# Production

In 2004, FHI successfully achieved a zero level of waste material generation at all its plants. In addition, the Utsunomiya Manufacturing Division implemented a natural gas cogeneration system in February 2005 as a powerful measure against global warming. FHI actively commits to continuing its efforts to preserve the environment.

#### **Amount of Resources Input and Total Emissions at Plants**

This figure shows the amount of resources used and emissions in fiscal 2004 at Gunma Manufacturing Division, our main automobile production plant in Japan.

#### Amount of Resources Input and Emissions



Total amount of materials generated: 68,600 tons

## **Reduction of Waste Materials**

#### Zero level of waste material generation achieved

FHI is actively committed to reducing waste in all its plants. At the Gunma Manufacturing Division,\*3 the Utsunomiya Manufacturing Division,\*4 the Industrial Products Company,\*5 and Tokyo Office\*6 zero emissions have already been achieved.

The total amount of materials generated, including scrap metal associated

the materials generated were treated as the figure below shows. The amount of waste materials generated (waste materials treated intermediately by external companies plus waste materials directly landfilled) reached the zero level from 2004, due to progress in the measures for by-product sources and expansion of the recycling program. The amount of waste materials landfilled has been at the zero level since October 2003.

with production activities in 2004, was 73,024 tons in total for all plants, and





\*1. HFC134a emissions: Calculated by multiplying the amount emitted by the global warming potential \*2. Drainage Emissions: The same as the amount of the water used \*3. Gunma Manufacturing Division: Automobile development and manufacturing base \*4. Utsunomiya Manufacturing Division: The Aerospace Company and Eco Technologies Company's development and manufacturing base \*5. Industrial Products Company: Industrial product development and manufacturing base \*6. Tokyo Office: Automobile research and development base

The following chart shows trends in the amount of materials generated, excluding scrap metal, and trends in the amount of waste materials generated from fiscal 2000 to 2004. In fiscal 2004, zero level waste generation was achieved by promoting reduction in the amount of materials generated and by recycling efforts.



#### Trends in Amount of Waste Materials Generated



#### **Reducing the Amount of Scrap Metal in the Automotive Production Process**

As for metals, including iron and aluminum, the primary materials for automobiles, FHI is making efforts to generate as little scrap metal (by-products) as possible by changing the quality of materials and weight-saving design for products and improving the yield ratio during the production process, in order to improve automobile environmental performance and effectively utilize resources. The following chart shows the past records after fiscal 2000 and our future plan.

#### Ratio of Amount of By-products Generated to Amount of Products Produced (Tons/100 million yen)



The 2004 Clean Japan Center Chairman's Prize<sup>\*1</sup> in the Resource Recycling Technology & System Commendation Sponsored by the Ministry of Economy, Trade and Industry(METI)

FHI developed a recycling technology of paint sludge into raw material used for automobile vibration-proof parts or blast furnaces and constructed its recycling factory in the Gunma Manufacturing Division in May 2001, where effective recycling of paint sludge has been carried out (for details, refer to page 30 in the 2002 Environmental & Social Report).

For this technology and recycling performance, the 2nd



Manufacturing Engineering Dept. and the Manufacturing Environment & Safety Dept. in the Gunma Manufacturing Division were awarded the captioned prize.

Column

# **Reducing Water Consumption**

The volume of water used by FHI in fiscal 2004 was 3,690,000 m<sup>3</sup>. We will continuously implement resource saving measures in everyday operations as well as strict maintenance of water pipes in order to reduce water consumption.

#### Trends in Volume of Water Used



\*1. The Prize in the Resource Recycling Technology & System Commendation: a prize

33

The Clean Japan Center awards prizes and citations under the commission of the Ministry of the Economy, Trade and Industry, with the aim of promoting the efforts of superior businesses that contribute to controlling waste generation and reuse.

