Promoting “Eco-Driving”

In line with the objectives of the Nissan Green Program 2010 to reduce carbon-dioxide emissions, Nissan recommends “Eco-driving,” because in addition to being safe and comfortable, it is also kind to the environment, people, and your budget. By driving ecologically, you can improve your fuel efficiency while reducing the amount of CO₂ emissions your car generates.

### Before You Drive
1) Check your tire pressure  
2) Remove unnecessary luggage  
3) Plan your route  
4) Combine short-distance drives

### While Driving
5) Avoid revving the engine while stopped  
6) Press the accelerator lightly  
7) Drive economically and accelerate gradually  
8) Take your foot off the gas early  
9) Use electronic toll collection (ETC) and navigation systems  
10) Run the air conditioner on Automatic  
11) Save power to be ecological

### When Parking
12) Don’t leave your engine idling  
13) Avoid parking violation

#### The Top Five Most Recommended Actions

4) Reduce the frequency of short-distance drives  
   - The difference in fuel consumption between short- and long-distance drives is approximately 26 percent, so group your driving errands as much as possible.  
   * Using a two-liter CVT vehicle. Research by Nissan.

5) Warming up your engine is generally unnecessary  
   - Idling for long periods to warm up your engine is usually not necessary except in special circumstances, such as in cold climates. Five minutes of idling consumes 0.16 liters of gasoline*.  
   - According to research by the Energy Conservation Center.  
   - Avoid accelerating suddenly to warm up the engine.

6) Press the accelerator lightly (“e-Start”)  
   - Start smoothly and accelerate gradually to approximately 20 km/h in the first five seconds. Lighter pressure on the accelerator improves fuel consumption by 11 percent.  
   * Using a two-liter CVT vehicle. Research by Nissan.

11) Use air conditioning in the auto mode  
   - Set the air conditioner temperature a little higher in summer but avoid overcooling the car’s interior.

**CARWINGS Received Both the “Eco-Products Awards” and “Energy Conservation Grand Prize.”**  
*Awarded to the CARWINGS HDD Navigation System*

The “Fastest Route Guidance Service” and “Vehicle Carte Service” offered by CARWINGS are highly regarded for contributing to CO₂ reduction, receiving both the “Eco-Products Awards 2007” and the “Energy Conservation Grand Prize 2007.”

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*Development: NISSAN MOTOR CO., LTD.*

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Clean Diesel Technology

Diesel engines have the advantage of emitting smaller amounts of carbon dioxide (CO₂) than gasoline engines. As part of our midterm environmental action plan, known as “Nissan Green Program 2010,” we will increase the number of clean diesel vehicles that satisfy the exhaust gas regulations that go into effect in 2010. Furthermore, we are actively promoting research and development to make our ultimate goal of “emissions matching atmospheric levels” practical.

M9R Engine

We developed the new M9R clean diesel engine with our Alliance partner, Renault, and introduced it in Europe in 2007. The M9R combines the crucial elements of power, quiet operation and affordability. This clean diesel also significantly reduces emission levels of nitrogen oxides (NOₓ) and particulate matter.

Main Technologies Adopted

- **Common rail system**
  - Raising injection pressures to extra-high levels—1600 bars—and using the piezoelectric-controlled injector enhances fuel injection control and combustion efficiency. Particulate matter levels are also reduced.

- **Double swirl port**
  - Placing the exhaust and intake ports in opposing positions accelerates swirl flows. This allows a more efficient mixture of air and fuel, and contributes to superior combustion.

- **Diesel particulate filter (DPF)**
  - After trapping the particulate matter that combustion generates, the DPF maintains a temperature of approximately 600°C to oxidize it. The cycle is then repeated, making it possible to clean exhaust gas regularly.

Diesel Technology for SULEV-Level Clean Exhaust Gas

Nissan has developed clean diesel technology that meets the state of California’s standard for super-ultra-low emission vehicles. (SULEV standards are equivalent to Tier2 Bin2 standards for gas emissions in North America.) This is part of the Nissan’s goal of making engine exhaust equal to the atmospheric level.

**Features**

- **Improved combustion technology**
  - Nissan’s original MK combustion technology controls the generation of regulated substances from the source.

