# Creating Environmentally Sound Plants

## Policy for Creating Environmentally Sound Plants/Energy Conservation/Effective Use of Resources

### Policy for Creating Environmentally Sound Plants

Vehicle manufacturing has environmental impacts that range from the local area of the plant, all the way up to the global scale. Bearing this in mind, we are based on the policy "think globally, act personally" in creating environmentally sound plants. If we are to be successful in our environmental initiatives, priorities must be based on an accurate grasp of the facts. We also engage in environmental communications with local residents and are strengthening our collaboration with suppliers and customers in Japan and overseas as part of our commitment to "open" plants.

Led by the Plant Environmental Committee, we promoted the initiatives to consider the environment in all manufacturing activities, in order to accomplish our top goals of reducing generated industrial waste, conserving energy and controlling and reducing substances with environmental impact.

### Energy Conservation Initiatives

In our energy conservation efforts, we have given a high priority to both routine activities, including reconsidering the work procedures to avoid air leakage and idling of equipment, and drastic initiatives, including production efficiency improvements by changing manufacturing processes and integrating production lines to accommodate production fluctuations. At our plants, energy conservation committees have had good results using "energy conservation patrols," which identify and rectify areas needing improvement.

In fiscal 2002, $CO_2$ emissions from our manufacturing activities increased by 7% compared to the previous year, with an actual figure of 197,000 tonnes. This is because our production increased to meet the increased demand. However, we achieved a 55% reduction in $CO_2$ emissions, more than the numerical target of a 30% reduction.

#### Examples of Successful Initiatives

- Improved production efficiency by integrating production lines and simplifying manufacturing processes
- Avoidance of steam leakage, air leakage, machine idling, etc.
- Installation of inverters on pumps to optimize efficiency
- Reduction of compressor operation loss by changing the lubricant
- Stopping air blows in mechanical washers

### Effective Use of Resources

#### Initiatives for Near-Dry Cutting Process

We spare no efforts to ensure continuous improvement in the reduction of environmental impacts, within the framework of our ISO 14001 environmental management systems in each plant. Examples of these efforts are given below.

In machining plants, cutting lubricant coolants account for a significant percentage of energy and industrial waste at 30% and 60%, respectively. Bearing this fact in mind, we worked to bring into actual application the "Near-Dry Cutting Process based on vegetable oil micro-mist feeding" and achieved remarkable results with optimized machining conditions.

1) Significantly reduced cutting lubricunt consumption.
2) Significantly improved production capacity (cycle time improved by 30% to 80%).

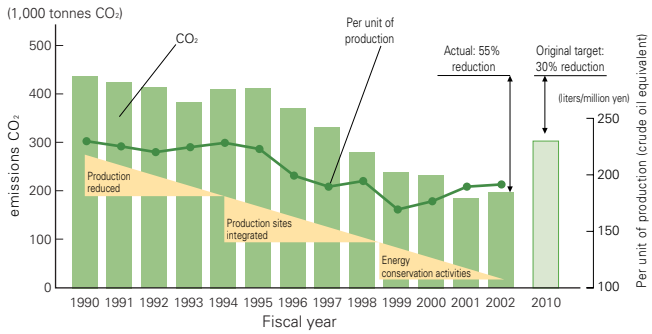
#### Efforts to Limit the Production of By-Products Such as Metal Scrap

We have made steady improvements by reducing defective products due to machining failures etc., thanks to more precise control of machinery and equipment, and by applying the "fracturing split method" to engine connecting rods to eliminate the cutting process and reduce cutting dust.

### Initiatives to Create Environmentally Sound Plants That Are Open to Their Communities

- Waste reduction
- Energy conservation
- Control and reduction of substances with environmental impact
- Prevention of air and water pollution, compliance with laws
- Effective use of resources

#### Actual $CO_2$ Emissions

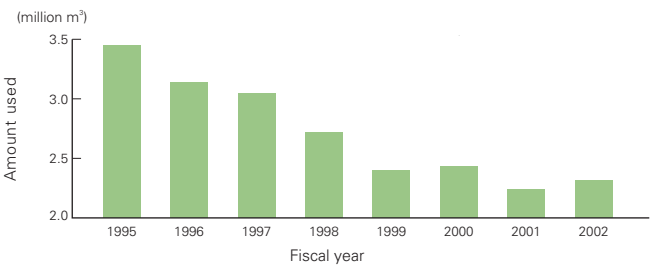



By these energy saving activities, we have already achieved our energy-related $CO_2$ emissions reduction target for the year 2010. These achievements include effects of fluctuations of domestic production, as well as the improvements above.

