Japan’s automobile recycling law was established in July 2002 and will be enacted in the latter half of 2004. Besides complying with various laws and regulations concerning End of Life Vehicles (ELVs), it is important to improve ELV processing and recycling systems to enable customer’s reliance. We have striven to make effective systems with the help of others.

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). We are in the process of developing a technology to reduce this waste and recover energy from it.

*1 Reduce: Reduce the amount of wastes through resource conservation and extended product lives.
*2 Automobile Shredder Residue (ASR): The dust that remains after ELVs have been shredded and metals, such as steel, have been removed. Most ASR is landfilled today.

**Approach to 3R at Nissan**

**Reduce:**
- Efforts aimed at reducing the amount of wastes through resource conservation and extended product lives
- Efforts aimed at suppressing the generation of byproducts through rationalization of production processes

**Reuse:**
- Efforts aimed at the reuse of vehicles
- Efforts aimed at the reuse of parts

**Recycle:**
- Efforts aimed at recycling of items for appropriate treatment
- Efforts aimed at adoption of recyclate
- Efforts aimed at recycling of Automobile Shredder Residue at Oppama plant
- Efforts aimed at reusing byproducts from manufacturing processes as raw materials

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

- Oil collection rate
- Battery collection
- Recycling rate + 1.8%
- Tire collection rate
- Recycling rate + 3.8%
- Reuse ASR
- Thermal energy usage rate + 2.4%

Add to above items, more activities to increase recycling are requested through “Communication” (cf. P36)
1. Activities at the New Vehicle Development Stage

Development Process for 3R Design
Target values for new model development have been set with respect to the recoverability rate, the environmental impact substance, the dismantlily efficiency, and the marking standard for plastic components. We clarify the evaluation criteria in the designing stage, and we evaluated and manage the degree of target achievement in the development process according to ISO14001.

Recycling Targets
At Nissan, we have achieved recoverability rate of 90% or higher for all new vehicles launched since 1999; furthermore, in 2002 we successfully achieved a rate of over 95% for the new Cube. Nevertheless, we fully intend to continue in our development efforts to realize even higher potential recycling rates in future new models.

Recoverability rate: Determined in accordance with Nissan’s own calculation standards

Results for 2002’s New Models
90% or higher: Elgrand, Fairlady Z, Skyline Coupe, and Teana
95% or higher: Cube

Design Guidelines
The Recycle Design Guidelines have been created in order to ensure a positive and proactive approach to recycle-conscious design of new models. 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
(1) 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 Featuring Bumpers

Example of Rear Combination Light
(2) Easy material separation
Many 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.

Parts made of single materials
Example of Improvements to the Instrument Panel (made all of olefin)

(3) Easy identification of materials
When plastics of different types are mixed, the material recycled from the mixed plastics tends to be inferior in quality. In some cases, the plastic mixture is difficult to recycle. At Nissan, we mark plastics 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.

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 plastic materials, we are expanding the use of parts made from single materials and the use of materials that are easy to recycle.

(1) Greater use of thermoplastic
Nissan is promoting the wider use of thermoplastic, which are easy to recycle.

(2) Consolidation of polypropylene
PP is a common thermoplastic that accounts for approximately one half of total plastic use. The material is used for a variety of application, from bumpers with excellent impact characteristics to heater parts which require excellent thermal properties. 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
The Nissan Green Program 2005 targets the reduced usage of materials with an environmental impact, and activities are being carried out with this aim. The auto industry’s target for lead use was to reduce lead use by approximately one third of the 1996 level by the end of 2005. Nissan achieved this target on five new models we introduced in 2002. Furthermore, efforts are currently underway to develop replacement technologies for hexavalent chromium.

 Suppliers’ Meeting for Environmental-impact Substance Reductions and Current Conditions
Meetings have been held to provide our suppliers with information regarding Nissan’s targets, reduction policies, and management methods for substance with an environmental impact. As part of efforts to ensure that consideration is given to environmental quality even from the design stage, our suppliers are requested to provide reports on such substance in terms of reduction and usage conditions, and chemical substance data for components and materials is currently being maintained and monitored.

Furthermore, the International Material Database System (IMDS) is being put to use in the identification and control of chemical-substance usage volumes within Nissan products, and this also links with activities for reducing the environmental impact. In 2002, a study was undertaken in terms of materials subject to European regulations (i.e., lead, mercury, cadmium, and hexavalent chromium) and the usage of these materials has been discontinued (except of excluded components).

Simultaneously Operated Airbag Deployment System for Easier Pretreatment
It is now possible during the processing of ELV to ensure that airbags can be safely and easily deployed within the vehicle. In this, an airbag deployment device is connected to the vehicle’s deployment connector, and by simply pressing a button, all airbags on the vehicle can be deployed simultaneously, regardless of the number of airbags.

Suppliers’ meeting
2. Efforts in the End of Life Vehicles 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.

1. 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. In order to prepare for usage of this product in France, practical testing is currently being carried out in that country.

![Operation test in France](image)

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

2. Engine long-life coolant (LLC) recycler
Nissan has sold "Fukkatsukun", an LLC recycling machine used since April 1999.

3. Airbag deployment equipment
Nissan has developed airbag deployment equipment that controls odor and noise in air bag deployment. The equipment is being used by dismantlers.

