Environmental Performance

1. Product Development

In order to reduce the environmental impact of vehicles, it is important to implement environmental preservation measures in all stages of a vehicle life cycle, including the usage stage. For this, we consider environmental impact from the development stage, including the enhancement of fuel economy, reduction of gas emissions and enhancement of recycling possibilities.

Organizational chart of Product Environment Committee

1. Environmental Management

Organization for the Product Environment Committee

Nissan promotes activities at the committee level under the Product Environment Committee by specifying important environmental measures based on environmental impact evaluation into six categories: fuel consumption (CO2), emission gas, external noise, air conditioner refrigerant, environmental impact substances and recycling. Persons in charge of environmental management in the respective fields promote activities by setting policies and goals on development. The vice president in charge of the technology and development division oversees the entire process.

Bringing together all related divisions, we have made steady progress in enhancing our EMS was appropriate and that we were making improvements in control technology and catalytic systems and other post-discharge cleaning system. By the end of March, 2003, we will bring the percentage of "Ultra-Low Emission Vehicles (U-LEV)" to more than 80% of all passenger vehicles sold in Japan.

2. Environmental Policy on Product and Development Process

Nissan has reviewed and revised its environmental policy in accordance with the renewal audit of fiscal 2001. In order to realize the Nissan environmental philosophy of "Symbiosis of people, vehicles and nature", we will engage in product development programs that contribute to the preservation of the environment and reduction of environmental impact.

1. We will voluntarily set specific environmental goals and develop products in response to the legal restrictions throughout the world and the demands of society.
2. We will study the environmental impact caused by vehicles in all stages of their life cycle, and continue to develop environmental technology and improve our environmental management system.
3. We will designate especially important environmental fields such as fuel consumption (CO2), emission gas, external noise, air conditioner refrigerant, environmental impact substances and recycling.
4. We will nurture a corporate culture to develop products aimed at realizing a society of clean automobiles by educating employees about the environment and by seeking the cooperation of affiliated companies in product development.
5. We will promote communication with society in conjunction with the process of product development.

3. Cleaner Exhaust Emissions

Nissan established the Exhaust Emission Committee in December of 1990 to actively promote the research and commercialization of technologies to purify automobile exhaust emissions, such as engine modifications, improvements in control technology and catalytic systems and other post-discharge cleaning system. By the end of March, 2003, we will bring the percentage of "Ultra-Low Emission Vehicles (U-LEV)" to more than 80% of all passenger vehicles sold in Japan.

Low Exhaust Emission Technology

Gasoline engine

Super Ultra-Low Emission Vehicle (SULEV) certified Sentra CA (Clean Air), sold in the United States since February 2000, is the first gasoline vehicle to receive Zero Emission Vehicle credit from the California Air Resources Board (CARB) as it met all other requirements including zero evaporative emission from the fuel system and the on-board diagnosis level (2BDI-4). In Japan, we have further improved the technology used in the Sentra CA and introduced the Bluebird Sylphy, with more than a 50% emission reduction from the Japanese "Ultra-Low Emission Vehicle (U-LEV)" standard by the Ministry of National Land and Transport. In fiscal year 2001, the equivalent ULEV technology was expanded to the new March, Serena, Skyline and Primera.

[ Awards ]

Nihon Keizai Shimbun Nikkei Global Environmental Technology Award 2000
Automatic Engineering Magazine New Technology of the Year 2001
The Japan Society of Mechanical Engineers Prize (Technical) 2001
Society of Automotive Engineers of Japan Technological Development Prize 2001
The 36th Japan Society for the Promotion of Machine Industry Award
Minister of Economy and Industry Prize 2001
JC Technology of the year, 2000

End of March 2002
End of March 2003
U-LEV 90%}

Increasing Ultra-Low Emission Vehicles (U-LEV)

U-LEV is an environmentally friendly vehicle with exhaust emissions as clean as one-fourth of the level of NOx and HC of cars certified for 2000 Japanese exhaust emission standards. Introducing 80% of U-LEV passenger cars annually in Japan has the equivalent effect, in terms of reducing NOx and HC, to disseminating 400,000 vehicles zero-emission cars, such as fuel cell vehicles and electric vehicles, annually. Our priority is to employ practical technology that enables us to realize a wide dissemination of U-LEVs at affordable prices to make an immediate contribution to environmental preservation.

NOx (Nitrogen oxide compound)

Restriction values of fiscal 2000

Excellent-Low emission (G-LEV)

Restriction values of fiscal 2000

Standard

-50%

-75%

-90%

-95%

-99%

Unit: g/km

End of March 2002

End of March 2003

U-LEV 90%

Bluebird Sylphy 1.8L 2WD

End of March 2002

End of March 2003

U-LEV 90%
Nissan Environmental & Social Report 2001

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**Sales ratio of U-LEVs in Japan**

<table>
<thead>
<tr>
<th>Year</th>
<th>1993/1</th>
<th>1994/1</th>
<th>1995/1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>20%</td>
<td>18%</td>
<td>16%</td>
</tr>
<tr>
<td>1994</td>
<td>22%</td>
<td>20%</td>
<td>18%</td>
</tr>
<tr>
<td>1995</td>
<td>24%</td>
<td>22%</td>
<td>20%</td>
</tr>
</tbody>
</table>

- **Direct injection (Nissan Di) diesel engine**
  - Nissan Di engine use direct injection and the new Nissan Modularized Fire (M-Fire) combustion technology to reduce CO2 emissions and to realize levels of clean combustion and smoke reduction which were previously impossible to achieve. The YD2DDTi has been adopted on the European models of the X-Trail.
  - M-Fire Combustion: Low temperature pre-mixture combustion, based on optimization of fuel injection timing, the creation of strong swirl, and large volume EGR.

