



Environmental
Report
2006



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Editorial Notes

- Reference was made to the Environment Agency's guidelines on environmental reports in drawing up this document.
- The contents of this report are primarily based on activities in the 2005 business year (March 21, 2005 to March 20, 2006). They also include some activities of related companies, past activities etc.
- Yanmar Co., Ltd. underwent business restructuring in F.Y.2005 and, as a result, some structures, data representation units, etc. have been changed. Accordingly, some data in this report may diverge from those described in our last environmental report, published in August 2005.
- The term *Shiga Zone* is used in this report to refer to the small engine's operations divisions (at Biwa, Yamamoto Nagahama and Kinomoto Plants) and the precision equipment operations divisions of the small engine operations divisions (at Omori and Nagahara Plants) based in and around Shiga Prefecture. *Amagasaki Zone* refers to Amagasaki Plant of the large engine operations division and Tsukaguchi Plant of the large engine operations division based in and around Amagasaki City, Hyogo Prefecture.

Greetings

Greetings

Our company has devoted itself to the waste-free use of energy resources by developing and diffusing extremely energy-efficient, outstandingly economical engines and machinery ever since its founding in 1912, with the consistent goal of creating enriched ways of life for all people through higher food production and industrial productivity.

The Yanmar company has developed in close dialogue with the nature, recognizing the importance of coexistence and pioneering not only reduction of environmental burden in production activities but also clean emission, low noise, low vibration and other advanced environmentally friendly features.

The spectacular social and industrial development of the 20th century has, even so, generated an environmental burden that exceeds the capacity of our physical world. We face a legacy of serious challenges for human society in the 21st century, ranging from global warming to the depletion of resources, environmental destruction and pollution.

We have stated, as our basic environmental philosophy, our commitment to the harmonization of development with the needs of the global environment, thereby contributing to the sustainable development of society. The entire Yanmar group is working on those issues by establishing the Yanmar Group Global Environment Committee.

In January 2005, in order to make our environmental commitment definite, we established a corporate philosophy as our mission statement for all employees of the Yanmar Group:

We, the Yanmar group, will strive to create new and meaningful value together in partnership with our worldwide customers. We will be innovators and leaders in harnessing energy, while contributing to an environmentally sustainable society, through the delivery of unrivaled products and services.

2012 will be our corporate centenary, and we are now working on our environmental vision of how the conservation activities of the Yanmar Group should be by that time. We shall implement the new vision from the Yanmar Group's mid-term environmental plan that starts in the 2006 fiscal year.

In the meantime, it gives me great pleasure to present this comprehensive overview of our activities in the 2005 business year in this, the fifth edition of our annual environmental report.

I trust that this report will provide all readers with a thorough understanding of the environmental measures, stance and activities of the Yanmar group. We continue to depend, as ever, on your guidance and support.



Takehito Yamaoka
President

Outline of Yanmar

Yanmar Diesel Engine Co., Ltd. became Yanmar Co., Ltd. on July 1st, 2002 to serve as the holding company of the Yanmar group.



Trade Name : Yanmar Co., Ltd.
 Head Office : 1-32 Chayamachi, Kita-ku, Osaka City
 Founded : March 1912
 Capital : 6.2 billion yen (July 1st, 2002)
 Chairman : Tadao Yamaoka
 President : Tatehito Yamaoka
 Turnover : 167.8 billion yen (FY 2005)
 Employees : 2,696 (as of March 20, 2006)

Our Products

With energy conversion technologies at the core, we research, develop, manufacture, sell and maintain products for use on land and sea and in other living spaces.

Industry and Construction



- Industrial Engines
 - Construction Machinery
 - Industrial Equipment
- (Projector, Portable power generator)

Energy



- Power Generation Equipment
- Air Conditioners (GHP)
- Micro-gas Cogeneration

Agriculture



- Farm Machinery
- Farm Facilities
- Hobby Farming Machinery
- Unmanned Helicopters
- John Deere Tractors

Marine



- Pleasure boats, Fishing boats
- Marine system equipment,
Fish feed
- Marine main & aux. engines

Environmental Protection



- Environmental equipment
- Environmental facilities
- Cool containers
- Household equipment

I Environmental Management Systems

1. Yanmar's Global Environmental Pledge (Revised 2002 Edition)

Yanmar Co., Ltd. has long tackled environmental problems in its daily business activities on the basis of the company's corporate philosophy of seeking beautiful harmony between plentiful human lifestyles and the needs of the global environment.

Global warming, dwindling natural resources, waste and other problems all continue to pose serious threats to the global environment and society demands that countermeasures be taken.

Yanmar Co., Ltd. made its Environmental Charter in 1995, and acquired ISO14001 environmental certification for all of its production plants in 1998, and we have been promoting environmental preservation activities. In 2002, with the reinforcement of management structures across the Yanmar group, the Environmental Charter was revised as the charter of the whole group, with the aim of facilitating environmental management group-wide.

In January 2005, we established a new corporate philosophy based on offering products and services for the sustainable society as our mission for the strengthening of recycling activities.

We shall continue to seek always to supply unrivaled products and services for the sustainable society that can point the way for the most effective uses of energy.

Work is progressing on the group's environmental conservation activities for our corporate centenary in 2012. The vision for that shall be incorporated in the Yanmar group's mid-term environmental plan that begins in the 2006 fiscal year.

Corporate Mission

We, the Yanmar group, will strive to create new and meaningful value together in partnership with our worldwide customers. We will be innovators and leaders in harnessing energy, while contributing to an environmentally sustainable society, through the delivery of unrivaled products and services.

Environmental Philosophy

The Yanmar group aims to contribute to the sustainable development of society by constructing a harmonious relationship between group development and the needs of the global environment.

Action Guidelines

1. We position environmental conservation as one of the most important management objectives of the Yanmar Group for the purpose of group-wide environment management.
2. We observe the laws of all countries and the ordinances and regulations of all districts where we conduct production activities strictly and when necessary establish voluntary environmental regulation in order to achieve superior levels of environmental conservation.
3. The Yanmar Group Global Environment Committee establishes the environmental promotion guidelines and disseminates them throughout the group for the overall promotion of environmental conservation by the group.
4. We actively disseminate environmental conservation information internally and externally to promote the understanding of group companies and partners of the need for cooperation in the promotion of efficient environmental conservation activities.
5. We promote effective measures systematically and on a continuous basis in the following four environmental fields:
 - Establishing technologies that contribute to environmental conservation and products and services that reduce environmental load.
 - Reducing environmental load in each stage of business operations
 - Joining forces and cooperating with external parties to contribute to local communities and disseminate environmental information.
 - Raising of environmental awareness among employees, internal environmental education, lifestyle innovation, etc.

● **Environmental Vision**

Our goal in the environmental preservation activities to be achieved by our centenary in 2012 is presented as our environmental vision , We have compiled the next environmental mid-term plan (2006-2010) in order to achieve this environmental vision.

Environment Vision of Yanmar Group Towards Centenary Anniversary

<Yanmar Group Mission>

We, the Yanmar group, will strive to create new and meaningful value together in partnership with our worldwide customers. We will be innovators and leaders in harnessing energy, while contributing to an environmentally sustainable society, through the delivery of unrivaled products and services.

<External Factors>

- Environmental Regulations Domestic & Foreign
- Construction of the sustainable society — resource saving, re-use, recycling
 - Prevention of global warming, (Implementation of Kyoto Protocol) —Energy saving, alternative energy sources
 - Bans and restrictions on the use of harmful substance — Control of chemicals, products, parts, materials

<Yanmar Group Mid-Term Management Policy>

Raising corporate value (=brand value)

<2012 Environmental Vision>

The Yanmar Group, in full recognition that it does handle products that can impose environmental load, undertakes to:

- (1) Contribute to the growth of the sustainable, resource-recycling society
[Prevention of global warming, zero-emissions, re-use, recycling]
- (2) Provide unrivaled products that are compatible with both environmental and economic needs
[Clean exhaust gas, high product efficiency, reduced use of harmful substances]
- (3) Fulfill social responsibilities in cooperation with society at large
[Legal compliance, voluntary regulation, information disclosure, communication with the community]

To achieve these objectives, the group shall:

- (1) Construct exhaustive common environmental preservation systems for all group companies in Japan
- (2) Implement environmental preservation activities step by step, provide environmental products and raise the brand image and reliability of the Yanmar group as a whole
- (3) Stay one step ahead of the resource recycling requirements of legal compliance for the fullest possible prevention of global warming and reduction of harmful substance use
- (4) Expand environmental education for associated companies and dealers

**Environmental
Philosophy
Action
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 - Raising of environmental awareness among employees, internal environmental education, lifestyle innovation, etc.

● The Next Environmental Mid-term Plan

We have compiled the next environmental mid-term plan (2006-2010) in order to achieve the Environmental Vision 2012. We are planning to enhance our environmental conservation activities toward the goals specified in the Environmental Vision for the 5 years starting in 2006.

Yanmar group's Goals in the Next Environmental Mid-term Plan (2006-2010)

No.	Category	Item	Goals
1	Structure	Transform to CSR Structure	CSR Report to be published from 2008.
		Expansion of the Global Environment Committee	Participation of overseas affiliated companies. Expansion to the Global Environment Meeting
2	Environmental Management	Environmental Audit	To be started among domestic companies adopting consolidated accounting in 2008.
		Environmental performance management	Environmental accounting Risk management. Producing an internal environment report.
		Acquiring ISO 14001 environmental certification	Group companies of the global environment committee. Overseas production companies (100%), 2007 and afterwards. Non-production companies 50%
		Execution of environmental education	Establishing and executing environmental education system by hierarchy
3	Products	Improvement of products' environmental performance	Accelerated achievement of exhaust gas regulation.
		Improvement of energy efficiency	Engine heat efficiency 5% Operating efficiency 20%
		Environment Coordination Design	Executing LCA for all the new products
		Elimination of materials with environmental load	4 materials banned for use. Eliminating 6 materials voluntarily banned for use (Complete elimination by the end of 2008)
		Provision of environmental information	Disclosing information regarding environment, recycle, disposal in instruction manuals
		Development of ecologically friendly products	Developing products with Environmental Label III.
		Reduction of environment burden at time of disposing products	Research and improvement of product disposal process.
4	Business Operation	Reduction of gas causing global warming	Reducing the emission of 6 gases causing global warming. ▲5%
		Reduction of energy consumption	Plant: Making energy saving plan/reduction ▲5% Building: Grasping energy consumption, reduction ▲5% Distribution: Grasping energy consumption, reduction plan making, recution▲5%
		Resource saving	Reducing water resource consumption ▲20%
		Elimination of materials with environmental load	Reduction of PRTR substances ▲30% 4 substances banned for use Eliminating 6 materials voluntarily banned for use (Complete elimination by the end of 2008)
		PCB treatment	Setting up Treatment Plan (by 2010)
		Waste reduction	Amount of waste emission ▲10% Reduction of final landfill volume 10% of waste
		Paper resource saving	Paper recycle ratio 70%
		Promotion of Green purchase	Eco office goods purchase ratio 70%
5	Social Contribution	Voluntary activities	Local voluntary activities 5 cases
		Communication with local residents	Holding social gathering 1 case
		Promotion of greening	Promoting tree-planting

1.2 Implementation Structures

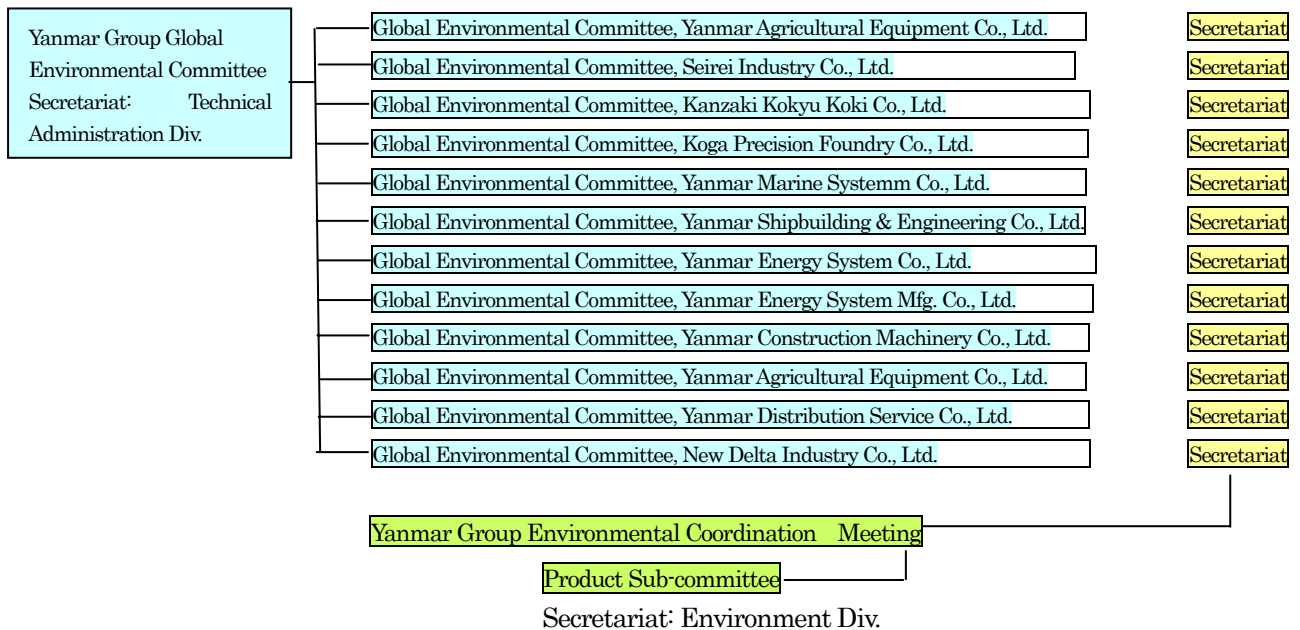
The Yanmar Group Environmental Committee was established in May 2002 with the participation of top executives from the group's companies. It is working to implement group-wide policy within clearly defined lines of responsibility and rights. 14 companies consisting of production, sales and distribution companies are organizing the committee.