**Topics** Receives the Director-General's Award from the Kanto Bureau of Economy, Trade and Industry

Isuzu's Kawasaki Plant received in February 2003 the Director-General's Award from the Kanto Bureau of Economy, Trade and Industry of Japan's Ministry of Economy, Trade and Industry, for energy conservation initiatives. Led by the Plant Environment Committee, the Kawasaki Plant has been working to conserve energy, and its efforts have produced this result. The Kawasaki Plant also received the Excellent Plant Award in fiscal 2000 and the Best Plant Award in fiscal 2001.

#### Water Usage (Total)



# Waste Reduction Initiatives

## Zero Emissions: Initiativs Towards Further Improvements

Led by the Plant Environment Committee, Isuzu established the target of reducing waste volume (excluding incinerator ash) sent to landfills by 95% compared to fiscal 1995 levels, by the end of fiscal 2001; the final reduction was 97.6%, which well achieved the target. This was the fruit of proactive efforts by the employees at all plants, starting with sorted collection of waste, and represents an important milestone toward achieving zero emissions.

Always seeking further improvements, we have set a final goal to reduce landfill waste to less than 1 tonne (including incinerator ash) per month, per plant, by the end of fiscal 2005. Future activities will contribute to plant management through approaches to cutting waste disposal costs.

### Accomplishments in Fiscal 2002

In fiscal 2002, the starting year for the "Further Improvements" slogan, we worked to reduce waste volume by 1) increasing the percentage of recycled incinerator ash and 2) reducing costs for recycling incinerator ash, in addition to continued efforts that had been made. We were able to reduce the volume of waste going into landfills (including incinerator ash) by about 40% compared to the previous year. The actual figure was about 600 tonnes.

Using the previous index (excluding incinerator ash), the volume of waste going to landfills was reduced by 99% compared to the fiscal 1995 level. Isuzu waste was no more than about 40 tonnes per year.

We have found it is feasible to recycle incinerator ash into road bed materials and other applications.

We are working to increase the percentage of incinerator ash recycled, a key to achieving further improvements for zero emissions. The key issues here are:

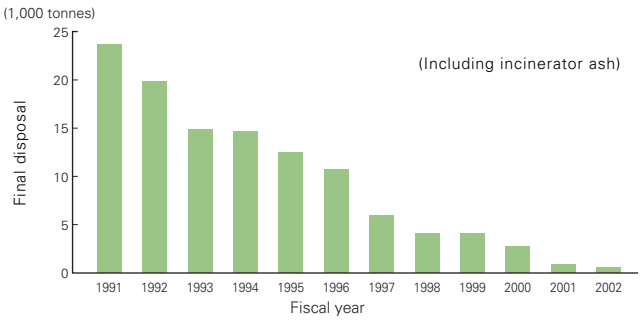
1) to reduce the volume of waste going into incineration so as to reduce incinerator ash, and
2) to seek cost performance of recycling.

Below are examples of our activities in fiscal 2002.

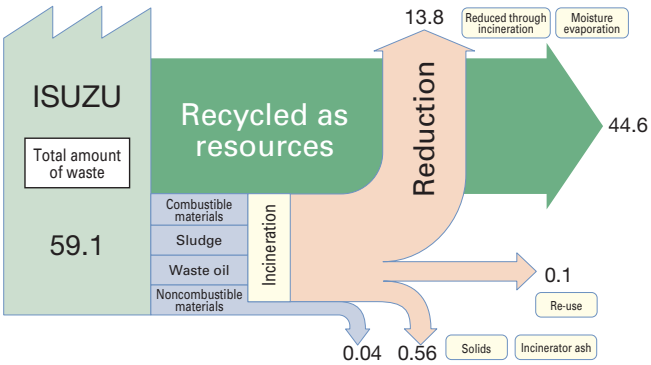
1) Reducing packaging lumber for components that are procured overseas
We conducted a survey on the breakdown of industrial waste that goes into incineration, and the departments from which it is generated. This revealed that packaging lumber for components supplied from overseas accounted for the largest percentage. In cooperation with the companies involved in material procurement and logistics, we are achieving a significant reduction in this item by increasing the percentage of internally manufactured parts, changing packaging styles, and changing over to steel crates.
2) We are also working to reduce recycling costs. In one project, we set out to reduce the costs for used of grindstone as a component of concrete. Previously, the recycle cost had been high and we had found few dedicated contractors for handling grindstone. Another problem was that each piece of used grindstone had to be broken into fist-sized pieces with a sledge hammer, in order to lower the unit cost; this is time-consuming and dangerous work, if done manually. We set up one of our unused pressure attachment machines for milling used grindstone for ourselves. This significantly shortened the milling time and secured procedure. The cost for grindstone recycling was decreased to one-third that of the previous process.