**Compared with gasoline engines, diesel engines have a number of unique advantages—lower CO2 emissions, better fuel economy, higher torque performance and greater energy conservation. Nissan is working to make its diesel engines even more cleaner and more efficient.**

**March**

- Skyline
- Serena
- Primera

**Direct Injection Diesel Engine Adopted Models**

<table>
<thead>
<tr>
<th>Engine Type</th>
<th>Models Adopting the Engine</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZD30DDTi</td>
<td>Elgrand, Terrano, Terrano Regus, Safari (Photo)</td>
</tr>
<tr>
<td>ZD30DD</td>
<td>Caravan</td>
</tr>
<tr>
<td>YD25DDTi</td>
<td>Serena (Photo), Presage, Bessara</td>
</tr>
<tr>
<td>YD22DD</td>
<td>AD Van (Photo), Expert, Sunny</td>
</tr>
</tbody>
</table>

*(Those mounting the above engines were sold in FY 2001)*

**4. Improving Fuel Economy**

In November 1999, Nissan established a “Fuel Economy Committee” (currently referred to as a Fuel Economy Subcommittee) and has been advancing its comprehensive research and development and commercialization in order to promote the improvement of fuel economy (reducing CO2 emissions). We aim to achieve its voluntary fuel economy standards which reflect Japan’s 2005 standards for diesel-powered vehicles and 2010 standards for gasoline-powered vehicles, as well as standards set by other countries. In Japan, all of our gasoline-powered vehicles in every weight class surpassed the Japan’s 2000 fuel economy standards. Our current goal is to achieve Japan’s 2010 fuel economy standards for gasoline powered vehicles by 2005.

**Trend of Average Fuel Consumption by Class (Km/L)**

- 1.2L AT
- 1.3L AT
- 1.3L AT
- 1.4L AT
- 1.4L AT
- 1.6L AT
- 1.8L AT

**Enhance Engine Efficiency**

- Direct injection (Nissan Di) gasoline engine
  - Nissan’s unique NEXT combustion* technology has proven to be an effective method for improving fuel economy. The Nissan Di VK41DD engine used in the Cima provides both an excellent combination of top running ability and stiffness, and a low 10 kilometer/liter fuel consumption and excellent low exhaust emission performance.

**Direct Injection Gasoline Engine Adopted Models**

<table>
<thead>
<tr>
<th>Engine type</th>
<th>Models Adopting the Engine</th>
</tr>
</thead>
<tbody>
<tr>
<td>VK41DD</td>
<td>Cima</td>
</tr>
<tr>
<td>VK30DD, VQ25DD</td>
<td>Stagea (Photo), Skyline, Cedric, Gloria, Cefiro</td>
</tr>
<tr>
<td>QR26DD</td>
<td>Primera (Photo), Primera Wagon</td>
</tr>
<tr>
<td>QR20DD</td>
<td>Blustbird Silphy</td>
</tr>
<tr>
<td>OG18DD</td>
<td>Sunny (Photo), Bluebird</td>
</tr>
</tbody>
</table>

*(Those mounting the above engines were sold in FY 2001)*

**Development of Low-NOx Technology Vehicle**

- PVY
- VY
- YD22DDTi
- ZD30DD
- ZD30DDTi

**Improvement of Engine Efficiency**

- Combustion
- Cooling to lower heat emission
- Use of variable valve timing
- Improvement of engine

**Improvement of Powertrain Efficiency**

- Reduction of rotating inertia
- Reduction of air resistance
- Reduction of tire rolling resistance

**Nissan’s unique NEXT combustion technology**

- Lean-burn Engine
  - Lean-burn engines burn with a leaner air fuel mixture than conventional engines, reducing heat loss and pump loss and improving fuel economy.

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Improvement of Drivetrain Efficiency

Belt drive continuously variable transmission (Nissan CVT/Nissan CVT-M6)

A belt type CVT that provides stepless change of ratio using a pulley and a steel belt was first used in the March model in 1992. In 1997 we developed the world’s first 2.0 liter class “Nissan CVT”. By using a torque converter, the initial acceleration was improved, and the lock-up range was expanded to further enhance fuel economy. At present this transmission is used in 1.0 to 2.5 liter class cars.

5-Speed automatic transmission (SM-ATX)

World-leading power in a small, light package—this is the concept behind this newly developed automatic transmission. It features Nissan’s compact E-Flow Torque Converter with multi-plate lock-up which, by suppressing engine rpm and providing a wide five-speed gear ratio, provides enhanced fuel consumption.

Torque Converter

Minimization of the unit body has increased efficiency, with a substantially expanded lock-up area.

Reduction of Running Resistance

Using cutting-edge equipment and facilities, including computer analysis and a large wind tunnel which enables actual vehicle experiments all up to 270 km/h, we have realized the best performance achievable in reducing air resistance. A level of Cd = 0.20 was achieved.

Reduction of Vehicle Weight

Nissan is involved in research and development to streamline parts structures, using nonferrous lightweight metals, such as aluminum, and resin materials.

The engine uses high pressure die cast (HPDC) and an aluminum cylinder block to streamline the structure of the piston and connecting rod and a smaller and lighter crank shaft. For parts, high tension steel plates, tailored blank materials and hydro forming* were used in addition to aluminum in the outer plates of the hood and trunk and in the suspension links. In order to lighten the load below the springs, the suspension system for the Skyline model was made 25% lighter than those of conventional vehicles. It was made into one of the lightest suspension systems in the world with the liberal use of aluminum forged materials.

In the ultra small electric vehicle “Hypermini”, an aluminum space frame structure is used primarily with extruded aluminum parts.

Ptrolie System

*Hydro forming: Forming process using hydraulic pressure.

5. Development of Clean Energy Vehicles

Nissan is acting positively to prevent global warming, reduce and clean exhaust emissions and respond to future energy problems through research and development in four technological areas: electricity, hybrid technologies, natural gas and fuel cells. To effectively spread the use of the clean-energy vehicles which use these technologies, such as issues as vehicle durability, price, driving range, technical issues and the establishment of fuel supply centers must all be addressed.

Fuel Cell Vehicle (FCV)

This is an automobile with a clean and efficient power source that directly generates electrical energy through the reaction of hydrogen and oxygen, leaving only pure water as a by-product. We are engaged in the development of FCV with excellent environmental performance and energy conservation while maintaining ease of handling.