An Environmental Committee with the participation of top management is established at each group company to implement the policies of the Yanmar Group Environmental Committee.

The Yanmar Group Environmental Coordination Meeting, consisting of secretariat members of the Environmental Committees of each company, is established to communicate the relevant policies and review the progress of implementation. The Product Sub-Committee, consisting of development division managers of group companies, is established within the Yanmar Group Environmental Coordination Meeting with the purpose of raising the environmental performance of Yanmar products.

The Yanmar Group Environmental Coordination Meetings are hosted at each company with a Yanmar Group Environmental Committee in turn to observe the state of environmental conservation activity at each host company, develop outstanding activities at all companies and give mutual notification of the various programs and their state of implementation.

Organization Chart of the Yanmar Group Global Environmental Committee



Yanmar Group Environmental Coordination Meeting



Yanmar Group Global Environmental Committee



Yanmar Group Environmental Coordination Meeting Plant Tour

1.3. Certification of the Environmental Management System

Our company's environmental management system is implemented for accreditation under the international ISO 14001 standard in the course of the continuous promotion of environmental protection activities. Yanmar Shipbuilding & Engineering Co., Ltd. was also accredited under ISO14001 in July 2006. Seirei Industry Co., Ltd. had acquired the certification separately in the Okayama and Kochi zones, but these were merged in 2005 to promote joint environmental conservation activities.

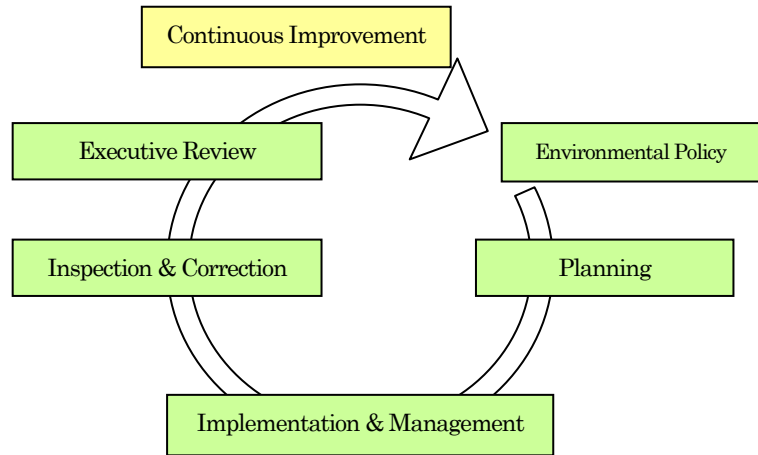
What is ISO 14001 ?

This is the standard for environmental management laid down by the International Standard Organization (ISO). The management system was revised in November 2004.

How is a Company Certified

Certification is performed by a third party organ, which inspects whether the standards have been satisfied.

Continuous Improvement Under ISO1400



ISO 14001 Certification by Site

Yanmar Domestic Facilities

No.	Factory Name	Accredited Business Units	Audit & Registration Organ	Register No.	Accredited Date
1	Large Engine Operations Division (Amagasaki Zone)	Amagasaki Plant, Tsukaguchi Plant	LRQA	770250	Jun. 1997
2	Small Engine Operations Division (Shiga Zone)	Biwa / Kinomoto / Yamamoto / Omori / Nagahama / Nagahara Plants	JQA	JQA-E-90134	Mar. 1998

Group Companies

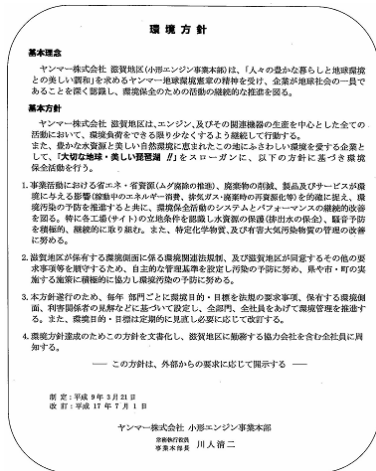
No.	Company Name	Accredited Business Units	Audit & Registration Organ	Register No.	Accredited Date
1	Yanmar Farm Machinery Mfg.	Head Office, Ibuki Plant	LRQA	4002304	Mar. 1999
2	Kanzaki Kogyukoki Co., Ltd.	Head office Plant	LRQA	772501	Mar. 1999
3	Seirei Industry Co., Ltd.	Okayama /Yamada / Nangoku Plants	JQA	JQA-EM0277	Dec. 1998
4	Yanmar Construction Machinery Co., Ltd.	Fukuoka Plant	JQA	JQA-EM0281	Dec. 1998
5	Matsue Diesel Co., Ltd.	Head Office Plant	LRQA	JBC-4002315	Aug. 2003
6	New Delta Industry Co., Ltd.	Head Office Plant	JICQA	JICQA-E840	May 2004
7	Yanmar Energy System Mfg. Co	Head Office Plant	JIA-QA Center	JE0464A	Jul. 2004
8	Yanmar Agricultural Equipment Co., Ltd.	Head Office / Facility Div. / Development Div.	JQA	JQA-EM4278	Oct. 2004
9	Yanmar Shipbuilding & Engineering Co., Ltd.	Head Office, the 1 st and the 2 nd Plants	JQA	JQA-EM5433	Jul. 2006

Yanmar Group Overseas Companies

No.	Company Name	Accredited Business Units	Audit & Registration Organ	Register No.	Accredited Date
1	P.T. Yanmar Diesel Indonesia	Head Office Plant	KEMA Quality B.V	2032854	Jul. 2003

1.4. Audit of Environmental Management System

The sites certified under ISO14001 disclose their respective environmental policies to the public and perform audits on a periodical basis to ensure their effectiveness and sustainability. The environmental policies of the sites certified under ISO14001 are as follows:



Environmental Policy in the Shiga Zone



Environmental Policy in the Amagasaki Zone

The Internal Environmental Audit Team inspects whether the environmental management systems are functioning effectively, also an external third party audits according to the ISO14001 requirements based on the results identified by the internal team.

In F.Y.2005, we changed the environmental management system to comply with the 2004 edition. A third party audit confirmed that it complies with the 2004 edition.

● Environment Audit

We are executing environmental audits under Yanmar's Second Environmental Mid-term Plan (2006-2010). A preparatory audit was performed together with the audit department this year. An improvement plan is being made to deal with items at some companies and sites where improvement is still needed.

Results of the Environmental Audit

We conduct an annual internal audit of all divisions throughout the company. The results are reported to the general manager of the business division for use in the environmental control review.

We also receive a surveillance and certificate renewal audit by a third party certification organization.

In F.Y.2005, we were instructed to improve 2 items in the Yanmar group and complied with those demands. Other requests were made regarding 31 items, and we enhanced our environment control systems accordingly.



Internal Environmental Audit

Companies targeted for environmental audit

Environmental audits were carried out at the following 7 companies and sites among the Yanmar Group Environmental Committee member companies.

- Small Engine Operations Division, Yanmar Co., Ltd.
- Large Engine Operations Division, Yanmar Co., Ltd.
- Seirei Industry Co., Ltd.
- Kanzaki Kogyukoki Mfg. Co.
- Matsue Diesel Co., Ltd.
- Yanmar Construction Machinery Co., Ltd.
- Yanmar Agricultural Equipment Co., Ltd.

II Environmental Products

2.1 Industrial and Construction Machinery

(a) Industrial Engines

The industrial engine represents the core business of Yanmar. The Small Engine Operations Division develops, produces and sells industrial diesel engines up to 75 kW, air-cooled gasoline engines of 2-9 kW etc. Seeking to contribute to global environmental conservation, we provide engines that are clean and friendly both to both people and the environment.

- **Vertical Water-Cooled Diesel Engine (TNV Series)**

The series of engines of 6-75 kW comply with environmental regulations in place around the world. These engines are designed from the start as gas engines and applied to GHP co-generation systems (GP Series).



TNV Diesel Engine

- **Horizontal Water-cooled Diesel Engine (NF/TF Series)**

These engines comply with both Japan's voluntary exhaust gas regulations and environmental regulations of South-east Asia.



NF Series

- **Air-cooled Gasoline Engine (GA Series)**

These engines comply with the exhaust gas regulations of Japan and Europe.



GA Series

- **Air-cooled Diesel Engine (L-Series)**

These engines conform to the European and American emission regulations and are the world leaders in the air-cooled diesel engine field.

We started marketing the air-cooled LV Series of single-cylinder diesel engines, which satisfy the EPA's Tier II exhaust gas regulations, in January 2005.

The engine size is same as for the established L-EE Series, which satisfied the EPA's Tier I regulations, but the adoption of a new cylinder block has enhanced displacement and use of Yanmar's original high technology in direct injection and combustion has reduced pollutants. Also the enhanced strength and stiffness of each engine part realizes low noise and vibrations.



L-V Series

(b) Construction Machinery

Yanmar Construction Machinery Co., Ltd. is the Yanmar Group company for construction machinery. The core products, the ViO and Series, are aimed at more global and universal product applications in a borderless business world.

The universal ViO40/50-5 in the 4-5 ton class and B6-6 were developed in 2005. The ecological features of these new products are as follows:



Mini-excavator ViO50-5



Mini-excavator B6-6

- **Resource Saving, Environment Conservation**

Unit-based design was introduced in order to shorten production lead time and stabilize production quality. This has reduced the number of parts by about 5% and increased the parts sharing ratio to 84% for the ViO and , which previously had different structures. Thoroughgoing resource saving is also underway with the reduction of the number of paints and higher yield rate of steel plates.

- **Compliance with Exhaust Emission Regulation**

This direct injection engine conforms to the Tier Three and off-road regulations of the Land, Infrastructure and Transportation Ministry and latest exhaust gas regulations of the US and Europe.

- **Energy Saving**

Yanmar's VIPPS hydraulic system distributes the hydraulic oil from the pump to each actuator according to the job size, both increasing the work rate and reducing fuel consumption.

- **Low Noise**

The Mini Back-hoe-is mostly used in urban settings and has to be quiet. Yanmar maintains its long construction machinery tradition of full compliance with the noise and vibration standards of the Land, Infrastructure and Transportation Ministry of Japan. The equipment also complies with the Tier Two noise regulations of Europe.

● Recycling

The bonnet and other major external parts are made of steel plate that is easy to repair and re-use. Adoption of a steel underside protector and flat-spring cylinder cover has enhanced reliability and recycling. The constituents of resin parts are indicated for easy recycling. The potential recycling rate by weight is about 95%.

2.2. Energy Systems

Yanmar Energy System Co., Ltd. is the Yanmar Group company for cogeneration systems and gas heat pump air-conditioners.

The enforcement of the Kyoto Protocol has accelerated the implementation of energy saving and environmental preservation measures, but the fact that CO₂ discharge emissions are still increasing in Japan means that there is a great need for compact, efficient, energy-saving equipment that imposes a low environmental burden in order to achieve the target values specified in the Kyoto Protocol. The decentralization of such energy system equipment as power generators and air conditioners contributes much to the effective use of energy and reduction of both the environmental burden and running costs.

Unlike large-scale centralized power generation by thermal and atomic power stations, decentralized power generation by cogeneration generates the power where it is needed and recovers the heat from the exhaust as well in the forms of hot water and steam. The result is a high energy efficiency of 75-85% and lower environmental burden due to CO₂.

In air conditioning, too, decentralized air conditioning by gas heat pump saves energy by maintaining a comfortable temperature only in rooms that require air conditioning, and reduces the environmental burden by using gas that produces less CO₂ discharge.

Cogeneration System

● 25kW High Efficiency Micro-Cogeneration Systems (CP25VB1)

The 25 kW Micro-Cogeneration System features an optimized engine combustion chamber structure and improved inverters. Its power generation efficiency of 33.5% is the same as that of 200kW-class gas engine cogeneration. The output can be gauged to each customer's needs by operating multiple units up to a maximum of 8 to achieve outputs of 25-200 kW.

Micro-cogeneration typically used to recover hot water at low temperatures of 65-75° that was only suitable for use as ordinary tap water. The CP25VB1, however, which was released this fiscal year, can recover hot water at temperatures of up to 83°. For the first time ever, the water can be used together with a gas pump in a 20 kW-class gas engine micro-cogeneration system, thereby realizing the use of exhaust heat for cooling

purposes.

These developments have increased the installation of units in office buildings and business facilities where the water load is lower than the power load, and in hospitals and hotels where power generation capacity has been based on the water load.



25kW Micro Gas Cogeneration Unit, Model CP25VB1

● 5kW High Efficiency Micro-Cogeneration Systems (CP5VB)

The 5 kW micro-cogeneration minimum output system for businesses was released this year to join the 9.9kW and 25 kW models in the high-efficiency B series.

These have been developed for installation in restricted spaces at chain- and other restaurants with small, flat backs for fitting neatly against the wall and cool exhaust at the side for installation beneath awnings or stairs.

An exclusive hot water container unit was developed together with the cogeneration system. This both enhances the installation and simplifies the installation process. The water supply system can be controlled by the remote control of the cogeneration system for increased user-friendliness. The power generation efficiency is 29%, 2 points higher with the conventional system.