Column

# Prevention of Global Warming (Energy Saving)

Every FHI plant is committed to improving the energy efficiency of facilities to avoid waste or loss of energy. Following to the example of the Yajima Plant in Gunma Manufacturing Division, the Utsunomiya Manufacturing Division implemented a natural gas cogeneration system in February 2005.

In fiscal year 2004, our energy use stayed flat compared with the previous year to 134,700 kiloliters (crude oil equivalent) in total for all plants, mainly by continuous promotion of various measures, including improving energy consumption of production facilities and reducing air leaks, even though the number of vehicles produced increased by 3.4%, automotive production being our main business. For CO2 emissions, the total amount decreased 1.5% compared with the previous year to 233,000 tons of CO<sub>2</sub> in fiscal 2004, owing to the use of natural gas for boilers and implementing the cogeneration system in the Utsunomiya Manufacturing Division. This is a 15.0% reduction compared with fiscal 1990 levels. In addition, energy consumption per production improved by 1.9% in comparison with the previous year, and a 33.6% reduction was achieved compared with the 1990 result.

The amount of greenhouse gases (methane, dinitrogen monoxide, HFC, PFC, sulfur hexafluoride) emitted, excluding CO<sub>2</sub>, was equivalent to 400 tons of CO<sub>2</sub>

## Management of Chemical Substances (the PRTR Law)

In fiscal 2004, 19 chemical substances subject to the PRTR Law were used by FHI, as detailed below. The total use of such chemical substances was up 10.6%, compared with the previous year, but their release into the atmosphere and water was down 19.1%. Major reasons for this include a change in the cleaning thinner during the automotive painting process to one with less xylene, reduction in paints used, and improvement in the cleaning thinner collection rate.

#### Totals of PRTR Chemical Substances Used in Fiscal 2004

Energy consumption per production (fiscal 1990 = 100) Trends in Amount of CO<sub>2</sub> Emitted 100 Amount of CO2 emitted (Index) 100 08 Index of energy consumption per production 40 82 81 81 emitted 78 77 77 72 71 30 68 27.7 27.4 27.7 66 27.4 27.2 26.0 25.7 25.6 24.7 Amount of CO2 23.6 23.3 20 0 '04 Fiscal year '98 '99 '00 '01 **'**02 '03 '90 '95 '96 '97

#### Winning the 2004 Prize of the Head of Kanto Economic Affairs Bureau, METI

#### By the Transmission Engineering Section of the Third Manufacturing Engineering Dep.

The Gunma Manufacturing Division worked on the improvement of parts cleaning machines which consume much energy in the transmission assembly process. This improvement was highly evaluated in the Energy Saving Excellent Case Symposium Kanto Conference sponsored by the Energy Conservation Center Japan because of the inclusion of many excellent technological elements, the availability of immediate effects, and the



versatility applicable to many aspects and fields. Mr. Nakamura in the Transmission Engineering Section received the prize. This activity was also presented in the national conference as an excellent case





(Only amounts exceeding one ton a year are shown. Substances marked with a \* are Class 1