Also, we have participated in the California Fuel Cell Partnership (CalCFP) to perform test drives on public roads with the high pressure hydrogen fuel cell powered “Xterra FCV” from April 2001.

Electric Vehicle (EV)

From February 2000, we commercially introduced the ultra small electric vehicle “Hypermini” as a proposal for a new type of city vehicle. Hypermini uses an aluminum platform exclusively developed for the vehicle, while also supporting its high energy efficiency and ease of use, plus its safety as an ultra small vehicle. Moreover, in the U.S. we have sold the

Altra EV (the North American name is RIN EV) in California since 1998, and the vehicle is widely being used by government agencies, electric power companies, security firms and as rental vehicles at airports.

Also, a market survey for ultra small electric vehicles commenced from November 2001 jointly with University of California, Davis, using the Hypermini.

Technological development of electric vehicles has been promoted since the 1960s. In Japan, electric vehicle models being sold are Cedric EV, Avenir EV, Prairie Joy EV and Rhessa EV in addition to the Hypermini. Prairie Joy EV was the first in the world to use a lithium ion battery—known as a high performance power supply for portable phones and notebook PCs—in electric vehicles. These batteries have been used in other electric vehicles thereafter.

Nissan Environmental & Social Report 2001

Environmental Performance

[Models Using Nissan CVT]

Primea, Primera Wagon, Bluebird, Avenir, Sunny, Liberty, Terra, P-nessa, Wingroad, Serena, Cube, Bluebird Sylphy

[Awards]

Technology Development Award of the 48th Annual Meeting of the Society of Automotive Engineers of Japan, Inc. (1998)

[Trooid-type stepless transmission (Trooid CVT)]

This is the world’s first CVT that was commercialized to provide drive power and ratio changes by combining disk and power roller (dual rotary type). This transmission was first used in the Cedric/Gloria models in 1999. The transmission was developed for large displacement engines used in luxury cars to provide excellent performance in enhancing fuel economy, quick response and smooth change in gear ratios.

[Models Using this Transmission]

Cima, Gloria, Skyline

[Nissan CVT (Technical Note)]

Nissan CVT

Liberty, Tino, R-nessa, Extroid CVT (Technical Note)

Xterra CVT (High pressure hydrogen-type)

Xterra FCV construction

Hydrogen tank

Air compressor

Fuel cell

Reformer

Power Control Unit

Hydrogen reforming system

Power control unit

Moter

Engine

Market Survey (University of California, Davis)

Altra EV
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Hybrid Electric Vehicle (HEV)

We have developed the “Nissan Hybrid,” a hybrid system that dramatically improves fuel economy by combining an electric motor with a gasoline powered engine and utilizing both of their strong features. The vehicle was commercially released in April 2000 under the name of “Tino Hybrid.” “Nissan Hybrid” uses its electric motor to power the vehicle at initial acceleration and during low speed driving (when engine efficiency is poor). It runs on the gasoline engine at mid to high speed driving, (when engine efficiency is high) or when running with a heavy load. It is possible to utilize the electric motor, whose performance excels on congested roads and low speed times, and the gasoline powered engine, whose forte is in the mid to high speed zones and heavy load situations. Also, fuel economy was maximized by installing a regenerative system that uses the motor to convert the vehicle’s inertial energy into electrical energy during deceleration. By using the vehicle in this manner, it is possible to constantly select the optimum fuel consumption in all ranges of driving. Moreover, by using such technologies as CVT and high performance lithium ion batteries, we have realized a higher level of dynamic performance while enhancing fuel economy.

“Nissan Hybrid” System

- Inverter
- Permanent-magnet type alternate current synchronized motor-A
- Improved Nissan CVT
- Improved UG16DE engine
- Lithium battery
- Clutch
- Permanent-magnet type alternate current synchronized motor-B

Natural Gas Vehicle (NGV)

Nissan is involved in the research and development of high-performance compressed natural gas vehicles (CNGV), largely using methane, which have the environmentally friendly qualities of low NOx and CO2 — emissions, as well as the possibility of an alternative energy that does not depend on petroleum.

The new AD Van CNGV, launched in January of 2000, was the first vehicle certified as a low-emission vehicle by the Ministry of Land, Infrastructure and Transport’s low-emission vehicle certification system. This vehicle has power performance and comfort similar to that of standard gasoline vehicles, and an operating distance that is at the top of its class.

From 1992, Nissan began sales of the AD van CNGV, Cedric Sedan CNGV, Atlas CNGV and Caravan CNGV, completing a lineup of commercial and passenger CNGV vehicles, promoting the use of low-pollution vehicles.

LPG Vehicles

LPG is widely used as an alternative to diesel fuel in commercial vehicles because of its low pollution level and quiet operation.

In 1998, Nissan’s LPG vehicles were designated as low-pollution vehicles in seven prefectures and cities in the Kanto, Osaka and Kobe area. Nissan currently sells the low pollution Cedric/Gloria LPG and Crew LPG vehicles. With LPG delivery trucks also highly requested, Nissan provides a full range of 1.5- to 3-ton Atlas LPG trucks.

Nissan’s LPG vehicle development began in the middle of the 1970s; in all, we have produced LPG versions of the Bluebird, Laurel, President and AD Van as well as Cedric/Gloria and Crew.

6. Reduction of Vehicle Noise

Various types of noises are emitted from vehicles, including engine noise, tire noise, exhaust noise, intake noise, cooling fan noise, and wind noise. We have aggressively conducted research and development in this area to reduce noise levels and have achieved favorable results.

As of fiscal 2000, all of our passenger vehicles were qualified under Japan’s new standards. We intend to have all of our commercial vehicles qualify under the new Japanese standards by fiscal 2002.