5kW Micro-Gas Cogeneration Unit, Model CP5VB

● Gas Engine Cogeneration Systems (EP350G)

The gas engine cogeneration system generates electricity with a gas engine and recovers engine heat from the exhaust in the forms of either steam and hot water or hot water alone. As it uses natural gas for fuel, the electricity is cheaper than from the commercial power supply. By supplying heat as well, it has both economic and environmental advantages.

The EP350G is equipped with a subsidiary chamber lean combustion mirror cycle gas engine. Its new technology realizes both high efficiency and low emissions. Compared with the conventional units, power generation efficiency is over 4 percentage points higher. It clears the NOx regulations of urban areas without NOx removal equipment.

It also provides space-saving, low noise and all-in-one cogeneration system features, enhancing implementation and environmental conservation simplifying transportation and installation. Sales have been strong to small- and medium-sized hospitals, plants and shopping malls, and we believe it can contribute much to energy saving and the reduction of CO2 emissions.

Topics: Outstanding Energy-saving Award

The EP350G gas engine cogeneration system, with its lean combustion subsidiary chamber mirror cycle gas engine, received the outstanding energy-saving prize of the Chairman of the Japan Machinery Federation at the 26th energy-saving equipment exhibition in 2005.

Its power generation efficiency is over 4 points higher than that of conventional units and its low emissions clear the NOx regulations of urban areas without the use of NOx removal equipment.

This unit has been well received at hospitals, plants and shopping malls.



EP350G Gas Cogeneration Unit

Gas Heat Pump

● The G1 Series of High Efficiency Gas Heat Pump Air Conditioning Systems

The G1 Series was developed with the aims of More Ecology, More Economy and More Amenity. The engine heat efficiency was improved by optimized control of the gas engine, adoption of a newly-developed scroll compressor, and reduced electric power consumption through use of a DC motor for the outdoor fan. It realizes COP1.6 (equivalent to 16 horsepower), the industry's highest efficiency; decreases the environmental burden by reducing CO2 emissions; and improves economic efficiency by reducing the running costs. The ceiling-type indoor unit with outlets all around enhances comfort, too.



G1 Series Gas Heat Pump, YNZP560G1

The AYG20L Subsidiary Chamber Mirror Cycle Gas Engine,

Large industrial engines are manufactured by the Large Engine Operations Division. Industrial engines cover the range of 200-3,475 kW (power generation volume: 200-4,250 kVA). These engines are used with power generators for emergency or disaster applications, regular electric power supply and cogeneration systems.

The recent focus on environmental issues and increasing demand for energy have been drawing attention to the clean, high heat efficiency gas engine. Yanmar started the development and production of gas engines early on and is active in various industrial fields.

The EP350G cogeneration system uses the AYG20L, a subsidiary chamber lean combustion mirror cycle gas engine.

● Features of AYG20L Gas Engine

The AYG20L is a lean combustion mirror cycle gas engine for cogeneration. It achieves low NOx and high efficiency simultaneously by means of a quick closing mirror cycle and super-micro-subsidiary-chamber combustion system. Optimization of the air fuel ratio by knocking detector and electrical control, and best matching at the time of ignition, together achieve 42.1% pole-end heat efficiency, the world's highest, and low emissions (NOx200ppm/1500min-1, NOx150ppm/1800in-1, 0% of O2 in both cases)

In combination with an exclusive high efficiency power generator, the AYG20L achieves, without NOx removal equipment, power generation of 50 kW with efficiency 4.3 points higher than that of the conventional units.

The fuel supply equipment uses a computer-controlled port injection system for the first time ever in this class, thereby providing precise fuel control and good response to fluctuating loads. It realizes a high load

application ratio of 40% and can be used with systems for both normal and emergency use.

The main body part of the AYG20L engine is shared with the 6AY diesel engine. It provides high reliability, high speed, high output and less machine damage (friction damage) than the conventional types. The maintenance costs are much reduced by prolongation of the minimum maintenance interval from 1,000 to 2,000 hours, and the top overhaul interval from 8,000 to 12,000 hours (See Table 2). The EPG cogeneration package using the AYG20L reduces power consumption by up to 24% and CO2 emissions by up to 44% compared with boiler and other power generation systems. The outstanding resource and energy saving features earned it the outstanding energy-saving prize from the Chairman of the Japan Machinery Federation at the energy-saving equipment exhibition of 2005.

Table 1: AYG20L-ST Type Engine Main Feature.

Engine Name	-	AYG20L-ST	
Fuel Gas		City Gas 13A	
Engine Style		Vertical Water-cooled 4 cycle Lean Burn Gas Engine	
Combustion Chamber Type		Subsidiary Chamber	
No. of Cylinder		6	
Cylinder diameter x Stroke	mm	155 x 180	
Total Stroke Volume	Liter	20.4	
Engine Rotation	min-1	1500	1800
Rated Output	kW	382	434
Applied power generator output	kW	350	400



AYG20L-ST Engine

Table 2: Efficiency Comparison

Item	AYG	Conventional	Contrast
Engine Name	AYG20 L-ST	6NHLG-ST	
Power Generation Output (50Hz/60Hz)	350/400	300/350	14-17% increase
Initial Cost	86-88	100 (standard)	13-14% decrease
Maintenance Interval	2000	1000	Twice as long
Overhaul Interval	12000	8000	1.5 times longer



Tractor EG700



HMT Mechanism Image

The mechanism transmits continuously and variably by adjusting the power balance between a mechanical gear and an oil-pressure transmission. It is like changing gear by pedal control in a passenger car.

2.3. Agriculture

Agricultural equipment, another core business of the Yanmar group, is handled by Yanmar Agricultural Equipment Co., Ltd. The main series and types of tractors, combines and snow throwers are as follows:

(a) Tractor: The EG700 with Continuously Variable Transmission

With the EG700, an electronically controlled HMT (Hydraulic-Mechanical Transmission) is equipped on a tractor for the first time in Japan to enhance work accuracy and efficiency. Integrated control with a computerized 'eco-diesel engine' makes this product even more ecologically friendly. The EG 700 series features:

(1) The electronically controlled 'eco diesel engine'

The new TNV direct-injection diesel engine complies with exhaust gas regulations and guarantees stable power even under sudden increases of load. It shows tenacious power in every engine speed range to maximize the tractor's work performance. The eco-mode control makes it possible to select between work under load at high engine speed and at medium and low speeds.

(2) The electronically controlled HMT Transmission

Yanmar has developed a tractor that uses electronically controlled HMT Transmission for easy, precise, smooth and stepless speed change. It is the first tractor of the kind in Japan.

HMT Transmission provides excellent handling through the HST drive's continuously variable transmission and superb efficiency of the mechanical transmission. Using the optimal combination of HST and HMT drive, it is designed to perform with maximum efficiency when towing and plowing.

(b) Combine: The GC695

The GC695 is the high-end product of Yanmar's Top Athlete Series. It was commercialized for the highest basic performance and functionality as a Head-feed Combine Harvester (Japanese type) combine. It has drastically reduced both working hours and fuel consumption. The GC 695 features:

(1) A computer-controlled 'eco-diesel engine'

The direct-injection 'eco-diesel engine' prevents unnecessary fuel consumption with the help of computerized control.

· Automatic engine speed control

The engine speed is adjusted promptly and automatically for stable grain threshing according to the field conditions and job.

· Isochronous engine speed control

The engine speed drops automatically as the load approaches the limit, and recovers when the load drops, to prevent excessive fuel consumption.

·Auto-deceleration

The mechanism senses the position of the main shift lever and clutch, and adjusts the engine speed (rated rotation idling) to prevent unnecessary fuel consumption and minimize noise.

(2) New Grain Threshing System

Yanmar already used a multi-drum threshing and dust outlet system. We have now introduced a new, comfortable-speed dual drum in which the length has been extended for better dust distribution. This reduces the power and enhances the performance.



Outline of the New Grain Threshing System

'FC speed coordination' adjusts and stabilizes the crop supply volume according to the work speed for greater adaptability and stably reducing the threshing load.

Also, Yanmar's original 'return conveyer' is introduced for selection, reducing loss and improving selection performance at high speed by means of a third rotor and triple fan.

(3) Higher work efficiency

The direct drive for mowing is linked directly to the engine at the highest work speed. The FDS (Full-time Drive System), original cruising system, sub-variable non-clutch transmission and new system for discharging rice chaff (Fast Discharge Auger) have together realized the drastic enhancement of work efficiency.



GC695 Combine

(c) Snow Thrower

We are upgrading the existing compact Je series and mid-sized YSR series with environmental considerations in mind, as follows:

- Enhancement of basic snow throwing performance (snow scraping performance, snow throwing performance, alleviation of snow blockages).
- Easier to use (easy to use/understand thanks to 'universal' design)
- Improved manipulation through continuously variable transmission.

(1) Enhanced performance through the synergy of the new fast discharge auger & e-shooter

The use of a serrated auger increases snow-scraping volume, and ideal matching with the e-shooter optimizes the blower and shooter positions for enhanced snow removal performance.

(2) New ecological engine (YSRA107)

An L-shaped air-cooled engine is installed. Noise is 3 dB(A) lower for the operator, user-friendly for both the operator and people in the surrounding area.



Compact Je Snow Thrower

(d) Farm Facilities

Yanmar Agricultural Equipment Co., Ltd. entered the farm facility business in 1963 and has delivered facilities in about 1,000 locations throughout the country.

These facilities include country elevators, soybean drying and control facilities, and 'color sorting equipment' that assesses rice grain by grain by high performance CCD camera. Recently, we have released the Agrimonster, a facility for year-round gardening and rice production that offers high efficiency to farm cooperatives.

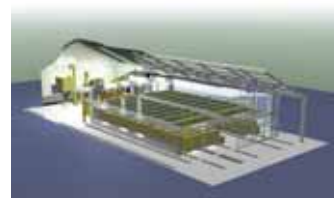


Image of the Agrimonster

Among various nursery facilities, we offer the ecological stabilizer for rice seeds, random sorter for potatoes and onions, stepless 'zero-tray selector', rational 'pan-type selector' and our original optical sensors etc for selection and packaging facilities.



stabilizer for rice seeds

(e) Unmanned Helicopter

Unmanned helicopters are playing an active role in pest control that reduces environmental burden. Here is how they are used for pest control in pine forests.

● Environmentally Friendly Unmanned Helicopter Pest Control

Pine trees perform important roles in land preservation, as wind and sea defenses on the coast and preventing landslides and floods in areas of poor soil. Those pine trees are being damaged by pine sawyers and dying in many places of scenic and historical interest. The damage started in 1965 and became very serious from about 1975. The spraying of chemicals and other pest control activity for the preservation of pine forests had reduced the damage in recent years but the pine wood nematode (PWN) is now killing pine trees and the carrier, *Monochamus alternatus* Hope, has become a major target for pest control. The methods include spraying on the ground with a power sprayer and spouter, and aerial spraying by manned or unmanned helicopter. Unmanned pest control has big environmental advantages:

- (1) Unmanned spraying, in which chemicals can be applied directly downwards, needs only a quarter of chemical volume used for ground spraying per unit area
- (2) In unmanned spraying, the nozzle is closer to the target crop or trees, so chemicals reach the target more quickly and chemical splash can be reduced.
- (3) The sprayer has a Yanmar-original large volume device that shortens the job and can spray a large area at one go.



Pest control over Amano Hashidate by an unmanned helicopter

2.4. Marine

(a) Boats

Yanmar Shipbuilding & Engineering Co., Ltd. in Oita Prefecture build FRP fishing boats and pleasure boats, and Yanmar Marine System Co., Ltd. is in charge of selling them.

Yanmar entered the pleasure boat market with the FZ22 series in 1978. The Marine Hunter FZ series was very well received due to the low fuel consumption and user-friendliness obtained by combining the diesel engine with Yanmar's original Z drive system. The core of Yanmar's pleasure boat line-up then shifted to the inexpensive 'Top Run Series' for fishing, and the Marine Hunter FZ series briefly disappeared from the line up in 1994 when sale of the FZ25E was discontinued.

User needs continued to diversify, however, with rising demand for comfortable fishing boats for outings with family and friends, so the Marine Hunter FZ series was resurrected with enhanced cabin comfort after 12 years. (FZ25 in Dec. 2005, FZ30 in Apr. 2006). The FZ was jointly developed with Yamaha Motor Co., Ltd.

Both the FZ25 and the FZ30 have a V-shaped hull for stable cruising and comfort even at high speeds of close to 30 knots. The fin-keel at the bow reduces drifting and provides the performance necessary for trolling.

For further interior comfort, careful 3D design has eliminated waste space and a seat for three passengers, toilet compartment (optional in FZ25G) and napping space have been added.

● **Environmental Considerations**

- (1) Low fuel consumption:
Fuel consumption is reduced to about two thirds of that of a 4 cycle gasoline outboard engine in the same class.
- (2) Fuel tank:
An FRP fuel tank is adopted for lightness of weight and a longer product life.
- (3) Parts sharing:
Parts sharing (front shield, wiper, etc) between the FZ25 and FZ30 and seat, steering wheel, door, table etc. sharing with Yamaha Motor Co., Ltd. has produced parts sharing rates of 88% for the FZ25G and 94% for the FZ30.



