum	Average
Zenmyo Plant (cont.)	Soluble iron (mg/l)	2.5	0.1	N.D.	0.02
	Soluble manganese (mg/l)	2.5	0.1	N.D.	0.02
	Chromium (mg/l)	0.1	N.D.	N.D.	N.D.
	Fluorine (mg/l)	7.5	0.3	0.1	0.1
	Colon bacillus (#/cm ³)	300	0	0	0
	Total nitrogen (mg/l)	10	7.5	2.0	4.2
	Total phosphorus (mg/l)	1	0.13	N.D.	0.02
Hiroshima Plant	pH	5.8-8.6	8.2	6.6	7.3
	BOD (mg/l)	15	6.0	1.5	3.0
	COD (mg/l)	15	8.4	1.1	2.8
	SS (mg/l)	15	6.6	1.0	2.2
	Oil (mg/l)	2.5	1.4	N.D.	1.0
	Phenol (mg/l)	1	N.D.	N.D.	N.D.
	Copper (mg/l)	1	N.D.	N.D.	N.D.
	Zinc (mg/l)	2.5	0.1	N.D.	0.1
	Soluble iron (mg/l)	2.5	N.D.	N.D.	N.D.
	Soluble manganese (mg/l)	2.5	N.D.	N.D.	N.D.
	Chromium (mg/l)	1	N.D.	N.D.	N.D.
Nukata Testing Center	Chromium (mg/l)	7.5	N.D.	N.D.	N.D.
	Colon bacillus (#/cm ³)	1500	150	0	20
	Total nitrogen (mg/l)	60	4.1	1.8	2.8
	Total phosphorus (mg/l)	8	0.40	0.10	0.20
	pH	6.5-8.5	7.7	6.6	7.1
	BOD (mg/l)	12.5	5.2	N.D.	1.4
	COD (mg/l)	20	7.5	1.2	3.1
	SS (mg/l)	20	14.1	N.D.	4.1
	Total nitrogen (mg/l)	100	77	0	16
	Total nitrogen (mg/l)	1	0.6	0.3	0.4
	Total phosphorus (mg/l)	8	0.06	N.D.	0.01
DENSO Research Laboratories	pH	5.8-8.6	8.3	6.5	7.1
	BOD (mg/l)	12.5	8.2	0.7	2.5
	COD (mg/l)	15	6.0	0.4	1.9
	SS (mg/l)	15	2.0	N.D.	1.0
	Oil (mg/l)	1	N.D.	N.D.	N.D.
	Phenol (mg/l)	0.5	0.03	N.D.	0.01
	Copper (mg/l)	0.5	0.01	N.D.	0.01
	Zinc (mg/l)	2.5	0.08	N.D.	0.02
	Soluble iron (mg/l)	2.5	0.1	N.D.	0.1
	Soluble manganese (mg/l)	2.5	N.D.	N.D.	N.D.
	Chromium (mg/l)	1	N.D.	N.D.	N.D.
Fluorine (mg/l)	7.5	5.6	0.9	2.3	
Colon bacillus (#/cm ³)	1500	103	0	8	
Total nitrogen (mg/l)	60	16.3	0.1	7.3	
Total phosphorus (mg/l)	8	0.24	N.D.	0.04	

*1 pH: Hydrogen ion concentration
 BOD: Biochemical oxygen demand
 COD: Chemical oxygen demand
 SS: Suspended solids

*2 Control parameters are established by DENSO and are more stringent than those mandated by law.

*3 N.D.: Not detected (below detection limit)