Examples of Main Measures

- Reduction of engine noise
  - Modifying the engine's physical shape
  - Modifying the engine's internal structure
  - Modifying intake and exhaust
  - Reducing exhaust noise, intake noise, cooling fan noise, and wind noise

7. Control of Air-conditioner Refrigerant emissions

As chlorofluorocarbon 12 (CFC12), used in the past as a refrigerant for vehicle air conditioners, has been designated as a substance which destroys the ozone layer, the “CFC Countermeasures Committees” established in February 1989 has promptly decided to ban its use. We subsequently began replacing CFC with a new refrigerant (HFC134a). In recognition of this undertaking our company received the U.S. Environmental Protection Agency’s Montreal Protocol 10th Anniversary “Best of the Best Stratospheric Ozone Protection Award” in September 1997.

8. Life Cycle Assessment (LCA)

In the Skyline model, LCA is applied in the design process. Specifically, we have conducted an environmental impact study concerning the use of resins in the radiator core support in the front end module. In the latest result, the environmental impact of CO2 has been reduced in the life cycle compared with previous structures and materials.

Conserving Refrigerants

We have reduced the amount of HFC134a and gradually used equipment designed to restrain leakage during usage of air conditioners on new model vehicles. As of the end of fiscal 2001, 14 models now use air conditioners with these adjustments.

Researching Vehicle Air Conditioner Refrigerants With Low Environmental Impact

None of the systems using C02 or HC type refrigerants have been commercialized because of some existing problems at this stage, and we are conducting joint research with vehicle air conditioner manufacturers concerning these technologies.

Promotion of Low-Pollution Cars

In 1998, Nissan has promptly decided to ban CFC. As a result, the environmental impact of CO2 has been reduced in the life cycle compared with previous structures and materials.

Nissan Environmental & Social Report 2001
2. Manufacturing

At our manufacturing plants, we aim to realize "green factories" under the Nissan Green Program 2005 on the belief that environmentally friendly products are manufactured at environmentally friendly plants. We will also try to eliminate the release of wastes and pollutants into the atmosphere and water as much as possible. By promoting resource conservation we are involved in realizing a recycling-based society.

Hidetoshi Imazu

(Director Vice President in charge of Manufacturing Division Environmental Activities, and Director in Charge of the Environment and Energy Control Section)

1. Environmental Management Organization in Manufacturing

Ever since establishing a dedicated organization in charge of the environment at the head office and the respective plants in 1972, we have involved ourselves in preventing environmental problems before they occur and have created the EMS centering on activities for saving energy and reducing waste, using "Countermeasures Implemented at Their Sources" as a key phrase. We have created a Manufacturing Environment Management Committee under the Environmental Management Committee, and have organized it with representatives from various fields, such as production management, logistics, manufacturing technology, and plant operations. The Manufacturing Environment Management Committee meets twice a year to plan activities and verify where progress has been made.

2. Pre-Assessment System

When constructing, remodeling and placing additions to new plants and facilities, or when introducing new materials or processing technologies, we believe it is important to make a pre-assessment of the impact they might have on the regional environment, and to implement the proper measures. We have created a pre-assessment system to study the impact on the environment to primarily access a situation using the Environmental Effect Pre-Assessment Standard Energy Conservation Evaluation Chart. Based on the results of the evaluation, we urge the planning department and the preservation department to implement steps to make changes and improvements to employ the best measures and to use substances with the least environmental impact.

2.1 Environmental Effect Pre-Assessment Standard

A standard for evaluating the environmental effect of new materials and substances. This standard is considered for new facilities and new processing methods and for improving a safe environment.

2.2 Energy Conservation Evaluation Chart

A standard for evaluating the quality and quantity of energy used in the planning stage when a new facility is built or an existing facility is remodeled. It can be used for evaluating the state and quality of energy after use, and for checking whether the energy has been used as efficiently.

3. Promoting Energy Saving

(Coping with global warming)

In fiscal 2001, Nissan promoted measures to make manufacturing more efficient through the utilization of facilities and processes and promoted energy conservation activities such as the introduction of highly efficient energy systems. As a result, total CO₂ emission declined by 14.5% from fiscal 1999 (down 45% from 1990).

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4. Waste Reduction (Zero Emission)

In 2001, we were able to achieve "zero emission" of wastes disposed in landfills with expanded efforts of the entire company. The company became thoroughly involved in sorting, recycling, and reducing the volume of waste that goes directly to landfills to less than 1.5% compared with the level of 1999.

* Figures since 1999 exclude those from the Fuji Plant which was spun off into a separate company.

** Fiscal conversion value of the level as of March 2002

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5. Management of Chemical Substances

When newly using oils and fats, chemicals, paints and other materials within the company, they are evaluated by environmental safety and health factors before use through the application of MSDS*. Harmful substances are not allowed to be used and are replaced with materials that have less impact on the environment. Materials used by Nissan is registered in the PRTR* system and the quantity used and the volume discharged to the environment are totaled. Chemical products to be registered are the 435 substances designated by the PRTR Law, "Law for understanding the release quantity of specified chemical substances to the environment and promoting better control" as well as other chemicals listed in the MSDS. The PRTR system is linked to the information of the purchase control system for procuring materials, and it manages the necessary information in an integrated manner.

An investigation of the statistics in 2001 shows that the main substances released into the environment were xylenes and toluene, unchanged from the last fiscal year, accounting for about 92% of the total discharge. We are reducing the use of these substances by maintaining thorough control over our facilities and switching to water-based paint in the painting process.

(See pages 51-57 and 60 for details)

* Material Safety Data Sheet

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6. Prevention of Water Contamination

Water used in Nissan plants is actively reused for processing; while the total quantities used have been reduced. Wastewater from this processing is also extensively treated before being released to the environment. The fiscal year of 2001 saw some changes in the COD contamination impact volume due to the increase in manufacturing density following the centralization of plants. In the future, we will reduce the release of this water by improving the level of management.

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Wastewater treatment facility (Fuyuha Plant)
2 | Environmental Performance

7. Prevention of Air Pollution
We are reducing nitrogen oxides (NOx) by improving our incineration methods. The release amount of sulfur oxide (SOx) saw an increase in 2001 due to the introduction of a cogeneration system at the Tochigi Plant to cope with global warming.