Marine Hunter FZ25G



Marine Hunter FZ25G

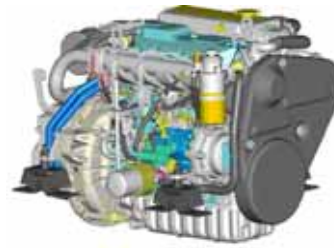
Table 3: Main Features of Marine Hunter

	FZ25G	FG30
L x W x D (m)	8.02 x 2.75 x 1.54	9.52 x 2.64 x 1.41
Max. Engine to be loaded	4 cycle diesel 4LH-DTZ(118kW)	4 cycle diesel 6LP-DTYZ(173 kW)
Vessel Speed at light loaded (knots)	29	30
Set Mass (kg)	2,270	2,680

(b) Marine Engines

Marine engines are produced at the Tsukaguchi Plant, YEU (Holland) and YMA (USA). Environmental regulations for marine diesel engines have been getting tighter both domestically and internationally, with the EPA regulations of the US the most rigid of all. The 4JH4-TE diesel engine for sailboats complies with EPA's Tier II. These engines are mostly installed on sailboats in the 45 foot class. Boats in this class are quite big and luxurious, and users want a quiet and comfortable interior. Engines must have low noise and vibrations and be compact. Engine reliability and adjustability are also important. Exhaust gas emission is reduced by improved combustion without depending on computerized control and post-processing. Combustion has been improved by the use of 4 valves in the cylinder and positioning of the fuel injection valve and combustion chamber in the

center for even fuel injection. The timing of fuel injection is very important for both reducing NOx to satisfy EPA's Tier II requirements and achieving low fuel consumption. Use of a plastic belt cover for lighter weight and improved safety as a standard fixture, and limited use of chromium hexavalent, lead and other harmful substances, reduces the environmental burden. The 4JH4-TE diesel engine is ecological and gives the users what they want. Sales commenced in January 2006.



4JH4-TE Engine

Table 4: Main Features of Marine Hunter

Model	Cyl.No.-Bore x Stroke	RPM	Output
4LY4-TE	6- 84 x 90mm	3200min-1	55.2kW

(c) Oceanic Equipment

The Environmental Business Development Division of Yanmar produces and sells oceanic equipment. We offer various types of equipment for the sanitation and freshness of fishery products to satisfy the needs of fishing ports throughout the country. We thus help to add value to the aquatic products of coastal fishing and achieve the low-waste use of such products.

● **Seafood Processing Residue Process / Discharged Water Recycle System**

Yanmar's Seafood Processing Residue Process / Discharged Water Recycle System is a bio-treatment system for the fish residue and discharged water of seafood processing plants and water maker that produces water of tap water quality using a membrane technology. This water is recycled within the seafood processing plant as an effective way of saving water.



Discharged Water Recycle System

2.5 The Household and the Environment

(a) Environmental Business of the Yanmar Group

The Yanmar group offers various types of environmental equipment and facility.

- Carbonization facility
- Compost disposal facility
- Biomass Facility (BDF, Chip Boiler)
- Biomass Power Generation System
- Wind-power Generation Equipment, etc.

(b) Environmental Business of Yanmar Agricultural Equipment Co., Ltd.

Agriculture can pollute the environment in various ways, including soil and groundwater pollution by agricultural chemicals. These can affect the entire ecosystem and reach the human body both indirectly and through the food that we eat.

Yanmar Agricultural Equipment Co., Ltd is examining Aquastela, a system that uses bacteria to reduce harmful chemicals.

● Aquastela

The Aquastela unit generates a saline bacterial solution. In laboratory tests at a concentration of 50ppm on 10 types of plant pathogen that damage strawberries, tomatoes, cucumbers, paddy rice, potatoes, green onions, ginger etc., it eliminates almost all pathogens. In spraying tests at a strawberry farm in Kurume city, Fukuoka Prefecture, cultivation and protection by Aquastela on its own performed at the same level as conventional chemical spraying. It promises to be a powerful tool for ecological farming.



Aquastela Units



Aquastela Water in use

(c) Environmental Business of the Distribution Equipment Division of Yanmar (Cool Containers)

The Distribution Equipment Division of Yanmar manufactures, sells and rents cool containers cooled by refrigerators driven by air-cooled diesels.

Many measures are moving ahead around the world to reduce the CO2 emissions that are feared to be causing global warming.

One modal shift in the transportation sector is the one from road transportation to efficient mass transportation by railway and sea.

The Yanmar cool container is a fixed temperature cool container developed for use in railroad transportation.

Their performance and reliability is optimized for railroad transportation. They can help a lot to curtail the CO2 emissions of the distribution sector.



Cool Container

Table 5 CO2 Emissions Unit requirement by Transportation Means

Transportation Means	CO2 Emissions Unit requirement
Railroad	21g-CO2/t.km
Coastal ships	38
Commercial truck	174
Captive use truck	338

Source: Website of the Land, Infrastructure and Transportation Ministry.

III. Environmental Protection Activities

3.1 Medium-term Environmental Protection Plan

Yanmar implemented its first medium-term plan for the promotion of environmental activities from fiscal 1995 to 2000. The second plan ran from fiscal 2001 to 2005. We aimed to achieve the goals set out below for fiscal 2005, with the records of 2000 as the benchmark.

As the second plan ended with this fiscal year, we are compiling the next medium-term plan on the basis of the Yanmar Group plan for F.Y. 2006 and beyond for the further promotion of environmental preservation activities.

Goals of Yanmar Co., Ltd. Second Medium-term Environmental Plan

Category	Sub-category	Controlled Item	Mid-term Goal
Product System	Product Cleanliness	Average NOx Emission Volume	Cut of at least 15% on average for combined annual engine production of each division
		Average CO2 Emission Volume	Control of average CO2, total CO2 and total NOx emission for combined annual engine production of each division
Business Operations	Energy Saving	Energy Use	Cut of energy used in production of at least 3.5% as a unit requirement of the entire company's sales turnover
		CO2 Emission Volume	Cut of CO2 emission during production of at least 3.5% as a unit requirement of the entire company's sales turnover
	Other Resource Saving and Recycling	Water Use	Reduction of at least 10% as a unit requirement of the entire company's sales turnover
		Waste Processing	Reduction of at least 10% as a unit requirement of the entire company's sales turnover
	Control of Dangerous Materials	Quantity Handled (total)	Reduction of at least 10% of chemicals covered by PRTR handled (used) annually by the whole company (2001 fiscal year as base)
Pollution Prevention	Extra Provisions	With regard to legal regulations for preventing pollution, extra 15% in addition to provisions for the whole company	
Local Society	Local Society	Community Activities	No numerical objectives
Public Relations	Public Relations	PR Activities	No numerical objectives

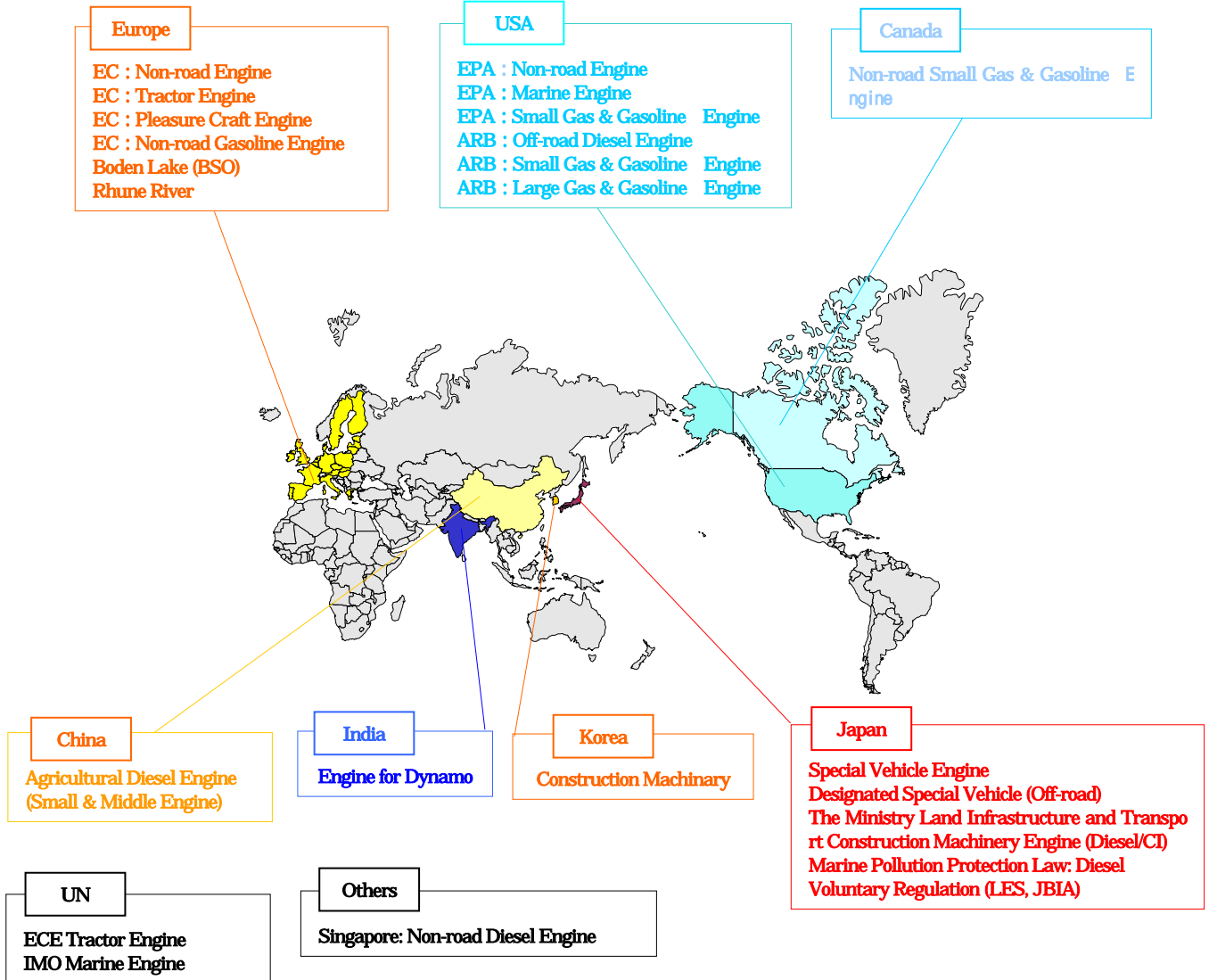
Note: Except where noted, F.Y.2000 is the benchmark year, and F.Y.2005 the target year

3.2. R&D for Environmental Protection

3.2.1 Meeting Global Emissions Requirements

Regulatory authorities around the world have set various requirements with the purpose of cleaning the atmosphere, and the mandatory values get stricter by the year. Emissions regulation for diesel engines in vessels was effectuated in Japan in 2005. Exhaust gas emission regulation of construction machinery was introduced in Korea, and regulation for agricultural vehicles in China.

Besides the above, exhaust gas emitted from stationary engines is regulated, too, in many countries, and our R&D is corresponding to those exhaust gas regulations around the world.



Non-road Engine Exhaust Emission Regulation around the World (F.Y.2005)

3.2.2 Yanmar Central Research Institute

The Yanmar Central Technical Research Institute was opened in Feb. 2000 at Maibara, Shiga Prefecture, as the core R&D center for the Yanmar Group. The building design weighed harmony with the surrounding environment and the demands of lower emissions and more recycling. The institute has the latest R&D equipment and IT technologies and tackles various R&D themes. Some examples are shown below.

3.2.3 Research Contents

● Engine Technologies

· Low Emission

Continuous efforts are made to develop the exhaust gas emission reduction techniques needed for full compliance with the exhaust gas regulations of the world. In the field of diesel engines, in particular, this issue has been positioned as a permanent development theme. We conduct R&D on not only the improvement of engine combustion but also electronic controls and exhaust gas after-treatment equipment to achieve extremely low exhaust emissions.

· Reliability & Durability

Microscopic diesel engine performance is measured with the latest measuring equipment. Based on abundant findings from element tests, engine reliability and durability are being constantly improved.

● System Technologies

Studies are advancing on highly efficient total energy systems based on engines to answer the needs of society.

· Raising System Efficiency

Demand continues to rise for highly efficient energy-saving air conditioning systems and the use of CFC coolant alternatives to prevent global warming. Research is advancing on various coolant cycle and control technologies.

· GHP Gas Engines

The R&D themes include combustion, exhaust gas after-treatment and engine control technologies for high efficiency, low exhaust emission engines.

Recent engines feature an air-fuel ratio sensor for the optimum control of fuel injection. They achieve high efficiency even while the NOx emissions are low.

· Fuel Cost Reduction of Engines

In order to keep on raising the already high thermal efficiency intrinsic to diesel engines, we conduct R&D on air movement inside the cylinder, FO spraying simulation, etc. for combustion improvement, and on engine intake and exhaust losses, mechanical losses, etc. to reduce horsepower loss.

· Low Vibrations and Low Noise

The reduction of vibrations and noise emitted from engines, besides the exhaust gas prevention measures, represents an important theme for environmental



Central Technical
Research
Institute



Entrance hall

improvement. At Yanmar, our own computer analysis system, VINAS, analyses engine structures and noise in the design stage. Appropriate modifications in subsequent stages achieve engines with low vibrations and noise. Yanmar has also developed an active noise offset system, (offsetting noise with noise) for use with marine engines and other applications.

● Basic Technologies

· Combustion Chamber Analysis

Studies are progressing on port shape, fuel mist flow inside the cylinder, numerical fluid analysis of the fuel-air mixing process inside the combustion chamber, etc. for high output and low emissions.

· Analysis of Vibrations (for Noise Reduction)

We use modal analysis to obtain the optimum structures and shapes for noise and vibration reduction. The example comes from the analysis of cylinder block vibration mode.

· Analysis of Vibrations

3D models are used to analyze mechanical vibration for the improvement of operating comfort.