Custom-made milling work bench

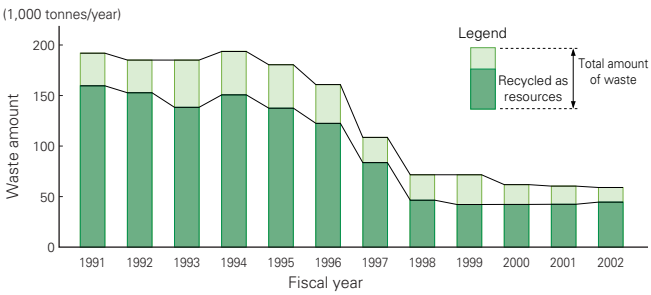
Reductions in Final Waste Disposal from All Plants




Waste Treatment and Disposal for fiscal 2002 (Unit: 1,000 tonnes/year)




Amount of Waste and Recycled Resources




Major initiatives

- Activities to reduce incineration and packaging lumber
- Investigation on incinerator ash recycling
- Activities to reduce recycling costs
- Sorted collection
- Resource-recycling by dismantling and disassembling.
- Adoption of polyethylene bucket collection method
- Acting on employee'f suggestions led to the development of new equipment to crush used grindstone
- Sharing strong motivation about zero emissions activities: publishing of "Environmental News", Zero Emissions Reports
- Cooperation with suppliers
- External cooperation: signing "joint environmental declarations" with buyers of waste materials, participation in "Zero Emissions Network".

# Reducing the Use of Substances with Environmental Impact/Preventing Air and Water Pollution

## Reducing the Use of Substances with Environmental Impact

### Initiatives to Comply with the PRTR Law*

Although chemical substances significantly contribute to improving production technologies and materials performance, their use involves risks to man and other organisms if they are released into the environment. Isuzu has constructed an integrated system that combines the information from our material purchase management system with that of our PRTR management system, which complies with Japan's PRTR Law, to reduce the risks of environmental pollution and damage caused by such substances. With this system, Isuzu is working to monitor, control and reduce the substances covered by the law.

In our own "Management Regulations on Regulated Substances," the target substances are classified into three grades (use prohibited, use conditional, and use with caution acceptable). We are working to properly manage, control and reduce their use, within the environmental management system of each plant. The results from the Fiscal 2002 PRTR Compliance Survey for Isuzu as a whole are shown in the table below, covering five substances. The use of toluene and xylene in the painting process accounts for a major proportion of the chemicals we use. We are working to reduce usage by raising the recovery rate of cleansing thinner and switching to paints that require less thinner.

* PRTR Law: Law Concerning Reporting etc. of Releases of Specific Chemical Substances to the Environment and Promotion of the Improvement of Their Management

### Banning the Use of Lead in Paints

In fiscal 2002, we completely phased out the use of lead compounds in paints for our vehicles. The use of electro-deposition coatings containing a lead compound, which are widely used to prevent rust in passenger cars and light-duty trucks sold in Europe, will be banned from July 2005. Electro-deposition coatings for truck frames, in particular, had lagged in shifting to a lead-free coating, since they need to have weather resistance not required for truck bodies. Starting in 1999, Isuzu achieved in 2002 a complete shift to a lead-free electro-deposition coating for truck frames.