Reduction of Volatile Organic Compounds (VOC)
To reduce VOC generated in the painting process, the recycling rate of discarded thinner was enhanced and usage of thinner was reduced. Through these measures, the amount of VOC released in 2001 per painting area was reduced by 40% compared with fiscal 1994. A water-based painting line with fewer VOC was installed at the Kyushu Plant, and a technology was established for reducing VOC release volume to the 20 g/m² level.

Control of dioxin generation
Dioxin is contained in the gases emitted from industrial waste incinerators and aluminum melting furnaces, and is subject to the special dioxin countermeasures law. Nissan has already reduced dioxin emissions to well below regulation values, and is now working to reduce dioxin emissions to one-tenth the regulation values or lower before dioxin regulations are tightened from December 2002. The reduction of the volume of waste incineration has also contributed to lowering the quantity of dioxin released.

8. Prevention of Soil and Water Contamination
Our respective business offices have been periodically examining underground water even before the drinking water standards for volatile organic substances were established in December 1992 under the Waterworks Law. Also, we are examining soil and underground water and investigating the history of chemical substances used in the past as we have judged that it would be necessary to voluntarily examine the environmental impact on soil and underground water following the acquisition of ISO 14001 certification by our respective business offices. As a result of these investigations, further surveys and detailed investigations were held at the local business offices where improvements were necessary. After purification measures were studied, we reported the results to the regional governments and promulgated measures to cleanse the area with the guidance of regional governments. We also began purification measures at the plants and offices where improvements were required. Cleansing operations at the Zama Business Office and the former Ogikubo Business Office have been completed. Moreover, we do not use volatile organic compounds governed by the environmental standards. (Volatile organic compounds referred to here are shown below: Tetrachloroethylene, trichloroethylene, 1,1,1 trichloroethylene, and dichloromethane)

9. Environmental Preservation in Logistics
Nissan has improved the streamlined logistics and the containers to achieve all our goals for fiscal year 2001. We will also improve the efficiency of transporting empty parts containers, and use shared, returnable pallets for service parts to improve loading rate. We are promoting a shift in shipping modes by expanding the rule for marine transport.
Environmental Performance

2 | Environmental Performance

Sales and Service

Through the Nissan Green Shop Certification System we are involved in the preservation of the local environment by implementing appropriate treatment and recycling of waste generated from service and repair operations at the dealers and from End of Life Vehicles (ELVs).

1. “Nissan Green Shop” Certification System
Certification of all dealers has been completed

From April 2000 we introduced our own environmental management certification system based on ISO 14001 and reinforced the environmental preservation activities of our dealer companies. As of March 2002 the certification of all 236 dealer companies, including those for parts and forklifts, has been completed.

Under this system, dealers complying with the 57 certified inspection items stipulated by our company in terms of “Appropriate treatment of waste”, “Appropriate treatment of ELVs” and “Facility management to protect water, soil, etc. and energy conservation activities” are certified as a “Nissan Green Shop”.

As the results of these activities, some of our dealers have indicated that they were praised by their customers because their outlets were beautified by the thorough efforts made in putting things in order. They were also praised because dealers were able to reduce waste disposal expenses “by making operations more efficient and revising their routes”.

2. Manifesto Concerning The Appropriate Treatment of ELVs

We will continue our activities to inform our dealers about the contents of the manifesto revised in 2001 and to have it completely implemented.

3. Collecting and Recycling Bumpers

We collect used plastic bumpers generated at dealers from all parts of Japan to repair and exchange them. The collected bumpers are recycled into plastic parts for new vehicles.

4. Collecting and Destroying Freon Gas used for Air Conditioner

Using a chlorofluorocarbon collecting machine, we are currently promoting the collection and destruction of chlorofluorocarbon (CFC12) for air conditioners in cars currently being used and those to be scrapped. Collection of CFC12 is being done at all 3,000 strong Nissan dealership and 1,200 shops in the U.S. with collection machines.

Collection and Destruction of Substitute CFC

The installation of air conditioner systems using substitute CFC (HFC134a) was completed for all production vehicles at the end of 1994. However, the CFC Collection and Destruction Law also stipulates the obligation to collect and destroy HFC134a to prevent global warming. The respective dealers have installed collection machines or have consigned others to collect and destroy HFC134a.
Besides complying with various laws and regulations concerning End of Life Vehicles (ELVs), it is important to improve ELV processing and recycling systems enable to have customer's reliance. We have striven to make effective systems with the help of others.

Shigeru Takagi
Senior Vice President, Recycling Committee
Chairman, Director in Charge of the Recycling Promotion Department

Our aim is to help society recycle. Our activities are based on the concept of the “Three Rs.” The first R is “Reduce,” to design automobiles that have a longer lifetime and use less resources. The next R is “Reuse,” before ELVs are placed in a shredder, parts are removed and given new life as used parts. Also, at the end-of-life stage, parts are returned to their original materials (“Recycle”).

We are even working to reduce environmental impact of the final waste, Automobile Shredder Residue (ASR)*1. We are in the process of developing a technology to reduce this waste and recover energy from it.

*1 Reduce: Reduce the amount of waste through resource conservation and extended product lives.

*2 Reuse: Reuse parts materials for resource (Also reuse processing heat).

Recycling of ELVs (Auto Industry as a Whole)

<table>
<thead>
<tr>
<th>ELV (about 5,000,000 units per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scrap dealers</td>
</tr>
<tr>
<td>Used car dealers, number (10%)</td>
</tr>
<tr>
<td>Individuals</td>
</tr>
<tr>
<td>Total (4,000,000 with per year)</td>
</tr>
</tbody>
</table>

Expected about 1,000,000 vehicle/year

Nissan's additional measures for achieving an 85% recycling rate

- Oil collection rate (battery collection): Recycling rate = 1.6%
- Tire collection rate: Recycling rate = 3.6%
- ASR: Thermal energy usage rate = 3.4%

The recyclability of new models launched in the 2001 model year (90% or higher): Caravan, Skyline, Stagea, (85% or higher): March

1. Development process for recycling design

Ability to recycle, reduction rate of substances with environmental impact, dismantling efficiency, and reuse part marking rate have been designated as target values for the development of new models. We clarify the judgement criteria in the designing stage, and we evaluate and manage the degree of achievement in the development process according to ISO 14001.