- **New HC-NOₓ trap catalyst**
  - Conventional NOₓ trap catalysts only purify NOₓ. This new catalyst adds a hydrocarbon (HC) trap layer to effectively utilize HC (a regulated substance) in NOₓ purification. That enables highly efficient reduction of both HC and NOₓ, improving combustion and engine control.
Variable Valve Event and Lift System (VVEL)

Nissan will continue to introduce more eco-friendly technologies, products and services under the objective of Nissan Green Program 2010. Combining VVEL with CVTC (continuously variable valve timing control) to continuously control the engine’s intake valve and lift operation produces a high level of instantaneous response and power, as well as better fuel efficiency and cleaner emissions.

Features

<table>
<thead>
<tr>
<th>Improved Fuel Efficiency</th>
<th>Improved Engine Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>We have improved fuel efficiency and engine torque by substantially reducing the intake resistance that occurs when the engine’s throttle valve opening is narrowed and output is low.</td>
<td></td>
</tr>
</tbody>
</table>

Improved Response

We increased throttle response by directly controlling the intake valve rather than using the traditional method of controlling intake with the throttle valve.

Reduced Hydrocarbon Emissions

Decreasing the amount of lift when revving with a low load makes complete combustion easier, increasing intake and atomizing the fuel. This also reduces hydrocarbon emissions, which are produced more readily during partial combustion.

System Structure

The control shaft’s rocker arm and two types of rings narrow the opening of the intake valves by transferring the revaluation operation of the drive shaft in the eccentric cam to the output cam. Rotating the control shaft, moving the fulcrum of the rocker arm and links in the DC motor and varying the movement of the output cam continuously vary the valve lift.
The VQ35HR and VQ25HR are the two newest engines in the VQ series, developed as part of Nissan’s ongoing pursuit of the ultimate in responsive, smooth-revving powerplants. From the time the series debuted in 1994, the VQ has been highly acclaimed* for its powerful evolution in line with the concepts of simplicity, compactness, low friction and responsiveness. Both of these V-6 engines have inherited the core elements of earlier VQ generations, with further enhancements to boost their capability to rev to high speeds and improve their smooth operation. They have evolved into next-generation FR V-type engines that offer a smooth and comfortable driving experience.

*The VQ is the only engine in the world to win a spot on Ward’s “10 Best Engines” list for 14 years running, starting from the inception of the list in 1995 through 2008.

**Features**

- **Revs up smoothly to high speeds**
  - Radical reduced level of friction plus improved rigidity
  - Redlines at 7500 rpm

- **Top-in-class power output**
  - Incorporating VTC produces optimal valve open/close timing, intake and exhaust on both sides
  - Enhanced intake, exhaust and combustion efficiency

**Examples of Newly Incorporated Technology**

- **Longer connecting rods**
  Lengthening the connecting rods by 7.6 mm reduces piston knock on the cylinder walls. This lessens friction, supplying smoother piston action to enhance high-rev performance.

- **Ladder frame support**
  Adding a ladder frame to support the crank strengthens rigidity, which dampens vibrations and greatly reduces friction at high speeds.

- **CVTC installed on both the intake and exhaust**
  The CVTC (continuously variable valve timing control) system sets the optimal opening and closing of the intake and exhaust valves according to the engine’s speed. The hydraulic CVTC expands the valve angle on the hydraulic intake cam side, while an e-CVTC (electromagnetic CVTC) system is used on the exhaust side. Together, they boost fuel efficiency at all engine speeds.

- **Better fuel efficiency and lower exhaust emissions**
  - Incorporates the world’s first hydrogen-free valve lifter coated with diamond-like carbon (DLC), which significantly reduces friction
  - Better practical fuel efficiency, lower CO₂ emissions
  These elements combine to achieve the cleanest emissions in class.

- **Compelling, dynamic sound**
  - Positioning the intake and exhaust systems symmetrically gives the engine a clear and impressive resonance

- **Hydrogen-free DLC-coated valve lifter**
  Coating the valve lifter with smooth-surfaced hydrogen-free diamond-like carbon, or DLC, has reduced friction by approximately 40 percent and improved practical fuel efficiency.