Designated Chemical Substances)(Unit: Tons per year, mg-TEQ per year (only for dioxins)									aloxins)	
Code	CAS Number	Name	Amount handled	Amount emitted into atmosphere	Amount emitted into public water	Amount removed	Amount consumed	Amount eliminated by processing	Amount recycled	Amount treated at landfills
1	none	Soluble compound of zinc spelter	27.17	0	0.29	5.44	21.45	0	0	0
9	103-23-1	Bis (2-ethylhexyl) adipate	1.21	0	0	0	1.20	0.01	0	0
16	141-43-5	2-aminoethanol	3.45	0	0.28	0.03	0	3.14	0	0
30	25068-38-6	Polymer of 4, 4'-isopropylidene diphenol and 1-chloro-2,3-epoxypropnae (liquid)	17.05	0	0	2.47	14.39	0.19	0	0
40	100-41-4	Ethylbenzene	368.27	180.26	0	0	84.02	26.77	77.23	0
43	107-21-1	Ethylene glycol	1,623.88	0	0	0	1623.88	0	0	0
63	1330-20-7	Xylene	973.33	420.39	0	0.63	375.24	62.29	114.78	0
69*	none	Hexavalent chromium compounds	3.83	0	0	0.10	0.27	0.66	2.79	0
176	none	Organotin compounds	2.94	0	0.01	0.14	2.80	0	0	0
179*	—	Dioxins	0.24	0.24	0	0	0	0	0	0
224	108-67-8	1,3,5-trimethylbenzene	48.30	16.45	0	0	18.31	4.81	8.73	0
227	108-88-3	Toluene	1077.95	362.34	0	3.58	598.83	74.62	38.59	0
232*	none	Nickel compounds	6.70	0	0.30	4.91	1.50	0	0	0
272	117-81-7	Bis (2-ethylhexyl) phthalate	86.99	0	0	3.97	83.02	0	0	0
283	none	Hydrogen fluoride and water-soluble salts	3.91	0	1.01	2.89	0	0	0	0
299*	71-43-2	Benzene	26.20	0.02	0	0	26.18	0	0	0
309	9016-45-9	Poly (oxyethylene) = nonylphenyl ether	1.20	0	0.09	0.90	0.12	0.10	0	0
310	50-00-0	Formaldehyde	1.38	1.38	0	0	0	0	0	0
311	none	Manganese and its compounds	10.87	0	0.30	5.22	5.35	0	0	0
Total			4,284.63	980.85	2.27	30.28	2,856.54	172.58	242.12	0

#### Trends in Amount of CO<sub>2</sub> Emitted

# **Reducing Substances with Environmental Impact**

#### Reducing VOCs Generated in the Painting Process (Automobile Division)

In fiscal 2004, we reduced emissions of VOCs per unit of area painted on the vehicle body to 46.4 g/m<sup>2</sup>, thereby reducing emissions by 57.4% compared to fiscal 1995 levels. The major contributing factors were efforts to reduce the amount of use by changing the cleaning process in the color modification phase, shortening the cleaning time, and reducing the amount of thinner in the paints.

#### Sulfur Oxide (SOx) Emissions

The amount of SOx emitted in fiscal 2004 was reduced compared with the previous year through such year-round efforts as introduction of a cogeneration system in the Yajima Plant in the Gunma Manufacturing Division, as well as the cogeneration system introduced and utilizing natural gas as fuel for boilers in the Utsunomiya Manufacturing Division.



#### Trends in Amount of SOx Emitted (total for all plants) (1,000 Nm<sup>3</sup>)



#### Nitrogen Oxide (NOx) Emissions





#### Reducing Use of HFC134a (Automobile Division)

To reduce atmospheric emissions from the vehicle manufacturing line, we have been minimizing leakage while pumping gas in air conditioners. As a result, we were able to reduce emissions by 95% compared to fiscal 1996 levels.

#### Emissions of Nitrogen, Phosphorous, and BOD

The chart below shows the total amount of nitrogen, phosphorous, and BOD emitted, including drainage, from all plants in fiscal 2004.

Substance	Fiscal year	Nitrogen	Phosphorous	BOD	
Amount emitted	2003	34	9	54	
(tons per year)	2004	36	8	60	

#### **Dioxin Emissions from Incinerators**

Incinerators were shut down in the Gunma Manufacturing Division in December 2000 and in the Utsunomiya Manufacturing Division and the Industrial Products Company in September 2001. This means we shut down all incinerators in every FHI division, ending dioxin emissions from all sources.

## **Green Procurement**

#### **Automotive Business Unit**

We held an explanatory meeting on our green procurement activities to suppliers in May 2005 to exchange ideas and to explain our efforts for the current year. We also sponsor the Subaru Safety Environment Association conference regularly every April to assist local suppliers in setting up their environmental management systems (EMS). By March 2005, the EMS had been completed by 283 out of 296 target suppliers in Japan.