Recycling flow

**Legal trend**

Market information

Consideration of recycling targets by model

Vehicle module

Decision on policies by model

 Harm evaluation of target achievement

Arrangement

Final evaluation of target achievement

Production Vehicle Confirmation

1992 March

New March

<Example of Improvements to Rear Combination Light>

Changing how the part is installed on the automobile (bolt + sealed D bolt + rubber) has reduced disassembly time by approximately 80% and improved reusability.

Skyline front end module

3. Efforts in the development stage of new models

Recycling Design Guidelines

Nissan has created the Design Guidelines and Design for Recyclable Technical Standards to facilitate our aggressive effort to design new models for recycling. To recycle ELVs and reuse parts, recycling and reuse designs must be built into the automobiles when they are developed as new models. To efficiently recycle ELVs, the guidelines provide a framework for making improvements. Namely, the guidelines show how to facilitate recycling from the design stage by incorporating the improvements that were requested on previous products and the ideas for new mechanisms.

Development of easy-to-recycle structure

- Ideas to make parts easier to remove
- Nissan has made parts easier to remove from automobiles by reducing the number of parts and reducing the number of points where parts are installed on automobiles.
- Example of Improvements to Bumper
- Reduced the number of installation points on the automobile (32 points vs. 12 points). As a result, disassembly time has been reduced by approximately 40%.

- Innovations for easier separation of materials
- Parts are made of more than one material. As a result, separating these materials is an essential step in recycling. We are advancing the use of structures that allow the complete separation of materials and the development of parts made of single materials.

- Innovations for easier identification of parts materials
- When resins of different types are mixed, the material/recycled from the mixed plastics tends to be inferior in quality. In some cases, the resin mixture is difficult to separate. At Nissan, we mark plastic parts with material code according to ISO 11469. Large parts such as bumpers that are cut off prior to disassembly are marked in several places.
Environmental Performance

Development of Easier to Recycle Plastics

Today, plastics materials that are difficult to recycle are landfilled in the form of ASR. To recycle a greater amount of such resin materials, we are expanding the use of parts made from single materials and the use of materials that are easy to recycle.

- Greater use of thermoplastic: Nissan is promoting the wider use of thermoplastic, which are easy to recycle.
- Consolidation of polypropylene: PP is a common thermoplastic that accounts for approximately one half of total resin use. The material is used for a variety of applications, from bumpers that are subject to strong shocks to heater parts that must withstand heat. We have decreased the variety of PP that we use in production to six types that are readily available overseas.
- Reduction of substances with environmental impact: Nissan has set new targets for reducing substances with environmental impact to design automobiles that reduce these substances. The auto industry’s target for lead use was to reduce lead use by approximately one half of the 1996 level by the end of 2000. Nissan achieved this target as early as the 1997 models, and four new models we introduced in 2001 also use one half or less of the 1996 level.

Others 30.7%
Thermosetting 19.5%
Thermoplastic 1.4%
PVC 4.8%

Thermoplastic 83.3%
Others 1.2%
PVC 3.1%

1998 Model Skyline
New Skyline

Principal recyclable parts on the new March

Note: Reusable and made from polypropylene parts

4. Efforts in the ELV Processing Stage

Nissan is developing new technologies and systems for properly processing waste oils and liquids and those for recycling parts and materials in an effort to reduce shredder dust and lower environmental impact.

Demonstration Disassembly Research
Nissan is developing processes and technologies for properly processing waste oils and liquids from the ELV dismantling process to improve the recycling rate without polluting the environment. The information and technical knowledge obtained through the research are disclosed to relevant industries.

- Development of equipment for appropriate treatment of waste oils and liquids: Using our knowledge as an automaker, we developed “one-stage drainer”, a equipment that securely and economically collects waste oils and liquids in a single process. We began selling the equipment in May 2001. This equipment roughly doubles the volume of waste oils and liquids that can be collected, and allows the work to be performed quickly.
- Airbag development equipment: Nissan has developed airbag deployment equipment that controls odor and noise in air bag deployment. The equipment is being used by dismantlers.

Engine long-life coolant (LLC) recycler: Nissan has sold “Fukkatsukun”, an LLC recycling machine used since April 1999.
- Manual on Appropriate Treatment of ELVs: The information on dismantling and appropriate treatment obtained from the demonstration disassembly studies has been compiled in the “Manual on the Appropriate Treatment of ELVs.” Approximately 8,000 copies of the manual have been distributed to Nissan dealers and dismantlers around the country as of the end of 2001. (Issued: March 1999)

- Exchanging information with recycling industry: In December 1999, we published the first edition of “Communication”, a quarterly publication designed to exchange information between our company and the recycling industry and to promote the appropriate treatment and recycling of ELVs. The eighth edition was published at the end of 2001. We will continue to publish this magazine.

Development of the one-stage drainer system

Overview of the one-stage drainer system (system shown is engine coolant case)

Engine
Recover Part
Waste Oil and Liquid Storage can (Drum)
Compressor
Pipes
Air hose
Suction attachment
Ejector
Airbag equipment

Engine long-life coolant (LLC) recycler

Nissan has sold “Fukkatsukun”, an LLC recycling machine since April 1999.

Cumulative number of visitors

Manual on Appropriate Treatment of ELVs

Disclosure of research: Nissan encourages visitors to see its experimental disassembly plant. So far the plant has received visits from many dismantlers, car dealers, parts sales companies, government offices, schools, and mass media. Between its startup in October 1997 and the end of 2001, the plant received approximately 3,600 guests.
Nissan's concept of appropriate treatment and dismantling plant layout

Material Recycling Technology
Nissan is continuing research on technology to recycle used materials that are difficult to recycle, such as plastics, to improve the recycling rate of ELVs and recyclability of new models.