Air Pollution Data

Plant	Equipment	Substance* ¹	Control Value	Actual Measurement (maximum) ^{*2}
Headquarters and Kariya Plant	Boiler	P.M. (g/Nm ³)	0.1	0.08
		NO _x (ppm)	150	79
		SO _x (-) (K value)	1.75	0
	Gas turbine	P.M. (g/Nm ³)	0.05	0.0005
		NO _x (ppm)	50	19
		SO _x (-) (K value)	1.75	0
Ikeda Plant	Boiler	P.M. (g/Nm ³)	0.1	0.056
		NO _x (ppm)	150	75
		SO _x (-) (K value)	1.75	0.09
	Oven	P.M. (g/Nm ³)	0.2	0.01
		NO _x (ppm)	130	15
		SO _x (-) (K value)	1.75	0
	Thermal grease remover	P.M. (g/Nm ³)	0.2	0.009
		NO _x (ppm)	130	21
		SO _x (-) (K value)	1.75	0
Anjo Plant	Boiler	P.M. (g/Nm ³)	0.3	0.009
		NO _x (ppm)	230	159
		SO _x (-) (K value)	4.67	0.13
	Melting furnace	P.M. (g/Nm ³)	0.2	0.01
		NO _x (ppm)	140	88
		SO _x (-) (K value)	17.5	0
	Incinerator	P.M. (g/Nm ³)	0.5	0.367
		NO _x (ppm)	230	176
		SO _x (-) (K value)	17.5	0.01
	Gas turbine	P.M. (g/Nm ³)	0.05	0.0006
		NO _x (ppm)	50	35
		SO _x (-) (K value)	17.5	0
Nishio Plant	Boiler	P.M. (g/Nm ³)	0.3	0.236
		NO _x (ppm)	210	125
		SO _x (-) (K value)	17.5	1.89
	Melting furnace	P.M. (g/Nm ³)	0.2	0.0007
		NO _x (ppm)	170	9
		SO _x (-) (K value)	17.5	0
	Ash immersion furnace	P.M. (g/Nm ³)	0.2	0.0004
		NO _x (ppm)	150	20
		SO _x (-) (K value)	17.5	0
	Gas turbine	P.M. (g/Nm ³)	0.05	0.002
		NO _x (ppm)	50	31
		SO _x (-) (K value)	17.5	0
Takatana Plant	Boiler	P.M. (g/Nm ³)	0.25	0.01
		NO _x (ppm)	140	106
		SO _x (-) (K value)	2.92	0.04
Daian Plant	Boiler	P.M. (g/Nm ³)	0.25	0.098
		NO _x (ppm)	110	64
		SO _x (-) (K value)	17.5	1.48
	Melting furnace	P.M. (g/Nm ³)	0.2	0.002
		NO _x (ppm)	100	54
		SO _x (-) (K value)	17.5	0
	Incinerator	P.M. (g/Nm ³)	0.5	0.402
		NO _x (ppm)	250	179
		SO _x (-) (K value)	17.5	1.45
	Kiln	P.M. (g/Nm ³)	0.25	0.117
		NO _x (ppm)	180	130
		SO _x (-) (K value)	17.5	0
	Gas turbine	P.M. (g/Nm ³)	0.05	0.013
		NO _x (ppm)	70	38
		SO _x (-) (K value)	17.5	0

Plant	Equipment	Substance* ¹	Control Value	Actual Measurement (maximum) ^{*2}
Kota Plant	Boiler	P.M. (g/Nm ³)	0.05	0.003
		NO _x (ppm)	140	118
		SO _x (-) (K value)	5	0.20
	Gas turbine	P.M. (g/Nm ³)	0.04	0
		NO _x (ppm)	50	38
		SO _x (-) (K value)	5	0
Toyohashi Plant	Boiler	P.M. (g/Nm ³)	0.15	0.003
		NO _x (ppm)	140	115
		SO _x (-) (K value)	2.34	1.39
	Ash immersion furnace	P.M. (g/Nm ³)	0.1	0.01
		NO _x (ppm)	100	10
Agui Plant	Boiler	SO _x (-) (K value)	2.34	0
		P.M. (g/Nm ³)	0.05	0.003
		NO _x (ppm)	140	79
	Oven	SO _x (-) (K value)	1.75	0
		P.M. (g/Nm ³)	0.05	0.0008
Kitakyushu Plant	Boiler	NO _x (ppm)	140	96
		SO _x (-) (K value)	1.75	0
		P.M. (g/Nm ³)	0.05	0.001
		NO _x (ppm)	120	33
Zenmyo Plant	Boiler	SO _x (-) (K value)	3.5	0
		P.M. (g/Nm ³)	0.05	0.005
		NO _x (ppm)	120	100
Hiroshima Plant	Boiler	SO _x (-) (K value)	3	0.32
		P.M. (g/Nm ³)	0.3	0.002
		P.M. (g/Nm ³)	250	130
Nukata Testing Center	Boiler	SO _x (-) (K value)	7	0.74
		P.M. (g/Nm ³)	0.3	0.107
		NO _x (ppm)	140	70
DENSO Research Laboratories	Boiler	SO _x (-) (K value)	7	1.15
		P.M. (g/Nm ³)	0.05	0.022
		NO _x (ppm)	120	45
		SO _x (-) (K value)	3	0

*1 NO_x: Nitrogen oxide
SO_x: Sulphur oxide

K value: An index established by local ordinances for limiting the volume of SO_x emissions. K values are low (more stringent) in regions in which there is concern over the possibility of a high concentration of SO_x.

*2 The actual measurements shown refer to maximum values with respect to the control values for each particular piece of target equipment.

Published by: DENSO CORPORATION
Safety, Health, and Environment Dept.
1-1, Showa-cho, Kariya, Aichi 448-8661, Japan
URL: <http://www.denso.co.jp/>

For further information, please contact:
Facsimile: 81-566-25-4525

Published: October 1999 (based on the Japanese version
issued in July 1999)

Next scheduled report: Fall 2000

DENSO