The example is an analytical model of crawler vibration. We analyze the vibrations of tractor and combine undercarriages to improve operation and operating comfort.

· Analysis of Casting

We analyze the solidification process in casting to discover possible defects or failures and make extremely efficient casting plans.

· Structural Analysis

We use the finite element method (FEM) to know the areas of stress concentration in advance and achieve highly reliable structures.

· Analysis of Mechanisms

The 3D model of a new mechanism is analyzed to assess the performance characteristics and make it highly reliable.

· Fluid Analysis

We use numerical analysis software to analyze air flow in the invisible areas of machinery.

● Applied Technologies

Besides the R&D for the core engine and agricultural businesses, Yanmar also conducts R&D in many other business areas.

· Construction Machinery

We use the techniques of hydraulic and fluid analysis to simulate the hydraulic drive performance and air flow inside the engine compartment in order to manufacture construction machinery that functions quietly and smoothly.

· Distribution Equipment

For the distribution equipment business, we use fluid analysis to learn the airflow inside the cool containers and develop coolant applications.

· Transmissions

We use the techniques of structural and hydraulic analysis in strength and performance simulation for the transmissions of marine engines and tractors.

· Marine

We use the techniques of fluid and structural analysis to research for more efficient vessel shapes, enhancement in propulsion system searching for safer and more comfortable vessels.

· Waste Recycling and Purification Systems

We promote R&D on the recycling of organic wastes, recycling systems, water purification, etc.

● Agricultural Technologies

Yanmar's Central Research Institute develops new technologies and ideas for the future shape of farming in Japan.

· Ecology & Economy

The energy-saving and environmentally friendly Yanmar ECO tractor is equipped with the electronic governor controlled ECO diesel. The tractor features low fuel consumption, high work efficiency and curtailed CO₂ emissions. It has high, persevering output, too.

· Easy Operation

FDS (Forced Differential Transmission) is a new steering system with a passenger car type round steering wheel and outstanding traveling performance on wet paddy fields.

· Rice Planting Technology

The rice planter performs ultra-precise seedling transplanting with such sophisticated techniques as the transplanting pawls with noncircular planetary gears for optimum dynamic locus movement, and level control by a membership function.

3.2.4 Elimination of Environmental Burden Materials

Yanmar group is seriously acting to eliminate environmental burden materials. There are 4 substances banned for use and 6 substances voluntarily banned as follows:

Banned substances: Asbestos, Designated CFC, Triethanolamine, PCB

Voluntarily banned substances: Lead, Mercury, Cadmium, Chromium hexavalent, PBB, PBDE

Topics: Clean Fuel Technology

Yanmar Co., Ltd. is conducting a joint project with JFE Holding Co., Ltd (JFE) and Iwatani International Corporation targeting the commercial application of DME (dimethyl ether) fuel at a compact 8.2kW diesel cogeneration facility. Tests are being conducted for two and a half years on a JFE site in Kawasaki from FY 2005 to 2007 (See Chart 2).

The DME, similarly to LP gas, liquefies under pressure at room temperature and is widely used in sprays. As a diesel fuel, it is now drawing attention for the low level of particulate matter (PM) in the exhaust. PM, which consists mostly of burnt fuel and smoke, is harmful to the health. (See 'Chart 1'). DME is also sulfur-free, so it would not emit the materials that cause acid rain. It is particularly attractive for Japan, which depends on imports for both light and heavy oils, because it can be synthesized from various raw materials, including natural gas, coal and biomass.

The DME diesel engine is equipped with Yanmar's original DME fuel supply system and an EGR (Exhaust Gas Recurrence) system. Use of a bigger EGR volume with regular light oil fuel reduces NOx and but also generates more smoke. The lower smoke of DME burning makes a larger EGR volume feasible. The test facility satisfies the air pollution prevention law and rigid exhaust gas regulations of large cities like Kawasaki (See 'Chart 3'). The test will be continued for 5,000 hours to evaluate the performance of the DME diesel engine and fuel supply system and durability of each part. The electric power generated is being supplied to a restaurant on the JFE site.

Yanmar develops and distributes cogeneration systems that have high efficiency and durability. The DME technology will contribute to environmental conservation and energy saving in various fields.

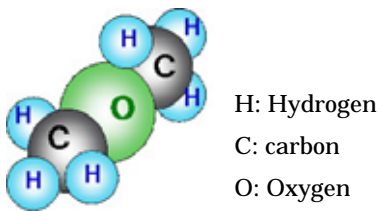


Chart 1: Chemical Structure of DME



Chart 2: DME Cogeneration Experiment Facility

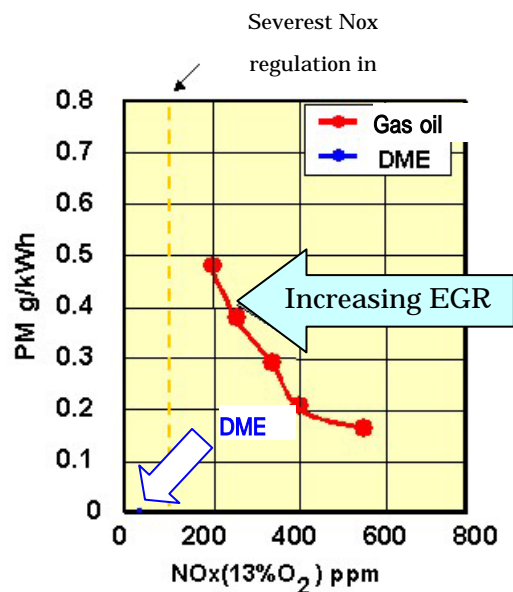
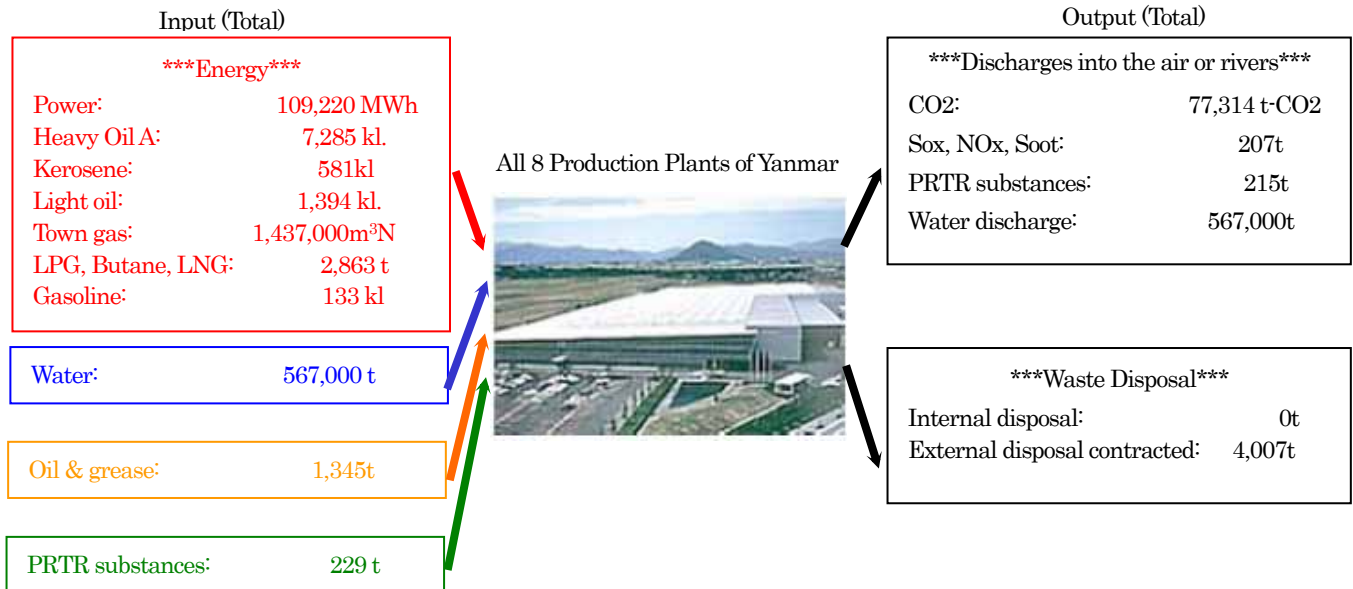


Chart 3: Exhaust Gas Features of DME Fuel Nox-PM Trade-off Curve

3. 3. Environmental Protection in Production Activities

3.3.1 ECO Balance

Production activities necessarily produce an environmental burden in the form of emissions of greenhouse gases and pollutants and the consumption of natural resources. Our company constantly gauges this environmental burden and endeavors to reduce it wherever possible and recycle waste materials. Energy, water consumption, CO2, industrial waste and water discharge increased this year on account of production increases.



3.3.2 Energy Saving (Preventing Global Warming)

The fuel, electric power etc. used in the course of production is being reduced in a planned manner in order to prevent global warming. In this fiscal year, too, we promoted the following targets:

- 1) Improved power efficiency through the use of V-connection transformers.
- 2) Reduced power consumption with the use of energy-saving mercury lamps
- 3) Improved energy efficiency using GHP air conditioning equipment
- 4) Optimum control of heating boiler according to outside temperature.
- 5) Improved power efficiency through inverter implementation of oil pressure unit.

The photos show an example of improved power efficiency through the introduction of Inverter Oil Pressure. Electric power is consumed only when load is on, saving 97,020 kWh per year. CO2 emissions are reduced by 37.4t-CO2. An inverter oil pressure unit reduces power consumption by approx. 75% (1.47 kW) compared to the former oil pressure unit.

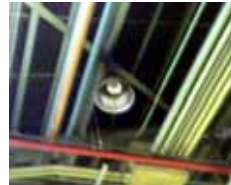


Before change



After change

Introduction of Inverter Oil Pressure Unit (Kinomoto Plant): 10 units



Before change



After change

Introduction of Power saving mercury lamp (Kinomoto Plant): 156 unit

Taking the opportunity provided by layout changes at the Kinomoto plant, the

lamps were replaced by mercury lamps that saved 218,400 kWh per year. The 156 new 400W lamps provide the same brightness as the old 700W system. CO2 emissions have been reduced by 84.3t-CO2.

The Amagasaki Plant has also implemented energy saving by mercury lamps. Sixty 1,000W mercury lamps at the 8th plant (large operations) have been replaced by 400W mercury lamps to save 96,000kWh per year. There were no direct energy-saving replacements for the 1,000kW mercury lamps already installed but it was found that the 400W mercury lamps

normally used to replace 700kW lamps could provide sufficient illumination. Their use reduces CO2 emissions by 37.0t-CO2. Also, the cooling equipment of the 7th plant in Amagasaki has been shifted to GHP (3 units), reducing CO2 by 4.5t-CO2.



Energy saving mercury lamps in the 8th Plant, 60 units



**GHP Outdoor Unit in the 7th Plant, 20PS x 3 units
(One unit not shown here)**

The company's annual energy use for the current fiscal year is shown in terms of crude oil. CO2 emission is described below. Incremental and reduction ratios are in comparison to the figures for F.Y.2000. The unit requirement denominator refers to transaction volume, which is the business transaction price adjusted to the price in 2000.

CO2 emission was described in terms of carbon conversion in previous reports. This has been changed to CO2 in this F.Y. CO2 emission can be converted to t-CO2 by multiplying t-C by 3.667.

Energy Unit Requirement and CO2 Emissions Unit Requirement in F.Y.2005

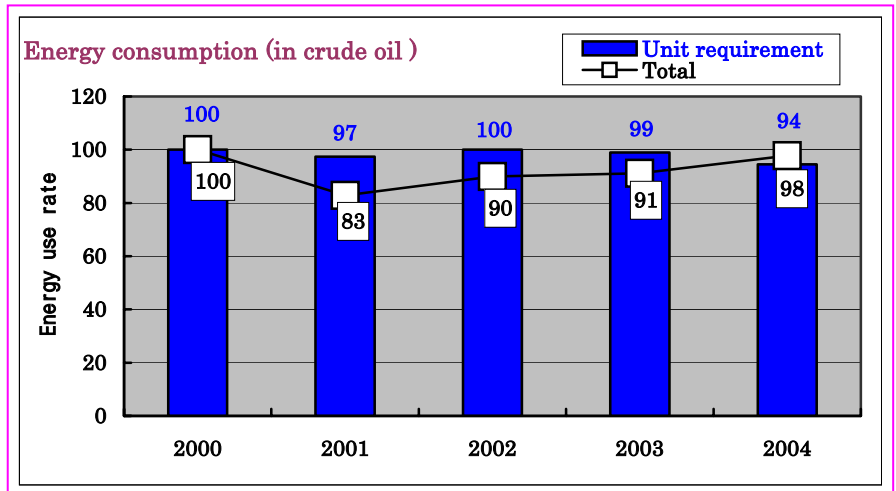
	Energy unit requirement (Crude Oil kl / ¥100mil.)						CO2 Emission unit requirement (t-CO2) / ¥100mil.)					
	Whole Company		Shiga Zone		Amagasaki Zone		Whole Company		Shiga Zone		Amagasaki Zone	
	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease
Fiscal 2000	33.4	.	37.6	.	25.1	.	61.0	.	65.7	.	51.6	.
Fiscal 2001	32.6	-2.6	37.5	-0.3	24.3	-3.1	59.1	-2.3	65.7	-0.1	48.2	-4.1
Fiscal 2002	33.5	0.1	37.8	0.5	25.4	1.4	62.2	0.9	66.2	0.7	54.6	3.0
Fiscal 2003	33.1	-1.0	37.8	0.6	24.4	-2.8	60.4	-1.0	65.7	0.0	50.6	-1.9
Fiscal 2004	31.5	-5.9	36.6	-2.5	21.8	-13.2	56.6	-7.3	62.8	-4.4	45.0	-12.8
Fiscal 2005	30.3	-9.4	33.7	-10.2	24.1	-4.1	55.5	-9.0	58.5	-10.9	50.1	-2.9

The gross energy use and CO2 emissions in F.Y.2005

	Energy consumption (Crude Oil kl)						CO2 Emission t-CO2					
	Whole Company		Shiga Zone		Amagasaki Zone		Whole Company		Shiga Zone		Amagasaki Zone	
	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease
Fiscal 2000	40,038	.	30,127	.	9,911	.	73,080	.	52,701	.	20,379	.
Fiscal 2001	33,180	-17.1	24,017	-20.3	9,163	-7.5	60,742	-16.9	42,093	-20.1	18,649	-8.5
Fiscal 2002	36,009	-10.1	26,471	-12.1	9,538	-3.8	66,312	-9.3	46,391	-12.0	19,921	-2.2
Fiscal 2003	36,471	-8.9	27,068	-10.2	9,403	-5.1	66,598	-8.9	47,098	-10.6	19,499	-4.3
Fiscal 2004	39,152	-2.2	29,716	-1.4	9,436	-4.8	70,440	-3.6	50,937	-3.3	19,503	-4.3
Fiscal 2005	42,182	5.4	30,312	0.6	11,870	19.8	77,315	5.8	52,604	-0.2	24,711	21.3

Changes of Energy Use

The changes in energy consumption and CO2 emissions with the benchmark year (FY.2000) as 100% are shown in the diagram on the right. The energy consumption, following the reduction of 83% in 2001, has been rising gradually, and is now 5% higher than in the benchmark year. While the Shiga Zone has shown only a slight increase, the increase has been substantial in the Amagasaki Zone.