- **Isometric exhaust manifold**
  Making the left and right exhaust manifolds of equal length produces a clearer and more dynamic exhaust note. This isometric design prevents unwanted interference between the exhaust pulsations each cylinder produces following combustion, minimizing undesirable sound components. Exhaust efficiency is also improved, producing extra torque at low to mid speeds.
Research Project in Kanagawa Prefecture
Using ITS Technologies

Nissan is active in the Intelligent Transport systems (ITS), and plans to engage in a project with the aim of helping to reduce traffic accidents and traffic congestion. Based on the results of the ITS Project in Kanagawa Prefecture, we hope in the future to bring the successes of the project to all of Japan and the world.

1. Intersection collision avoidance system

The driver can receive information of potential risks from vehicles in certain intersections where accidents may occur frequently.

2. Intelligent speed assistance

The driver is alerted of his speed when the vehicle speed exceeds speed limits around schools and/or similar facilities.

3. Dynamic route guidance system with probe data

Faster and more accurate routes are provided by using more detailed traffic information than previously available.
New CARWINGS-enabled Navigation System

Nissan's new CARWINGS-enabled navigation system further enhances driving convenience and enjoyment. Driver simply pushes the operator button to call up a CARWINGS operator and asks for the fastest route to any destination.

Provision of the fastest route based on statistical traffic data and real-time traffic data

The system searches for the fastest route to the destination based on previous data concerning the route and the present traffic situation as known from real-time traffic data using Vehicle Information and Communication System (VICS). Previous data refer to predicted statistical traffic information for all road sections considered for route guidance. The speed of route searches, estimated arrival time accuracy and other performance attributes have been substantially improved over previous navigation systems. Those improvements, along with easy-to-see map screens and easy-to-understand voice guidance, make driving more comfortable and enjoyable.

Conventional navigation system
The system searches for the shortest route based on predetermined conditions without considering the driving time. As a result, the route also includes roads that are usually congested.

CARWINGS-enabled navigation system (without using CARWINGS)
The system factors usual congestion into a route search by predicting the present degree of congestion from past congestion data. However, it cannot take into account unexpected congestion.

CARWINGS-enabled navigation system (using CARWINGS)
The system searches for the fastest route by combining a congestion prediction based on previous statistical traffic data with real-time traffic information. This feature can take into account not only usual congestion but also unexpected traffic jams.

Conventional navigation system
*The system selects the route estimated to have the shortest travel time at the moment the search is made. The selected route is the result obtained by using statistical traffic data and VICS information, but it does not necessarily avoid congestion. There may be times when it does not always avoid congestion.

Easy-to-master procedure provides superior operating ease

The state-of-the-art functions are simple to operate, thanks to the easy-to-use layout of the center control switch and steering wheel switches and the intuitive design of the navigation screens. In addition, the steering wheel switches and voice commands enable drivers to operate the system safely even while driving without taking their hands off the steering wheel.

Connectivity just by bringing a Bluetooth-enabled cellphone into the car

Just bringing a Bluetooth-enabled cellphone into the car provides access to hands-free calls and CARWINGS services, even if the phone is inside a briefcase or in a pocket. *Bluetooth and the Bluetooth logo are registered trademarks of Bluetooth SIG, Inc. of the U.S.

Okutto-Keitai ("Send to Cellphone")

With this service, users can have information about their present position or destination sent to their cellphones by e-mail by simply selecting the Okutto-Keitai channel. Received messages provide access to a wide variety of information, including town maps and restaurant information.

CARWINGS provides the world's most advanced operator-based agent functions, including a newly added service for having the operator search for the fastest route. Featuring the ultimate voice-activated interface, CARWINGS service can be used free of charge at anytime 24 hours a day for three years.
Fuel Cell Vehicle X-TRAIL FCV

Feature of Nissan FCV Development

Nissan Fuel Cell Vehicle (FCV) utilizes the electric vehicle (EV), hybrid electric vehicle (HEV), and compressed natural gas vehicle (CNGV) technologies developed up to the present.

New Technologies Incorporated in the X-TRAIL FCV 2005 Model

1. Fuel Cell Stack Developed by Nissan

By installing the in-house fuel cell stack, maximum output has been greatly increased to 90 kW, improving maximum speed and acceleration.