Development of applications for recycle
A used resin part is recycled in the following order of priority:
- Reuse as the same part
- If it is difficult to reuse as the same part
- Reuse as another auto part
- Reuse in another industry

Development of technology for reusing a collected part as the same part
Because used bumpers (made of polypropylene) are painted, recycling them presented a number of problems, including reduced strength. To solve this problem, we jointly developed with Synthesis Chemicals Co., Ltd. a mechanical paint remover that removes paint from crushed bumpers without using chemicals and does it less expensively than in the past. Nissan has used this technology on Hypermini, a model that is already on the market. In addition, we make recycled bumpers from used bumpers and supply them as replacement parts. We also are preparing to use the recycled bumpers on new models.

Same parts on Hypermini:
- Bumpers
- Instrument panel
- Air duct
- Carpet

Examples of use on Hypermini:
Recycling flow (bumpers): Reuse item added in 2001

Technology of collecting materials
Recycled cushions and recycled cushions

Research on automobile shredder residue (ASR) treatment and recycling
Because the widely used shredding process creates ASR, steps must be taken to treat and recycle the ASR. Therefore, beginning in July 1997 we have conducted a cokeless cupola experiment to treat ASR for approximately two years. Based on the knowledge gained from the experiment, we are collaborating with shredding operations, as well as with the materials industry, including non-ferrous smelters, steel mills and plant manufacturers to find even more effective ways to use ASR, and to continue our study and research on even more efficient treatment.

Recycling of nonmetallic materials

Examples of use on Hypermini:
Recycled cushion

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Recycling of nonmetallic materials

Examples of use on Hypermini:
Recycled cushion
2 | Environmental Performance

5 | Green Procurement

Green Procurement

We have launched the Nissan Green Procurement Guideline in collaboration with suppliers to systematically reduce substances with environmental impact and avoid environmental risks.

In June 2001, we presented the Nissan Green Procurement Guideline to parts and materials suppliers and requested their understanding and cooperation.

Namely, we ask our suppliers to:

- Report data on substances with environmental impact
- Notify Nissan of the person in charge of environmental activities
- Obtain the ISO 14001 certification

We will continue the activity in 2002 to gain greater acceptance and improve performance.

Obtain the ISO 14001 certification

We have requested our suppliers to develop environmental management systems to work with our environmental management system.

Develop environmental management system by March 2003 (Must be reviewed by internal environmental audit and by the management)

Voluntarily obtain the ISO 14001 certification by March 2003.

As of March 2002, 63% of our suppliers had obtained the ISO 14001 certification. According to our own self-diagnosis standards the environmental management of 7% of our suppliers has reached satisfactory levels. Therefore, combined, 70% of our suppliers have established environmental management systems.

According to a survey at the time we began the activity (July as of September 2001), 56% of the suppliers had obtained the ISO 14001 certification and 10% had reached satisfaction levels according to self-diagnosis, and 66% as a whole had established environmental management systems.

Notify Nissan of the person in charge of environmental activities

To better coordinate the Nissan Green Procurement activities at suppliers, and the environmental activities in our company, we ask each supplier to notify us who their environment manager is, to report data on substances with environmental impact, and to keep us informed on the progress of obtaining the ISO 14001 certification. We also share information on our environmental policies with environmental managers to strengthen the collaboration between our company and theirs.

Presentation of data on substances with environmental impact

Years ago we set technical standards for substances with environmental impact that are contained in parts and supplies based on laws of various countries, voluntary activities in the auto industry, and society’s concerns. We have asked our suppliers to always comply with these standards.

Nissan Green Procurement takes this activity a step further. We not only confirm the absence of substances whose use is prohibited, but determine the usage volume of substances that will likely be banned and usage volume of substances that we feel require caution in the development stage, and begin the development of alternative technology as soon as possible.

System of technical standards concerning substances with environmental impact

The system of technical standards concerning substances with environmental impact serves as a database for the ISO 14001 certification.

System of technical standards concerning substances with environmental impact

Our system consists of three principal parts, based on laws of countries, and demands of society and voluntary industry activities.

- Laws of countries
- Demands of society
- Voluntary industry activities

Voluntary industry activities

Nissan Motor

Self-diagnosis report of environmental management system

6 | Others

1. Efforts on ITS (Intelligent Transport Systems)

Air and noise pollution can be reduced further by alleviating road traffic. ITS (Intelligent Transport Systems) employs the latest information, communications, and electronic technologies to link drivers, vehicles, and road infrastructure. By alleviating road traffic, ITS is anticipated to make a great contribution to environmental protection and to improving traffic safety and comfort.

Nissan works closely with government agencies, universities, research institutions, and other manufacturers and organizations in actively promoting ITS research and development facilities. Notable examples of ITS projects for creating a better automotive society in the future include advanced navigation systems, ETC, and driver support tools for enhancing driving safety.

ETC system

ETC (Electronic Toll Collection) system is a toll collection system that allows vehicles to pass toll gates without stopping. This system is a combination of electromagnetic waves and identification technology. As of March 30, 2001, Nissan supplies two types of ETC equipment. One is a built-in type that is linked to the navigation system (manufacturer-installed option) and a dash-mounted type (dealer installed option).

Major Areas of Activity

Advance in navigation systems

- Nissan will continue to provide environmentally friendly and enjoyable driving solutions based on advanced information technology:
- Electronic toll collection (ETC) system
- This system can eliminate congestion at toll gates.
- Assistance for safe driving
- We are developing emergency alarm systems and systems that assist the driver in such controls as braking and acceleration.
- Optimizing traffic management
- We are cooperating with national and local government agencies to improve traffic flows.
- Increasing efficiency in commercial vehicle operations
- Nissan is developing onboard information systems on trucks to alleviate traffic congestion and improve the environment.

Nissan will continue to provide environmentally friendly and enjoyable driving solutions based on advanced information technology.
Traffic information Weather forecast

Auto DJ

with the system and having access to information. Combined
enjoyment of staying connected with friends
been made available from the new March
new-generation car-mounted system opens up
hands-free phones, and use road guidance by
obtain various information, receive e-mail, use

CARWINGS (Total Telematics Service)
CARWINGS is a service that allows the driver to
deliver various information, receive e-mail, use
hands-free phones, and use road guidance by
connecting a cell phone to the vehicle. This
new-generation car-mounted system opens up
easier possibilities for the driver. The service has
been made available from the new March
launched in March 2002. It provides the
enjoyment of staying connected with friends
and having access to information. Combined
with the system’s road guidance function and
emergency operator service, it adds comfort
and convenience to driving.