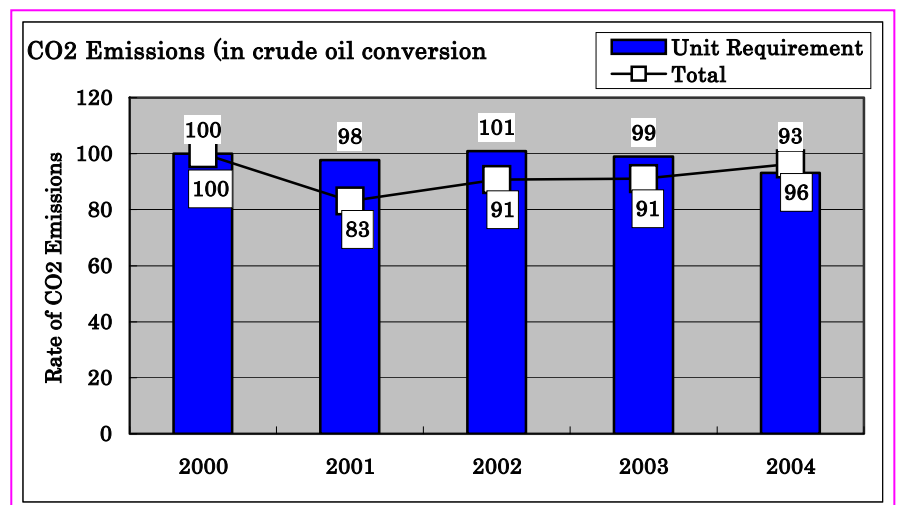


There were only marginal changes this time in terms of the unit requirements, but considerable improvement has been made since FY.2004 through the reform of production systems to bring the overall reduction to 91% in FY. 2005. This reflects drastic improvement in energy consumption in the Shiga Zone, which has large energy consumption. This improvement was realized by reorganization of production system and increased production volume. We were able to achieve the unit requirement of 3.5% stated in the second mid-tem environmental plan.

Tendency of CO2 Emissions

The changes in CO2 emissions with the benchmark year (FY.2000) as 100% are shown in the diagram on the right.

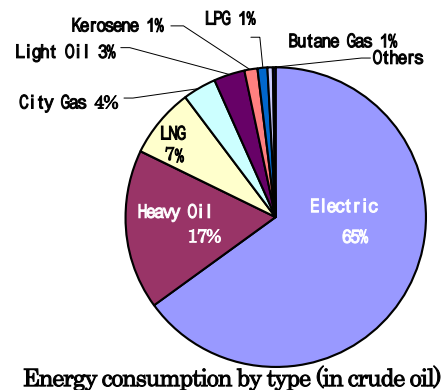
The tendency of CO2 emissions is comparable to that of energy consumption. FY.2005 emissions by unit requirement were 91% of the level of the benchmark year in both the Shiga and the Amagasaki Zones, reflecting the efficiency improvements realized through reorganization of the production system and the introduction of cogeneration systems. Regarding CO2 emissions, we achieved the unit requirement target of 3.5% stated in the second mid-tem environmental plan.



CO2 reduction will continue to be an important issue for us with the effectuation of Kyoto Protocol, and we shall carry on promoting CO2 reduction with great vigor.

Energy Consumption by Type

The energy used by our company breaks down by energy type as shown in the diagram on the right. Electric power consumption comprises the largest part, and it is apparent that we must focus on energy consumption. The overall energy consumption by type is similar to the previous year, but the proportion of city gas has increased and it now exceeds light oil.



This is because of the implementation of gas cogeneration in the Amagasaki Zone.

Heavy oil, which is mainly used for air heating in the plants, ranks second.

The consumption of LNG increased due to the introduction of the gas co-generation system at the Biwa Plant, but the ratio was slightly lower than in FY.2004.

Topics: Helping to Prevent Global Warming

Electric Power Recovery Device Introduced at a Test Facility in the Shiga Zone

The Compact Engine Operations Division tests TNV, L and horizontal engines with repeated DF and other tests on engine reliability, durability, and the deterioration of exhaust gas over time. These tests consume a lot of electricity and fuel.

In durability tests, engine load is applied using a hydraulic gauge. Heat from the engine's work warms water and that is collected in a large tank and cooled in a cooling tower. As this is wasteful of energy, we have tried twice to collect it as electrical power instead but without success so far because of all the changes of engine rotation speed that are involved.

Inverter technology is advancing rapidly with the diffusion of solar power generation, and we have established inverter technology for linking power generators to the commercial electric power supply for use with our commercialized micro-cogeneration systems. This technology has been applied to a new recovery device scheduled to enter operation in the next fiscal year. It should reduce electric power fees by approximately 40 million yen by recycling about 3,100kW and cut CO2 emissions by 1,224t-CO2/kW (equivalent to 110,000 cedar trees) in FY 2008. The table shows the 3 year plan and expected scale of electric power recovery.

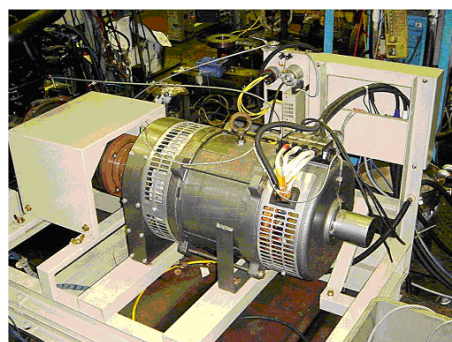
Electric power Recovery Plan and Expected Effects (2006-2008)

Fiscal Year	No. of units	Power collected	Power recycled	CO2 Emission Reduction	Value of power collected	Notes
		kW	kW	t-CO2/kWh	Unit: ¥1,000	
FY2006	8	425	990	387	12,880	October 2006-
FY2007	7	375	1,102	431	15,240	May 2007-
FY2008	(15)	800	3,132	1,224	40,710	All in operation

Note: The 8 units installed in FY 2006 include the test units installed in FY.2005.



Low voltage electric box



Power generator part

3.3.3 Resource Saving and Recycling (Waste Reduction)

We focused on waste reduction in F.Y. 2005. We have been promoting the use of returnable pallets and conversion of waste into valuable resources through the sorting of waste. Each plant draws up sorting charts and these are displayed around the premises. Sorting instructions are explained in employee education. Once wasted cardboard boxes have become a valuable resource, and once burned shredded paper is now recycled. The mixing of waste oils is prevented in the production process, and the collection of these oils has achieved larger than expected cost savings.



Waste Sorting Chart (Shiga Zone)



Change from wooden to iron pallets for shipping of engines (Tsukaguchi Plant)

The Tsukaguchi Plant has made the shift from wooden to steel pallets for shipment of the 3JH series engines to shipyards to reduce both packaging costs and the environmental burden. It introduced returnable pallets in July 2005. This has reduced both the consumption of wooden packaging materials and the volume of wood en waste at our customers' sites. We estimate that the consumption of wooden materials for packaging will drop by 3.6 tons per year

Having achieved better than expected results, we are planning to expand this approach to other customers and mid-sized engines.

Our company's water consumption and waste production figures for F.Y.2005 are shown below. Prices are adjusted to the 2000 levels. The increases/decreases are with reference to the benchmark year of F.Y.2000.

Unit Requirement for Water Consumption and Waste Production in 2005

	Unit Requirement of Water Consumption (ton / ¥100 million)						Unit Requirement of Waste (ton/¥100 million)					
	Whole Company		Shiga Zone		Amagasaki Zone		Whole Company		Shiga Zone		Amagasaki Zone	
	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease
Fiscal 2000	536	.	311	.	993	.	3.21	.	4.10	.	1.42	.
Fiscal 2001	554	3.3	281	-9.6	1006	1.3	3.34	3.8	4.54	10.9	1.33	-6.4
Fiscal 2002	532	-0.7	253	-18.6	1068	7.6	2.88	-10.3	3.76	-8.3	1.20	-15.4
Fiscal 2003	441	-17.8	261	-16.3	775	-21.9	3.22	0.1	4.17	1.7	1.46	2.3
Fiscal 2004	415	-22.6	249	-19.9	724	-27.0	2.92	-9.3	3.79	-7.5	1.28	-10.2
Fiscal 2005	408	-24.0	222	-28.8	746	-24.8	2.88	-10.4	3.71	-9.4	1.36	-4.7

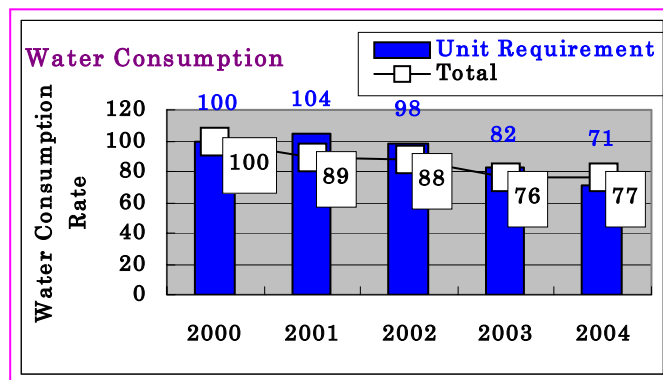
Total water consumption and waste volumes in 2005

	Water Consumption (ton)						Production of Waste (ton)					
	Whole Company		Shiga Zone		Amagasaki Zone		Whole Company		Shiga Zone		Amagasaki Zone	
	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease

Fiscal 2000	641,918	.	249,596	.	392,322	.	3,849	.	3,286	.	563	.
Fiscal 2001	569,451	-11.3	180,294	-27.8	389,157	-0.8	3,429	-10.9	2,913	-11.4	516	-8.3
Fiscal 2002	567,336	-11.6	177,508	-28.9	389,828	-0.6	3,075	-20.1	2,635	-19.8	440	-21.9
Fiscal 2003	485,459	-24.4	186,700	-25.2	298,759	-23.8	3,547	-7.8	2,985	-9.2	562	-0.2
Fiscal 2004	516,310	-19.6	202,241	-19.0	314,069	-19.9	3,630	-5.7	3,075	-6.4	555	-1.4
Fiscal 2005	567,376	-11.6	199,116	-20.2	368,260	-6.1	4,007	4.1	3,337	1.6	670	19.0

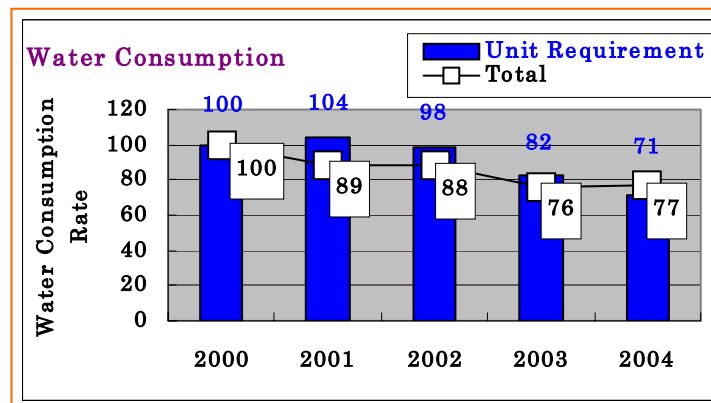
(1) Changes in Water Consumption

The changes in water consumption (F.Y.2000 = 100%) are shown in the diagram below. The water consumption of the whole company was drastically reduced the year before last, but increased slightly last year and greatly this year. Consumption was constant in the Shiga Zone but increase at Amagasaki brought a substantial increase for the company overall. There has been a steady improvement in terms of unit requirements. There was a 5% improvement with regard to the unit requirements in the Shiga Zone but some decline in the Amagasaki Zone due to higher production volume. The company's overall consumption rose by 8%, but the unit requirement value improved by 1% to 76% from 77%. This achieved the unit requirement target of 10% stated in the second mid-term environmental plan.