2. 70 Mpa High-pressure Hydrogen Tank

A 70 Mpa high-pressure hydrogen tank has been installed that, compared to the previous 35 Mpa high-pressure tank, represents a 30% increase in hydrogen fuel load, and extends the cruising range to over 500 km.

Overview of the Body of X-TRAIL FCV

1. Layout

2. Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>2005 Model</th>
<th>2009 Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Type</td>
<td>FCV</td>
<td>FCV</td>
</tr>
<tr>
<td>Powertrain</td>
<td>Fuel cell</td>
<td>Fuel cell</td>
</tr>
<tr>
<td>Engine Type</td>
<td>Internal</td>
<td>Internal</td>
</tr>
<tr>
<td>Transmission</td>
<td>CVT</td>
<td>CVT</td>
</tr>
<tr>
<td>Top Speed</td>
<td>150 km/h</td>
<td>145 km/h</td>
</tr>
<tr>
<td>Range</td>
<td>550 km</td>
<td>600 km</td>
</tr>
<tr>
<td>Fuel Cell Type</td>
<td>Stacked</td>
<td>Stacked</td>
</tr>
<tr>
<td>Fuel Cell Size</td>
<td>60 kWh</td>
<td>60 kWh</td>
</tr>
<tr>
<td>Onboard Battery</td>
<td>Lithium-ion</td>
<td>Lithium-ion</td>
</tr>
<tr>
<td>Onboard Battery Capacity</td>
<td>60 kWh</td>
<td>60 kWh</td>
</tr>
</tbody>
</table>

*Note: The specifications are for the X-TRAIL FCV 2005 Model and the X-TRAIL FCV 2009 Model.

**Powertrain:** The powertrain is composed of an electric motor and a fuel cell system.

**Transmission:** The transmission is a continuously variable transmission (CVT).

**Top Speed:** The top speed of the X-TRAIL FCV 2005 Model is 150 km/h, and the X-TRAIL FCV 2009 Model is 145 km/h.

**Range:** The range of the X-TRAIL FCV 2005 Model is 550 km, and the X-TRAIL FCV 2009 Model is 600 km.

**Fuel Cell Type:** The fuel cell type is a stacked cell type.

**Fuel Cell Size:** The fuel cell size is 60 kWh.

**Onboard Battery:** The onboard battery is a lithium-ion battery.

**Onboard Battery Capacity:** The onboard battery capacity is 60 kWh.

**Onboard Equipment:** The onboard equipment includes a compression battery for vehicles equipped with the 70 Mpa high-pressure hydrogen tank.
**SU-LEV Technologies**

The Bluebird Sylphy that Nissan launched in the domestic market in August 2000 was the first gasoline-fueled car in Japan to be certified as a ultra-low emission vehicle (U-LEV) by the Ministry of Land, Infrastructure and Transport. As of March 2004, 90% of Nissan’s gasoline-fueled passenger vehicles sold in the domestic market were U-LEVs. Moreover, in December 2003, the Bluebird Sylphy became the first car in Japan to be certified as a super ultra-low emission vehicle (SU-LEV), requiring a further reduction of exhaust emissions by 50% from the U-LEV standards. As part of the company's ongoing contributions to environmental protection, Nissan has set a goal of achieving an SU-LEV sales ratio of 80% or more by March 2006 among all its gasoline-fueled passenger vehicles sold in the domestic market.

**Efforts to achieve cleaner exhaust emissions**

Nissan was among the first to provide vehicles that comply with the latest regulations, beginning in 1970 with the Muskie Act in the US and the first emissions regulations adopted in Japan. Currently, our cleanest gasoline vehicles—U-LEVs and SU-LEVs—attain emission levels that are 1/100 and 1/250, respectively, of the levels originally called for by those regulations. We are working on a wide variety of technological developments, including technological improvements that allow for cleaner combustion and development of a catalyst that cleans exhaust emissions, as well as responses to gas vaporization from the fuel tank.

U-LEV: A vehicle that emits 75% fewer exhaust emissions of nitrogen oxide (NOx) and hydrocarbon (HC) than the level prescribed in the year 2000 exhaust emissions standards.

SU-LEV: A vehicle that emits 75% fewer exhaust emissions of nitrogen oxide (NOx) and nonmethane hydrocarbon (NMHC) than the level prescribed in the year 2005 exhaust emissions standards.