Nissan Information Service CARWINGS

Compass Link (Drive support service)
Compass Link is a next-generation drive service developed by
Nissan. The most distinctive feature of this system is that it uses a
navigation system and a digital cell phone to call
and receive the services of an operator at the
touch of a button. The service has been made
available around the clock nationwide from
September 1998.

System Overview of Compass Link
This is an entirely new service system that connects the vehicle and information center via a cell
phone line. The driver makes a verbal request and an operator responds to the request.

The customer lets the operator know
what he/she wants.

REQUEST

Car-mounted system

Operator checks the information and replies to the customer.

CARWINGS
Nissan Information Service CARWINGS

Traffic information

Weather forecast

VICS (Vehicle Information and Communication System)
VICS is a new-generation road traffic information system that Japan developed ahead of
other countries. Beginning with the Tokyo area and Tomei and
Makuhari expressways in April 1996, the system
has been expanded around the country. The
system allows drivers to obtain information on
congestions, accidents, road constructions, and
traffic restrictions in real time via transmitters
(nadio and optical beacons) that are installed on
roads and FM multiplex broadcasting towers.
Combined with Brokwee® Navigation, VICS
allows the driver to easily select a smooth
flowing route. By facilitating the flow of vehicles,
the system can provide a comfortable traffic
environment.

2. Pilot EV Sharing Experiments
EV sharing program has received a great deal of
attention from consumers and businesses alike as a solution to the problems that all cities
face: global warming, poor air quality, and traffic
congestion. Nissan participates in sharing
experiments using Hypermini, an ultra-small
electric vehicle, and ITS (Intelligent Transport
Systems) technology, to determine the
possibilities of vehicle sharing in the future.

Pilot Projects that Use the Hypermini
ITS (Intelligent Transport System)EV city car system
From January 2000
(Operator: Japanese Association of Electronic
Technology for Automobile Traffic and Driving,
Place: Minato Mura 21, Yokohama)

Automobile Transportation Society Experiment
Fujisawa 2001
November 2001 to March 2002
(Operators: Fujisawa City, Kanagawa
Prefecture, and the Ministry of National Land
and Transport, place: Fujisawa)

Kyoto Public Car System
From December 2000
(Operators: Japan Electric Vehicle Association
and Optimization Research Group, place: Kyoto)

Sharing at Okayabata River City 21
From September 2001
(Operators: Urban Development Corporation,
OKR Rent-A-Car Corporation, Nissan Motor
Co., Ltd., place: Okayabata, Chuo-ku, Tokyo)

3. Environmental Monitoring Research
Air pollution along major urban roads is one of
society’s serious environmental problems.
To improve the air quality, reducing the
concentration of exhaust emissions from
vehicles is not enough. Other solutions that
have been suggested include alleviating traffic
congestion and changing the shapes of
buildings and other structures in the vicinity.
Nissan is taking part in the Japan Clean Air
Program (JCAP, a program that is organized by
the auto and oil industries to improve air quality
by automotive and fuel technologies). Through
JCAP, we are helping to construct a simulation
model that can predict air flow, traffic flow,
concentration of exhaust emissions, and dispersed
emission distribution, and dispersed
concentration distribution of exhaust emission in an actual street canyon surrounded by
elevated roads and buildings of various shapes.
This model helps us study the effectiveness of
air quality improvement measures such as
emission regulations and traffic policies.

Prediction of effect of emission regulations
JCAP predicts the effect of emission
regulations on improving air quality, and makes
recommendations to environmental
administration.

Daily average on a high concentration day
along a road

Nissan Environmental & Social Report 2001

2000 Present

2015 (forecast)

Daily average on a high concentration day
along a road

Nissan Environmental & Social Report 2001
4. Environmental protection in industrial machinery business

Nissan’s industrial machinery business, which includes forklifts, is taking the initiative in the industrial vehicle industry by working to develop technologies to reduce environmental impact, while coordinating its efforts with the automobile operation. Electric vehicles, which have little environmental impact, have quickly gained popularity in urban areas in recent years. On the other hand, there is still strong demand for engine powered vehicles. Therefore, we are working to make engine emissions even cleaner to protect the environment.

Sale of low emission forklift (Gasoline vehicle and LPG vehicle)

Our first year of the 2001 California Phase-in 25% Regulation (25% of total vehicle sales in California must be powered by engines meeting the regulation) was largely successful. More than 38% of the engines we sold, including those mounted on our forklifts and OEM engines, met the regulation. In September 2001, Nissan launched the low emission J01/J02 models for the domestic and general export markets. These models use the same three-way catalyst and air/fuel ratio feedback control, as do the D01/D02 designed for the European market (launched in December 1999) and the J01/J02 models designed for the North American market (launched in January 2001). Fitted with a clean engine that meets the CARB (California Air Resources Board) regulation, the models have drawn the attention of environmentally conscious customers and industries. As a result, sales of the new models have exceeded the forecast.

Meeting the second stage regulation

Compared to the first stage regulation (on new vehicles), the second stage regulation will be more stringent (includes deterioration factor). The final draft of the regulation is awaiting approval. Nissan has participated in the workshops from the planning stages of the regulation, where we provided cooperation with technical aspects of environmental protection, while continuing with our research and development in the environmental field.

Regulation trends

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5. Green Office campaign

In May 1990, Nissan became the first company in the auto industry to use recycled paper for catalogues and office supplies. In October of the same year, we launched a campaign to collect and recycle used paper. Since February 1998, we have advanced the Green Office Program throughout the company to do what we can do on the office and personal level to prevent global warming and reduce CO2.

Green purchasing of company vehicles

We began green purchasing company vehicles from 2001. We are aggressively implementing low emission vehicles. In the NTC area, we purchased two CNS buses for commuters.