(2) Waste Discharge

Changes of waste discharge (F.Y.2000 = 100%) are shown in the diagram below. The waste discharge had increased gradually from 2002, and this increase continued last year in both the Shiga and Amagasaki Zones marked increase, reflecting the increased production volume. Although the total volume of waste increased, the unit requirement value improved by 1%.



Topics: FRP Abandoned Boats Recycle

FRP boats are often dumped because their hard hulls are so strong. While fishing vessels are classified as industrial waste, pleasure boats are considered only as general waste, which reduces the disposal options. The Japan Boating Industry Association has been working on an FRP boat recycling system with 7 major boat builders (Kawasaki Heavy Industries Ltd., Suzuki Motor Corporation, Tohatsu Corporation, Toyota Motor Corporation, Nissan Marine, Yamaha Motor Co., Ltd. and Yanmar Marine System Co., Ltd), based on the results of a study by the Land, Infrastructure and Transportation Ministry.

Abandoned FRP boats were added to the scope of exceptions in the disposal of general wastes in September 2005. The FRP boats recycling system started operation in November of the same year. Operations are limited at present to Nishi-Setouchi and Northern Kyusyu, which have a large number of registered boats, but will be expanded gradually across the whole nation. Yanmar is participating actively in this system. Yanmar is committed to the recycling society, prevention of illegal dumping, and fulfillment of EPR (extended producer responsibility).

● Structure of Recycling System

Boat users wishing to dispose of an FRP boat should apply for quote at a registered dealer (in the case of Yanmar, a sales office or special agent of Yanmar Marine System Co., Ltd. in the relevant area). The fee is paid to the recycling center of the Japan Boating Industry Association. The dealer keeps the boat temporarily and takes it to the designated place. A ship-breaker is in charge of rough disposal, and the boat is then recycled by a cement company.

The cost of recycling varies by boat type: ¥55,000 for Yanmar's Top Run 20, and ¥85,000 for the Top Run 24.

● Recycling in Operation

On March 20th, 2006, the YMS Kyushu Sales Office retrieved a boat in its role as a registered dealer. It was broken up in Oita.



Before breaking



After breaking

● Current Situation of Abandoned FRP boats

·Life of FRP boats

FRP materials are said to last for over 30 years, but the figures provided by the Land, Infrastructure and Transportation Ministry give an actual average for boats of 23 years.

·Dumping Estimates

The number of registered FRP pleasure boats (boats, yacht and water bikes) subject to this recycle system is approximately 410,000 as of the end of F.Y.2000. It is projected that 6,000 boats are likely to be dumped nationwide each year.

·Illegal marine dumping

Based on the data of the Japan Coast Guard, 1,133 vessels were dumped in 2000, 66% of them pleasure boats.

3.3.4 Environmental Risk Management (Control of Dangerous Materials)

Yanmar pursues complete pollution prevention and is tackling the reduction of the use of chemicals, in compliance with the laws and regulations of Japan and local governments, in order to prevent the environmental risks associated with our production activities.

● Compliance with Laws and Regulations and Pollution Prevention

Yanmar abides by the periodic reporting of measurements and keeping of records in compliance with the laws and regulations of Japan and local governments. We measure and check the water quality of wastewater discharged into rivers and drains on a weekly basis according to a voluntary standard more rigorous than the regulations demand.

• Removal of Boilers in Nagahama Plant

With the closure of the Nagahama Plant, we removed 3 heating boilers and reported this to the proper authorities.

● Control of Chemical Substances

• Elimination of Asbestos

Our products do not use asbestos.

• Elimination of Toxic Heavy Metal in Paint

The Yanmar Group Global Environment Committee has decided to eliminate toxic heavy metal from paints. Yanmar is working on the development of alternative paints in cooperation with the paint maker. The development of alternative paints was mostly completed this year but we are still working on some colors.

• Control and Elimination of Chemical Substances

The Yanmar Group has identified various chemical substances that will be or already have been banned for use in Yanmar products in order to develop environmentally friendly products and reduce environmental risk. The elimination activities are advancing strongly. The policy is to prevent the use of materials and sub-materials containing chemicals that may become attached to products. The lead in solder is also subject to elimination separately from this initiative.

Banned Chemical Substances: Asbestos, CFC, Triethanolamine, PCB

Chemical Substances Banned Voluntarily: Lead, Mercury, Cadmium, Hexavalent chrome, PBB, PBDE

The lead in solder is also subject to elimination separately from this initiative.

• The management of PCBs

Each site controls and stores condensers etc. that contain PCBs with great strictness and reports their status each year to its respective prefectural governor. The PCB-related laws shall continue to be observed and the control and processing of PCBs enhanced. Equipment containing PCBs is stored at each site as shown below

The status of PCB equipment in Yanmar group companies is shown in the table below.

The group as a whole owns and stores 1,115 items of PCB equipment. PCB processing has started and application for entrusted work has been made.

No. of PCB equipment items at Yanmar Co., Ltd. plants

Div.	Shiga Zone	Amagasaki Plant, Amagasaki Zone	Tsukaguchi Plant, Amagasaki Zone	Central Technical Research	Head Office	Total
PCB equipment items	776	187	2	0	0	965

No. of PCB equipment items at Yanmar group companies

Div.	Seirei	Kanzaki	Matsue Diesel	Koga Foundry	Yanmar Energy System	New Delta	Yanmar Farm Machinery	Yanmar Construction Machinery
PCB equipment items	27	5	2	23	89	1	2	1

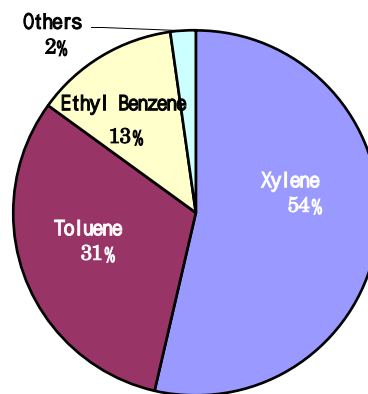
- PRTR Substances

- 【Handling in Yanmar plants】

The volumes of chemical substances consumed, discharged to the outside environment, disposed of and transferred to products at plants are all monitored as required under the PRTR law.

The F.Y.2005 consumption of chemicals regulated under the PRTR Regulation is listed in the table on the next page. Details of the use of chemicals in excess of the regulatory level are reported to the agencies of the national or local governments in accordance with their regulations.

The PRTR chemical substances of Yanmar break down as shown in the diagram at the right. The organic solvents (toluene, xylene and ethyl benzene) are mostly used for paint. They are subjected to reduction under the revised Air Pollution Control Law and we shall continue to curtail the use of these VOC chemicals.



**Use of PRTR substances
In Yanmar**

Yanmar's Consumption of Chemicals Covered under the PRTR Law (Results for fiscal 2005)

: Use reported to the agency highlighted

Unit: kg

No	Names of Chemicals / Site	Reg. No.	Biwa	Yamanoto	Nagahama	Kinomoto	Omori	Nagahara	Amagasaki	Tsuikaguchi	Total
1	Water soluble zinc compounds	1	0	0	0	206	0	25	0	0	231
2	2-aminoethanol	16	402	163	0	0	95	108	0	0	768
3	Straight chain alkyl Benzenesulfonic acid & its salt	24	0	0	0	0	2	0	0	0	2
4	Bisphenol A Epoxy resins	30	0	6	0	0	0	0	0	0	6
5	Ethyl benzene	40	18,525	412	437	3,371	154	26	6,456	264	29,645
6	Ethylene glycol	43	0	0	415	0	18	0	0	0	433
7	Xylene	63	102,237	1,813	2,033	4,769	151	584	8,854	2,334	122,775
8	Chrome and trivalent chrome	68	0	0	0	0	0	0	0	56	56
9	Hexavalent chrome	69	0	0	0	0	0	0	22	17	39
10	Acetic acid-2 ehoxy-ethyl	101	0	0	0	0	19	0	0	481	500
11	Vinyl acetate	102	0	0	1	0	0	0	0	0	1
12	Organic tin compound	176	0	0	0	56	0	0	0	0	56
13	Trichloroethylene	211	1	0	0	0	0	0	0	0	1
14	1,3, 5-trimethylbenzene	224	20	14	0	288	0	0	862	243	1,427
15	Toluene	227	46,566	3,068	3,192	7,252	1,762	818	3,539	5,394	71,591
16	Lead and lead compounds	230	0	0	0	0	0	0	100	1	101
17	Nickel compounds	232	0	0	0	14	0	0	0	0	14
18	Hydrazine	253	0	0	0	0	0	56	0	0	56
19	Phthalic acid di-N-butyl	270	7	6	19	47	13	39	6	0	137
20	Phthalic acid di-2-ethylhexyl	272	1	0	0	0	1	0	59	0	61
21	Benzene	299	61	190	220	0	5	0	0	0	476
22	Polyoxyethylene=alkylphenylether	307	35	0	0	0	0	4	0	0	35
23	Polyoxyethylene=nonylphenylether	309	7	1	0	279	63	180	0	0	530
24	Molybdenum & its compounds	346	0	1	0	0	6	0	0	0	7
Total			167,862	5,674	6,317	16,282	2,289	1,836	19,898	8,790	228,948

【The Situation in Yanmar group companies】

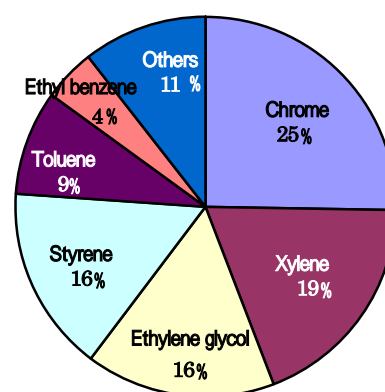
The volumes of chemical substances consumed, discharged to the outside environment, disposed of and transferred to products at plants are all monitored as required under the PRTR law.

The F.Y.2005 consumption of chemicals regulated under the PRTR Regulation is listed in the table on the next page. Details of the uses of chemicals exceeding the regulated level are reported to the agencies of the national or local governments.

The figures are five times greater for the Yanmar group companies than for Yanmar Co., Ltd. They need to be reduced and this will be addressed in our second mid-term environmental plan.

The PRTR chemical substances of Yanmar break down as shown at right. They do differ from the substances used by Yanmar Co., Ltd. The organic solvents (Toluene, Xylene and eEthyl benzene)

Are used for paint, Chrome is an additive for casting, Ethylene glycol is used for GHP engine cooling water. Styrene is a raw material for FRP shipbuilding



**Use of PRTR substances
in Yanmar group companies**

Group Company Consumption of Chemicals Covered by the PRTR Law (Results for fiscal 2005)

: Use reported to the agency highlighted

Unit: kg

No.	Names of Chemicals	Reg. No.	Seirei	Kanzaki	New Delta	Matsue Diesel	Koga Foundry	Yanmar Farm Machinery	Yanmar Energy System	Shipbuilding YMR	Construction YMR	Total
1	Zinc water soluble compounds	1	828	0	0	0	0	314	0	0	1,378	2,520
2	2-aminoethanol	16	0	0	0	0	0	27	0	0	0	27
3	Antimony	25	0	0	0	0	3,502	0	0	0	0	3,502
4	Bisphenol A Epoxy resins	30	372	0	0	0	0	0	0	0	0	372
5	Ethyl benzene	40	30,142	528	3,673	422	0	5,023	0	0	12,052	51,902
6	Ethylene glycol	43	8,170	55	0	0	0	84,417	94,454	0	0	187,097
7	Epsiloncaprolactam	61	0	0	0	0	0	0	0	0	79	79
8	Xylene	63	137,233	2,373	6,032	1,460	0	19,845	0	145	49,380	216,468
9	Chrome and trivalent chrome compounds	68	0	0	0	245,273	48,146	0	0	0	0	293,419
10	Hexachrome compounds	69	2	0	0	0	0	0	0	0	64	66
11	Dichloromethane (ethylene dichloride)	145	0	0	0	0	0	63	0	0	0	63
12	Organic tin compounds	176	0	13	0	0	0	46	0	0	397	456
13	Styrene	177	0	0	0	0	0	0	0	183,388	0	183,388
14	1,3,5-trimethylbenzene	224	1,430	0	0	88	0	1,749	0	0	1,888	5,155
15	Toluene	227	37,221	7,524	4,456	3,186	0	28,209	0	21	20,097	100,715
16	Lead and lead compounds	230	2	0	0	272	0	0	0	0	318	590
17	Nickel compounds	231	0	0	0	0	251	0	0	0	0	251
18	Nickel compounds (Nickel nitrate II hexahydrate)	232	66	0	0	0	0	33	0	0	153	253
19	Barium	243	0	0	0	0	3,497	0	0	0	0	3,497
20	Phenol	266	0	0	0	11,335	516	0	0	0	0	11,335
21	Phthalic acid -N-butyl	270	0	0	0	0	0	0	0	0	14	14
22	Benzene	299	0	0	0	0	0	818	0	0	0	818
23	Polyoxyethylene=alkylphenylether	307	169	0	0	0	0	0	0	0	0	169
24	Polyoxyethylene=nonylphenylether	309	5	104	0	0	0	75	0	0	6	190
25	Formaldehyde	310	100	0	0	3	0	0	0	0	0	103
26	Manganese and manganese compounds	311	0	0	0	41,063	55,475	0	0	0	5,079	101,617
27	Molybdenum & its compounds	346	9	0	0	0	1,869	5	0	0	0	1,883
Total			215,759	10,597	14,161	30,310	112,740	140,625	94,454	183,616	90,905	1,165,946

3.4 Green Procurement and Purchasing

Yanmar, as a member company of the Green Purchasing Network inaugurated by the Japan Environment Foundation, works to minimize the environmental load imposed by product parts, materials and products during production, use and disposal.