**Major technologies featured on SU-LEVs**

**Long-discharge ignition coil**

A long-discharge and high-energy ignition coil is used together with a double fine-tip spark plug having a reduced heat mass, thanks to its finer center and ground electrode tips and tapered ground electrode. As a result, mixture ignitability is substantially enhanced for a significant improvement of engine stability, and the exhaust gas temperature right after engine start is also raised to promote quicker catalyst light-off.

**Double fine-tip spark plug**

A fine-atomization fuel injector is used to promote better fuel evaporation.

**Fine-atomization fuel injector**

Advanced computer-aided engineering (CAE) analysis was applied to achieve the optimum combination of atomized fuel spray pattern and intake port geometry. This combination works to reduce intake port wall-wetting by the fuel spray for a substantial reduction of HC emissions right after engine start.

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A continuously variable transmission (CVT) has many attractive features, such as helping to improve fuel economy, providing smooth acceleration, delivering engine power continuously and facilitating powerful driving performance.

Nissan realized the advantages of CVTs early on and has worked vigorously to improve their performance since implementing its first CVT on a production model in 1992. Nissan adopted a CVT on a 2.0-liter car for the first time in 1997 and was the world's first automaker to apply a CVT to a 3.5-liter front-wheel-drive car in 2003. Moreover, in conjunction with the development of new engines, Nissan has developed and applied new steel-belt CVTs to 2.0-liter and 1.5-liter class cars. Those units and the XTRONIC CVT for use on 3.5-liter cars give Nissan a full CVT lineup.

XTRONIC CVT delivers powerful acceleration and smooth driving performance

Powerful acceleration and improved fuel economy have been achieved by quickening shift response, widening the gear ratio range and expanding the region of lockup operation.

Delivering smooth, delightful performance in various driving situations

Compared with previous CVTs, the XTRONIC CVT improves vehicle response when climbing hills and coming out of turns. Moreover, its linear control provides driveability characterized by a feeling of acceleration that perfectly matches the driver's sensibility.

When there is a series of uphill and downhill grades, the repeated shifting and braking actions required in a conventional AT-equipped vehicle tend to be annoying. With the XTRONIC CVT, there is no repeated upshifting/downshifting on long uphill grades. Moreover, the XTRONIC CVT provides suitable engine braking on downhill grades for smooth, stable driving.
The HR15DE and the MR20DE are in-line 4-cylinder gasoline engines, developed jointly by Nissan and Renault as global strategy engines for use on both companies' volume-selling models.

**Features**

1. **Best-in-class torque at low to medium speeds and high efficiency**
   Fundamental engine attributes were thoroughly enhanced to achieve class-leading torque at low to medium speeds, low friction and high thermal efficiency.

2. **Compact, lightest-in-class design**
   The HR15DE engine delivers powerful low-end torque and pleasing acceleration at medium to high speeds to achieve enjoyable driving performance and low fuel consumption under real-world driving conditions in combination with a continuously variable transmission (CVT).

   (1) **Large torque at low speed**
   (2) **A linearly increasing torque curve at medium to high speeds**

   The 2.0-liter MR20DE engine provides the low-end torque of a 2.2-liter engine and a broad, flat torque curve. In combination with a CVT, this results in highly enjoyable driving performance and excellent fuel economy under real-world driving conditions.

   (1) **90% of maximum torque available from 2000 rpm**
   (2) **A broad, flat torque curve that increases linearly without faltering**

**Examples of applied technologies**

**Friction reduction technologies**
The accumulation of advanced technologies has reduced friction by about 30% compared with the previous engines.

1. **Bore circularity machining**
   The technology used to machine the exceptionally round cylinder bores of racing engines has now been applied to mass-produced engines intended for global use.

2. **Mirror-like finish**
   A mirror-like finishing technique is applied to the surfaces of the crankshaft pin/journal and cam label/journal, polishing them to near mirror smoothness. This mirror-like finish markedly reduces the friction of sliding surfaces.

**Class-leading thermal efficiency**
Combustion speed and other characteristics have been improved to achieve best-in-class thermal efficiency.