4. Disclosure of research
Nissan encourages visitors to see its experimental disassembly plant. So far the plant has received visits by 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 4,700 guests.

5. 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 2002. We will continue to publish this magazine.

![Communication](image)

Nissan’s concept of Appropriate Treatment and Dismantling Plant Layout

1. Model-specific disassembly instructions
2. Appropriate treatment
1. (fuel, tires, battery)
3. Treatment 2 (removal of waste oil and liquids)
4. Removal of used parts
5. Recycling of nonmetallic parts
6. Recycling of metals
Sale of Reuse and Rebuilt Parts

Reusable parts are sold under the product name “Nissan Green Parts: Nissan Green Parts are available as reuse (used) parts” and rebuilt parts. Nissan Green Parts is Nissan’s way of promoting recycling and providing customers with an option in a repair. Reuse parts are maintained at a total of fifteen different Nissan parts dealers nationwide, thus allowing these parts to be supplied via all 31 parts dealers within Japan.

*1 Reuse parts: Used parts that are reused after washing and performing a quality check.
*2 Rebuild parts: Recycled parts that are disassembled, washed, inspected, and fitted with new expendable parts.

(1) Sale of reuse parts

We have established our own part removal standards, developed testers for the engine and transmission, and devised a sales method for the parts. As a result, we have a smooth, consistent flow from part removal to sales.

Reuse parts product line

31 items including headlights, combination lights, doors, fenders, bumpers, hoods, meters, starters, wiper motors, driveshaft, power steering and linkages, and side view mirrors.

(2) Sale of rebuilt parts

Functional parts and parts whose safety is of paramount importance are disassembled, washed, inspected, and fitted with new expendable parts before they are sold so our customers can use them with confidence.

Rebuilt part product line

11 items including engines, automatic transmissions, torque converters, ECMs, brake shoes, power steering pumps, N-CVTs, alternators, and starters.
### 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.

1. **Technology for reuse of removed parts in identical applications**

   Because used bumpers (made of polypropylene) are painted, recycling them presented a number of problems, including reduced strength. We have developed a mechanical paint remover that removes paint from crushed bumpers without using chemicals and does it less expensively than in the past. 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.

2. **Technology for reuse of removed material to parts**

   Nissan has begun a full-scale operation to directly use aluminum wheels from ELVs as the raw material for parts on new vehicles.

3. **Development of recycle evaluation systems**

   Renault and Nissan have jointly developed a system named Opera which can simulate the recovery rate and costs in the process of recycling end of life vehicles. This system allows efficient recycling more economically, to evaluate recovery rates and costs at the development stage; based on design data, furthermore, investigation of this system for recycling design is currently underway.

### OPERA: The Recycling Evaluation System

![OPERA Diagram](image)

(4) Recovery of Automobile Shredder Residue (ASR) in the Oppama Plant

In a program scheduled to start in fall 2003, a portion of the incinerator located in the Oppama Plant for processing of industrial waste will be modified to recover energy from ASR. The amount of heat generated by ASR is large and the control of temperatures during incineration had proved difficult; furthermore, other problems such as the adhesion of foreign substances to the inside of the furnace, to the boiler’s evaporation pipes, and to other similar components have also been associated with this process.

However, optimum temperature control has now enabled these problems to be eliminated. Water vapor is also produced in this process, and this can also be put to effective use in the humidification of the plant’s pre-painting processes.

### Preparations for Laws & Regulations Applicable to Vehicle Recycling (part 2)

#### Activities in Europe

The EU directive on end of life vehicles was enacted in October 2000, and this directive put the responsibility for recovery and recycling of end of life vehicles on the manufacturers. (Each nation in the EU will enact its own regulations in accordance with this directive.)

1. **Alliance with Renault**

   In December 2000, Nissan Europe and Renault integrated their respective recycling departments in order to collect relevant information and the provide support to EU dealerships jointly.

2. **European Recycling Committee**

   Our European Recycling Committee comprised with representatives from each departments such as development, sales and management are held on a regular basis. In terms of activities to be carried out by Nissan in Europe, this committee is responsible for the specification of policies, for confirmation of the state of progress, and for other related tasks.

3. **Cooperation with distributor in EU Countries**

   Meetings with representatives from distributor in the each EU country are held regularly so that activities such as the actual collection of end of life vehicle and the construction of recycling networks can be carried out in accordance with the regulatory trends in each specific country.

4. **Activities in EU Countries**

   - **France:**
     A contract has been concluded with two of end of life vehicle management companies, in order to set up a network for the collection of end of life vehicle and parts which will extend to all Nissan dealerships in France.

   - **Germany:**
     In conjunction with Renault, end of life vehicle collection network supporting all dealerships in Germany has been established by contracting approximately 200 dismantling companies.

   - **The Netherlands:**
     Participating in ARN — an association made up of all importers — Nissan has contracted approximately 260 dismantling companies to perform the collection and recycling of end of life vehicles.

   - **Sweden:**
     Nissan participates in the recycling project established by BIL (the Swedish automobile industries association) and has established a collection network which supports all dealerships nationwide.

   - **Denmark:**
     We are participating in the waste management system established by the Danish government and consumers’ groups (including end of life vehicles).

   - **Austria:**
     In Austria, Nissan has joined dealerships to set up treatment network for end of life vehicles.