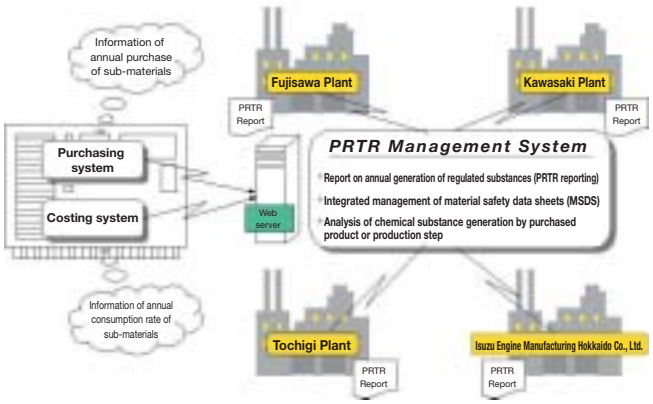
#### Results of the Fiscal 2002 PRTR Compliance Survey

(substances handled in amounts of 5 tonnes or more are listed) (Unit: kg)

| Name of substance | Substance number | Amount handled | Amount released | | | | Amount transferred | |
|---|---|---|---|---|---|---|---|---|
| | | | Air | Public water | Soil | Landfill | Sewage water | Others |
| Ethylbenzene | 40 | 145,938 | 48,000 | 0 | 0 | 0 | 0 | 81 |
| Xylene (isomer mixture) | 63 | 196,819 | 93,700 | 0 | 0 | 0 | 0 | 180 |
| Ethylene glycol | 43 | 726,453 | 0 | 0 | 0 | 0 | 0 | 8 |
| Toluene | 227 | 142,074 | 53,000 | 0 | 0 | 0 | 0 | 190 |
| Dioxins | 179 | — | 170* | 0 | 0 | 0 | 0 | 2,701* |

* Unit: mg-TEQ

#### Outline of Isuzu's System to Comply with the PRTR Law



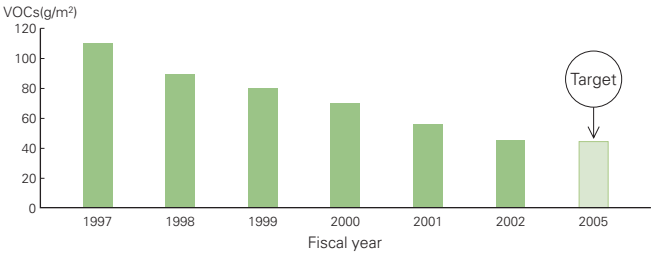

## Preventing Air and Water Pollution

### Reducing the Use of Volatile Organic Compounds (VOCs)

VOCs are substances used mainly in the vehicle body painting process. In fiscal 2002, Isuzu's rate of use was 45.4 g/m$^2$, representing a 59% reduction compared to the fiscal 1996 level. Our major efforts for their reduction included an improvement of the cleaning thinner recovery rate and the proactive introduction of paints which require less solvent. Since we have already achieved a monthly reduction of 35.3 g/m$^2$, we are confident that the target of achieving 45 g/m$^2$ by the end of fiscal 2005 will be accomplished ahead of time.

We are also working to reduce the use of VOCs in small parts by adopting spray guns of high painting efficiency and improving the skills of painting workers through visual training.

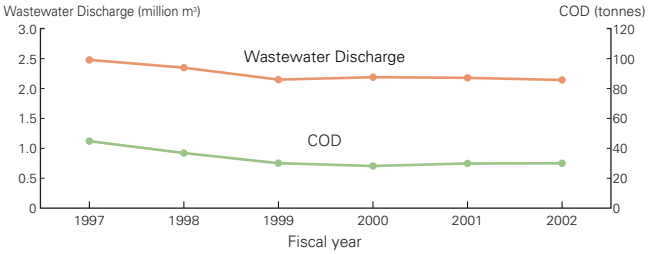
#### Use of VOCs in the Painting Process




### Air and Water Pollution Prevention

Placing an emphasis on the prevention of air and water pollution in our activities to protect the environment, we have established voluntary targets stricter than the legal regulations. Under our environmental management systems, the statuses of waste management and legal compliance are constantly monitored and reported to the Plant Environmental Committee. While working to meet our targets by multi-focal approaches, we are also endeavoring to reduce the use of harmful substances.

#### Wastewater Discharge and COD* Levels




* COD: Chemical oxygen demand

### Control of Dioxins

Currently three Isuzu plants in Japan are equipped with an incinerator. Two of these have already been shut down, complying with the dioxin emissions regulation standards. In these two plants, we were able to reduce the amount of industrial waste generated, and waste treatment is contracted to outside operators. Although the operation of the incinerator of the Fujisawa Plant will be continued, it has already cleared the emissions regulation standards that went into effect in December 2002 (10 ng-TEQ/m$^3$), with the actual measured value being 1.7 ng-TEQ/m$^3$. The plant will make continued efforts, precise control of combustion and reductions of the amount incinerated.