**Acoustically equal-length intake manifold branches**
The length of the four intake manifold branches was equalized acoustically to emphasize only the fundamental order components that produce a pleasant, clear sound and to reduce substantially the half-order components that cause an unclear sound. In addition, the sound pressure is designed to rise together with an increase in engine speed to create a pleasing feeling of acceleration.
e·4WD System

The e·4WD system was developed with the aim of providing 4WD capability for enhanced ease of use in daily driving situations combined with environmental friendliness. This system facilitates smooth driving performance, thanks in particular to its outstanding start-off acceleration and hill-climbing capability on icy road surfaces, which require the greatest attention by drivers during daily driving in cold-weather regions. Additionally, the system allows a more spacious roominess and lower fuel consumption than conventional 4WD systems. Another notable feature with respect to vehicle design and manufacturing is its excellent platform efficiency, by enabling 4WD to be achieved through minimal changes to a 2WD base vehicle.

An intelligent 4WD system that selects the optimum drive mode matching the driving conditions

The e·4WD system consists of a rear-wheel drive unit comprising a motor, clutch and reduction gear, an engine-driven generator used exclusively as the power source for driving the motor, and a 4WD control unit.

### Operating modes of the e·4WD system

<table>
<thead>
<tr>
<th>Mode</th>
<th>Functional explanation</th>
</tr>
</thead>
</table>
| 4WD On mode | When starting and when the front wheels begin to slip:  
1. The clutch is engaged.  
2. The generator produces power.  
3. The motor is driven to produce driving force at the rear wheels.  
* The traction control function operates continuously. |
| 4WD Off mode | With the clutch disengaged, the motor is stopped and the rear wheels are driven wheels.  
* The traction control function does not operate. |
| 2WD Off mode | Improved fuel economy |

### Outstanding start-off acceleration and driving stability on snowy and icy road surfaces

4WD control without any time lag and traction control capabilities at both the front and rear wheels ensure that traction and the torque split to the rear wheels are optimally controlled. There is little wheel slipping or skidding even on icy or snowy roads, enabling the vehicle to accelerate and travel with remarkable smoothness and stability.

### Large, unobstructed legroom and luggage space

There is no propeller shaft and transfer case for transferring driving force to the rear wheels, and the 4WD system itself has also been downsized. This allows for a low floor height for achieving interior roominess equal to that of a 2WD vehicle. The floor tunnel is about 10-30 mm lower in height than that of conventional 4WD vehicles.

### Improved fuel economy

Disengaging the electromagnetic clutch incorporated in the rear-wheel drive unit reduces friction to improve fuel economy. Drivers can also select the 2WD mode by a dashboard switch.
Nissan Green Shop

Starting in April 2000, Nissan introduced our own environmental management certification system, known as Nissan Green Shop, which is based on ISO14001. By March 2002, all of our dealerships in Japan had been certified under this system. Since April 2002, by carrying out annual auditings, Nissan has been continually improving its environmental management system.

Nissan Green Shop – Three Declarations

1. We observe all laws, ordinances, and guidelines.
2. We will minimize the environmental impact of our business activities.
3. We will communicate regularly about our environmental efforts to our customers.

Nissan Green Shop Activities

Under the Nissan Green Shop system, managers and staffs who are responsible for environment concerns, manage the appropriate handling of end-of-life vehicles (ELVs) and facilities for processing and recycling waste products, and promote environmental activities among our customers, all within an established framework of responsibility.

1. Protecting the local water and soil
   Oil leakage and energy loss are prevented by carrying out periodic inspections and cleaning of facilities such as oil separating tanks, etc.

2. Separating and recycling waste
   Dealerships are encouraged to reduce the amount of end waste by separating waste into categories, then recycling or otherwise appropriately processing them.

3. Correctly processing environmental contaminants
   Converted oils, long life coolant (LLC), etc. are recycled or appropriately processed as industrial waste to prevent water pollution and soil contamination.

4. Responsibly processing ELVs
   Vehicles that have reached the end of their lives are entrusted to reliable recycling companies, and correct processing is verified by an electronic manifest.

5. Appreciating the importance of resources and energy
   The Nissan Green Shop system is actively involved in energy and resource saving activities such as water and energy conservation, and is promoting the effective utilization of limited resources.