We are using the International Material Data System (IMDS), a system that meets global standards to measure substances, including components, with an environmental impact, and we continue to assist our suppliers in inputting data. Industrial Products Company

We explained our Annual Plan for Environmental Efforts to 101 suppliers. In fiscal year 2003, all of the suppliers completed the establishment of an EMS; however, we will continue to work on activities for environmental preservation by maintaining the establishment of EMS and reducing substances with an environmental impact. Aerospace Company

In April 2005, we held an explanatory meeting, again requesting that they set up an EMS. In addition, we asked 257 suppliers to complete a questionnaire regarding the examination and reduction of substances with an environmental impact contained in their products. **Eco Technologies Company** 

We sponsored a seminar about the establishment of EMS (Eco Action 21, promoted by the Ministry of the Environment) in February 2005 with suppliers to promote the reduction and elimination of substances with an environmental impact, as well as to improve the yield for raw materials. **Green Purchasing** 

We have been promoting activities to select and use environmentally friendly products since October 2000. The ratio of environmentally friendly products purchased in the Gunma region reached 100% in fiscal year 2004. For fiscal 2005, the Head Office area will aim for a complete transition to use of environmentally friendly products, and the environmentally friendly products campaign will be promoted at each FHI company.

# Utsunomiya Manufacturing Division's Cogeneration System

# Major Progress in the Prevention of Global Warming thanks to the Introduction of the Natural Gas Cogeneration System and the 6,030 kW Gas Engine Method!

Prior to the enforcement of the Kyoto Protocol, on February 1, 2005, the Utsunomiya Manufacturing Division started to operate the 6000 kW class natural gas engine cogeneration system as the ultimate measure for prevention of global warming. This follows the introduction of the natural gas turbine cogeneration system at the Yajima plant of the Gunma

Manufacturing Division in September 2002. The introduction of this system in other factories is now being considered in order to meet the unique energy demands of each factory.

### **High Generation Efficiency**

Compared to		
the efficiency	ine	Electricity44%
levels of the	nput e 00% e	efficiency
other gas	Gas	Steam20% 65%
engine		Hot water1%
generators		+
currently in use,		Loss35%
currentiy in use,		203303 /0

this system's power generation efficiency of over 44% ranks as the highest in the world. When combined with the high-efficiency exhaust heat recovery equipment, the steam (0.8 MPa) recovery rate reaches 3.83 tons per hour, and the heat recovery rate reaches 21%, including hot water recovery.

### Effects of Introducing the Cogeneration System

Since environmentally friendly natural gas is used as fuel, not only high power generation but also high energy-saving effects (1700 kl/year in crude oil conversion) and CO2 emission reduction effects (7100 tons-CO<sub>2</sub>/year, equivalent to 20% of the 1990 emission amount) are anticipated.

### Features of the System

During installation of this system, we have given every consideration to neighboring communities and to protecting the global environment. Environmentally friendly design An ignition engine (ignition plug system) that does not use heavy oil • Effective water-saving radiator cooling (compared with a cooling tower method) Engine adopted anti-vibration structure. And noise insulation structures were arranged in the building and on the rooftop Low exhaust emission (NOx) concentration (well within the regulated values) Uses a minimum of building space due to the compact design High reliability and power saving due to the 24-hour real-time remote monitoring system Upon introducing the high efficiency DSS (Daily Start, Daily Stop) operation system, we obtained subsidies from the 2003 Alternative Energy Project Support Program. Also, the adoption of the ESCO method \*1 enabled us to realize effective energy-saving policies without any initial investment.



\*1 ESCO method: The method according to which ESCO (energy service companies) providers supply customers who agree to introduce energy-saving policies with such comprehensive services as diagnoses, designing, construction, maintenance, and operation of buildings and facilities; help with procurement of project money, etc; carrying out retrofit work; and guaranteeing energy-saving effects from such projects ESCO companies receive part of the profits resulting from customers' energy-saving results as a reward.



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The natural gas cogeneration system introduced at the Utsunomiva Manufacturing Division