Nissan Green Shop Certification System

The Nissan Green Shop certification system does not end with the completion of a single audit. In order to guarantee that environmental activities are being maintained and improved, approximately 60 Nissan inspectors conduct regular audits on an annual basis and certification renewal audits every three years. At the end of fiscal year 2004, the certifications of all companies and shops were renewed under this plan. In addition, sales companies carry out the own independent internal audits every six months.

Internal Audit: Internal audit by dealerships of main office and outlets Every six months
Surveillance: Surveillance of main office and outlets by Nissan Every one or two years after acquisition of certification
Renewal Audit: Every three years
Nissan partially modified a waste incinerator at the Oppama Plant and began energy recovery from automobile shredder residue (ASR) in the autumn of 2003. Full-scale operation of 400t/month has been started from January 2005. Waste from Nissan plants and ASR from end-of-life vehicles (ELVs) are burned together in the incinerator. Thermal energy generated during incineration is converted into steam that is effectively used for humidification and other purposes in the pre-painting processes at the plant.

Since ASR generates large quantities of heat, controlling the temperature during incineration has been difficult. Another problem has been that unburned substances tended to stick to the inner walls of the incinerator and the evaporation pipes of the boiler. These problems have been resolved through optimum temperature control.

System for Energy Recovery from ASR at Oppama Plant

Recycling in manufacturing processes as energy
- For paint baking
- For air-conditioning, etc.

Steam

Temperature control

Flue gas treatment

Exhaust gas

Dust collector (bag filter)

Key facility improvement
The material of the incinerator wall was changed to one optimally suited to the high heat generated by ASR incineration, thereby allowing precise control over the incinerator temperature.

Autobile shredder residue (ASR)
ASR is what remains after material recycling is done to recover as much ferrous and non-ferrous metallic material as possible from the automobile shredder residue. It mainly consists of glass, plastics, fibers and other substances. One March small car results in about 160 kg and one Cedric sedan in about 260 kg of ASR.
Recoverability of 95%

Nissan achieved the goal of 95% recoverability rate* for new vehicles by 2005 through structural improvements such as harness removal and use of recyclable materials such as thermoplastics. A recoverability rate of more than 95% was achieved for the March and the Cube in 2002, the Cube Cubic in 2003, the Lafesta in 2004, and the Note, the Serena, the Wingroad and the BlueBird Sylphy in 2005. These are the results of diligent efforts in research and development, and improvements in dismantling efficiency.

*The value based on Nissan’s own calculation standard (by weight)

Major Recyclable Parts on the Note

Polypropylene (PP) Parts
- Because of high versatility, reusable in other applications besides automobiles

Reusable Parts
- Reusable as Nissan Green Parts
- (depending on condition) or as resin material

Polypropylene Bumpers
- Reusable as Nissan Green Parts

Thermoplastic Parts
- Reusable as resin

Innovations in the recyclable design of the new Note

Main harness
- The instrument panel was divided into upper and lower parts for easier disassembly. Main harnesses were gathered into a same area to facilitate easier removal.

Door Trim
- By bonding the sound insulating felt to the inside of the door trim using a thermal adhesion process, the felt can now be easily removed when required.

Rear Bumper
- The rear bumper can be removed without the need to remove the rear combination lamps.

Front Bumper
- Attachment points of the front bumper were reduced from 11 to 7 to facilitate separation from the spoiler, which is of a different material.
Improvement of Wire Harness Layout

Nissan set the target of achieving a 95% recoverability rate* by 2005 for all new models released in Japan. This target has already been achieved by the easy structure and material.

One way of increasing recoverability rate is to facilitate ease of dismantling at the end of life stage. As well as improving the layout of the wire harness and making it easier to remove, Nissan has integrated the harness, which was previously spread over various locations, thus its recoverability rate was further improved.

* The Value based on Nissan’s in-house calculation standard (by weight).

Harness dismantling evaluation test

Example of Facilitating Dismantling of Main Harness within Instrument Panel

<table>
<thead>
<tr>
<th>Previous Structure</th>
<th>Design for Dismantling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Since the main harness was placed under the steering member or winded on the steering member, it was difficult to remove.</td>
<td>By designing the main harness so that it is above the steering member, access to the harness is improved and the recovery rate increased.</td>
</tr>
</tbody>
</table>

Advantages of Recycling the Wire Harness

In order for vehicles to be recycled into high quality recycled metals, the rate of copper content must be kept as low as possible. For this reason, dismantling of the wire harness, which is composed of copper wiring, a great deal of which is utilized in vehicles, is of major importance. Also, because copper is a precious non-renewable resource, by separating, recovering, and recycling it, Nissan can contribute to the promotion of effective usage of resources.
Recycling of Aluminum Wheels

Nissan collects aluminum wheels from end-of-life vehicles (ELVs), recycles them into reusable aluminum material at one of its plants, and uses the recycled material to manufacture high-quality steering system parts. The recycling target at the time this activity was initiated in 2001, was five tons of aluminum wheels per month. Through collaboration with ELV dismantlers, 200 tons of aluminum wheels were collected per month on average in fiscal 2003, thereby substantially reducing the use of virgin raw materials. Scrap aluminum has been recycled into a wide variety of parts, including engine components. Dismantlers all over Japan are cooperating in thoroughgoing efforts to sort and collect aluminum wheels from Nissan vehicles separately, making it possible to reuse them in manufacturing parts made from a higher grade of aluminum.

Flow of recycling operations

Benefits of this recycling activity
- Reducing the use of virgin raw materials
  Nissan has put in place an operational and logistics network for sorting and collecting aluminum wheels separately from Nissan vehicles. This network makes high-grade aluminum recycling possible without any decline in material quality.
Nissan actively promotes recycling in all stages of the vehicle life cycle, from design and development through suitable post-use treatment. One of Nissan’s recycling activities is the Nissan Green Parts program that was initiated in 1997.

Overview of Nissan Green Parts

Parts recovered from end-of-life vehicles (ELVs) and parts replaced during repairs are cleaned, reconditioned and sold as reusable parts or rebuilt parts. The use of these Nissan Green Parts facilitates effective utilization of limited natural resources, reduces repair costs and gives customers a wider range of choices. Using Nissan Green Parts instead of new parts made it possible to reduce automobile shredder residue by 210 tons in 2003.

Reusable parts

Reusable parts are removed from ELVs, cleaned, checked to ensure their quality, and then resold as used parts. These activities are carried out according to specified quality standards and a standard work procedures manual.

Flow of operations for reusable parts

Rebuilt parts

Parts recovered from ELVs or parts replaced during repairs are disassembled, and any worn or deteriorated structural components are replaced with new ones. The parts are then re-assembled, checked to ensure their quality, and sold as rebuilt parts with their functional performance restored to that of the original items.

Flow of operations for rebuilt parts

Please ask about Nissan Green Parts at your local Nissan dealer.
OPERA Recycling Simulation System

Renault S.A. and Nissan have jointly developed the OPERA system for conducting recycling simulations at the development stage to calculate the recyclability rate and recycling cost of end-of-life vehicles (ELVs) based on design data. This system facilitates studies of recyclable designs with the aim of promoting economical and efficient recycling activities.

OPERA stands for Outil de Pilotage Economique du Recyclage Automobile, which means the overseas project for the recycling cost calculation system.

- The recyclability rate and recycling cost are calculated on the basis of design data.
- Simulations are run based on actual recycling operations.
- Using the common database shared by Renault and Nissan, the recyclability rate and recycling cost of ELVs can be calculated according to the recycling situation in individual European countries, in addition to making calculations for ELVs in Japan.

<table>
<thead>
<tr>
<th>Input data</th>
<th>Calculation results</th>
<th>Activities for improving recyclable designs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part names</td>
<td>Part quantities</td>
<td>Material types</td>
</tr>
<tr>
<td>Dismantling data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dismantling time</td>
<td>Dismantling tools</td>
<td>Dismantling operations</td>
</tr>
<tr>
<td>Recycling market data</td>
<td></td>
<td></td>
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<tr>
<td>Work cost</td>
<td>Transport cost</td>
<td>Treatment cost</td>
</tr>
</tbody>
</table>

Simulations are conducted according to actual recycling operations to calculate the recyclability rate and recycling cost of ELVs on the basis of design data. Calculations can be done automatically by entering the parts, dismantling tools and work operations involved, making it possible to run simulations based on design data alone without doing any actual dismantling evaluations. This recycling simulation system promotes quicker design improvements and facilitates economical recycling analyses.