● Green Procurement

We establish guidelines on items for which special attention is required during the design and development stages and for use in procuring parts and materials. We check the chemicals contained in the materials and parts supplied by the suppliers on the basis of these guidelines.

We have started the Green Procurement Survey of items purchased centrally by the head office and each plant. We also hold Green Procurement Explanation Meetings and request the cooperation of the managers of suppliers and associated companies.

As a voluntary initiative, we identify substances banned for use, and examine supplied parts to check whether or not they contain those substances. We will continue to tackle the elimination of harmful chemical substances on the basis of the results of these activities.



Yanmar Green Procurement Guideline

● Purchasing of Environmental Commodities by Convenience Network

We endeavor to purchase office and stationery supplies that are friendly to the environment. The purchase of such ecological commodities in F.Y.2005 through the Yanmar *'BENRI-NET'* amounted to 78,085 items and 28.81 million yen. The figures for items covered by the Green Purchase Law were 40,149 items and 7.43 million yen, or 51% and 26%, respectively.

The purchase rate of ecological commodities decreased in F.Y.2005, but we will seek to increase this rate in the future. The purchase of ecological commodities through *'BENRI-NET'* is being promoted by each group company. We plan to increase the number of companies which use *'BENRI-NET'*, and will try to increase the purchase rate of ecological commodities.

Note) *'BENRI-NET'* is an electronic purchase system operated by Net KOKUYO Co., Ltd. This system makes purchasing efficient and optimizes items to be purchased. This system was introduced at Yanmar Co., Ltd. and is to be extended to Yanmar group companies.

Purchase of Ecological Commodities of Yanmar

Year	Total No. of ECO commodities purchased	Total Amount purchased	No. of items qualified under Green Purchasing Law	Monetary Amount (under Green Purchasing Law)	Proportion of Items under Green Purchasing Law	Proportion of Amount under Green Purchasing Law
F.Y.2003	66,301 pcs.	¥23.93 mil.	32,520 pcs.	¥6.74 mil.	49%	28%
F.Y.2004	52,003 pcs.	¥15.80 mil.	33,242 pcs.	¥6.61 mil.	64%	42%
F.Y.2005	78,085 pcs.	¥28.81 mil.	40,149 pcs.	¥7.43 mil.	51%	26%

Convenience Network Group Companies

No.	Company Name	No.	Company Name
1	Yanmar Co., Ltd.	11	Yanmar Noki Shikoku Co., Ltd.
2	Yanmar Agricultural Equipment Co., Ltd.	12	Yanmar Noki Kyushu Co., Ltd.
3	Yanmar Marine System Co., Ltd.	13	Yanmar Farm Machinery Mfg. Co., Ltd.
4	Yanmar Energy System Co., Ltd.	14	Yanmar Distribution Service Co., Ltd.
5	Yanmar Construction Machinery Sales Co., Ltd.	15	Yanmar Engineering Co., Ltd.
6	Hokuto Yanmar Co., Ltd.	16	Yanmar Credit Service Co., Ltd.
7	Yanmar Noki Kanto, Co., Ltd.	17	Yanmar Business Service Co., Ltd.
8	Yanmar Noki Niigata Co., Ltd.	18	Yanmar Technical Service Co., Ltd.
9	Yanmar Noki Hokuriku Co., Ltd.	19	Yanmar Information System Service Co., Ltd.
10	Yanmar Noki Tokai Co., Ltd.	20	Yanmar Dream Agency Co., Ltd.
		21	Yanmar Helicopter Service Co., Ltd.

3.5 Environmental Preservation in Distribution Activities

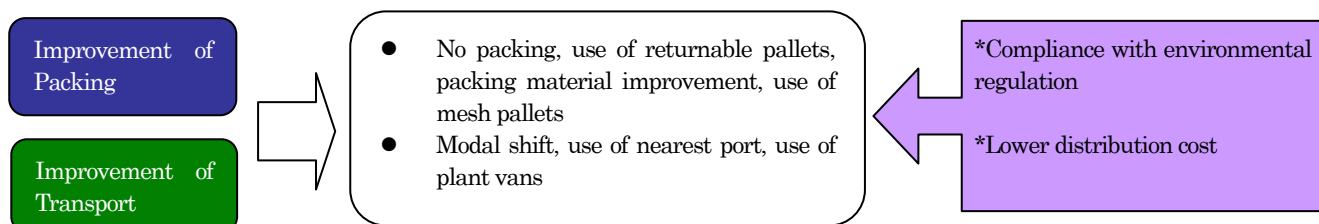
The Yanmar Group is outsourcing the transportation of products to Yanmar Distribution Service Co., Ltd.

● Improvements of Yanmar Distribution Service

Yanmar Distribution Service Co., Ltd. is not one of the transporters included under the revised energy saving law, but the company promotes the rationalization of transportation in coordination with Yanmar group companies. Environmental conservation activities are conducted in the following transportation and warehouse storage operations.

● Transportation

To rationalize product packing, covering and transportation, we promote modal shifts and the non-use of packing.



[Packing Style for Products]

We tackled the improvement of packing from 1978, and introduced the non-use of packing and use of returnable pallets from 1995. The improvement of packing systems was completed in 2001 in general. The improved system has been in use stably since 2002. The wooden crating and corrugated cardboard were saved as follows with the use of returnable pallets and non-use of packing. The use of returnable pallets for overseas procurement achieved a substantial reduction of wooden and corrugated cardboard waste in F.Y.2005.

[Reduction of Packing Material]

No.	Packing Material		Unit	2001	2002	2003	2004	2005
1	Packing Material Reduction		Ton	1,727	2,624	2,383	3,216	4,466
2	Material	Wooden	Ton	1,000	1,605	1,559	2,278	2,752
3		Cardboard	Ton	727	1,019	824	938	1,714

[Packing for Products]

We continue the effort to minimize environmental load. We have stopped the use of throwaway wooden and corrugated cardboard packing. We have switched to the use of steel pallets that can be used repeatedly to save wood. We use small items, too, such as adhesive tape, buffer materials and other small packing items that impose a smaller environmental load in terms of their toxic characteristics and ease of recycling.

[Transportation of Products]

We have promoted the modal shift from truck transportation to transportation by railway and sea to reduce environmental load in distribution. In transporting engines from the Biwa Plant to Seirei Fukuoka Plant, for example, we have switched from truck transportation to Japan Railways container transportation. These efforts save wood, curtail CO2 emissions, and reduce transportation costs.



Engine transportation by railway container



Carrying container to railway station

[Improvement of Overseas Procurement Product Packaging]

The amount of corrugated cardboard waste has been increasing due to the growth of parts procurement from overseas, so we are promoting the use of returnable pallets. We introduced returnable pallets for overseas transportation in 1999. The higher loading efficiency and work convenience contribute to resource recycling.

Returnable pallets were introduced for engine transportation from Indonesia in FY.2005. At present, engines are shipped in a sealed wooden box, but there are problems as follows:

- (1) Waste of wooden resources
- (2) Cost of scrap wood disposal
- (3) Labor and time for scrap wood disposal
- (4) Labor time to open package
- (5) Safety risk
- (6) Invisibility of contents

In order to solve those problems, we have introduced a net pallet with the following improvements:

- (1) 2 engines can be packed vertically
- (2) Use of the net pallet also to ship parts back to Indonesia. Clamps for engines returned as bulk.

In past



• Packaging in a sealed wooden box

After improvement



• Returnable net pallet



• 2 units per package



• How the engine is fixed.

Packing Improvement for Overseas Procurement Items

Returnable palettes were fully introduced in October. Scrap wood has been reduced by 47%, and the cost of scrap wood disposal and man-hours spent on scrapping have fallen proportionately.

Improvement at the Shiga Office of Yanmer Distribution Service Co., Ltd.

No.	Item		Unit	Before Improvement	After Improvement	Reduced Volume	Reduced Ratio
	Scrap Wood Volume	No. of Packages	boxes	453	239	▲214	47%
		Weight	kg	13,590	7,170	▲6,420	47%
	Cost for Scrap Wood Disposal		¥1,000	238	125	▲113	47%
	Man-hour for scrapping		minutes	4,530	2,390	▲2,140	47%

● Curtailment of Power Consumption of Warehouses

We use infrared light timer sensors to save power by turning lights on and off automatically at our warehouses. This has saved a lot of power at our distribution centers, starting with those for the Chugoku, Tohoku, Kanto and Kyushu regions.

As the revised Energy Saving Law requires shippers to make energy saving efforts, we plan to survey and grasp the overall distribution load related to our company's activities qualitatively by allocating a manager to energy-saving at each business unit and transportation company.

● Introduction of Low Emission Cars

We replace company cars with hybrid, low emission cars systematically upon renewal. The ratio of low emission cars to all company cars this fiscal year was 41%. We will continue this systematic introduction of low emission cars.

Introduction of Low Emission Cars

	F.Y.2002	F.Y.2003	F.Y.2004	F.Y.2005	F.Y.2010 goal
Ratio of Low Emission Cars	12%	22%	31%	41%	70%

3.6 Other Environmental Activities

3.6.1 Environmental Activities of Administrative Divisions

Such divisions such as the head office, Central Research Institute, Tokyo Branch, Umeda Center Building (UCB), and Osaka Parts Center also promote environmental preservation activities. Their activities are as follows:

- (1) Use of recycled paper, copying on both sides of paper, classification of waste for recovery and recycling.
- (2) Use of rear side of miscopied photocopies.
- (3) Optimum temperature setting for air conditioners, removal of neckties, turning off of lights, etc. during lunchtime.
- (4) Use of power-saving mode of PCs; power saving through screen saving during lunchtime.
- (5) Recycling of utensils, provision, etc. for reducing waste in general.

The Central Research Institute and Osaka Parts Center also promote the reduction of industrial waste.

The *no-necktie campaign* adopted in 2003 has been carried out. The power consumption figures of the head office building during the 3 summer months compared with the base year of F.Y.2002 are:

2003: ▲10.4% / 2004: ▲5.8% / 2005: ▲8.9%

Power saving was lower in 2004, but ▲8.9% energy saving was achieved in 2005.

3.6.2 Environmental Exhibitions

The environmental products of Yanmar Co., Ltd. and group companies were displayed and presentations made at the 8th Lake Biwa International Environmental Business Messe (Fair) in Shiga Prefecture in October, 2005.

Exhibits at the Lake Biwa Environmental Business Messe

Product Display

- Bio-gas Cogeneration 25kW
- Bottom Cleaner for fry aquarium '*KASUBEI*'
- Polluted Sludge Adjusting Device (sales discontinued)

Panel Display

- Biomass Power Generation Plant, 300kW Cogeneration System
- Biomass Power Generation Dual Fuel 150kW
- Bio Gas Cogeneration System 25kW
- Initiatives of continuous use of aquatic resources, Incubation/cultivation facilities
- Bottom Cleaner for fry aquarium '*KASUBEI*'
- Polluted Sludge Adjustment Device (sales discontinued)



Lake Biwa Environmental Business Messe Panel



Lake Biwa Environmental Business Messe



Lake Biwa Environmental Business Messe



Lake Biwa Environmental Business Messe / Bio Gas Cogeneration



Lake Biwa Environmental Business Messe / Bottom Cleaner '*KASUBEI*'

3.6.3 Environmental Education

(1) Environmental Education for New Recruits

New company recruits in 2005 received explanations of the company's environmental efforts from the Environmental Division and were instructed to pay full attention to environmental issues in their places of work.

(2) On-site Environmental Education

Education on general environmental issues, the methods and techniques of conservation and ISO14001 is given to all staff at each site once a year. Special education and training is also provided for members of staff who work with facilities and techniques that have a large environmental impact.

In addition, education etc. is provided for members of staff to earn environment -related qualifications from external educational institutions.

(3) Spreading Environmental Awareness through Internal Publications

The in-company magazine, *Echo*, carries environment-related articles in each issue, both informing members of staff about the latest environmental information and raising their awareness. This year's articles were:

- Spring: Trends in exhaust gas regulation for diesel engine for vessels
- Summer: The Yanmar Group's environmental vision
- Autumn: A 10-year history of Yanmar's environmental conservation activities
- New Year: The Yanmar Group's Environmental Management Index

(4) Study Meeting

Study meetings were held at the Environment Offices of Yanmar Group companies on how to calculate the environmental data which needs to be obtained for the next mid-term environmental plan.

(5) Orientation on Environmental Vision and Yanmar Group's next Mid-term Environmental Plan

In order to explain the Environmental Vision and Yanmar Group's next Mid-term Environmental Plan, we held Group Environment Committee and Product Sub-committee meetings and explained the Environment Committee system to staff members of Yanmar Agricultural Equipment.

(6) Supporting ISO14001 acquisition for Group Companies

Yanmar Shipbuilding & Engineering Co., Ltd. decided in 2006 to acquire ISO14001 certification and has started the application process. In order to support the process, we held a study meeting on system establishment and provided instruction on various environmental aspects. Certification was granted in July 2006.



Education for New Recruits

Education at Yanmar and Group Companies

No.	Staff Category	General Education	Special Education
1	Staff in special fields	-	Work practices for boilers, liquid waste processing facilities, etc.
2	Internal environmental auditors	-	ISO audit methods 1. ISO environmental regulations and Yanmar standards 2. Legal stipulations 3. Processes for reaching environmental targets / Auditing techniques
3	General staff	Environmental targets and implementation by business division	-
4	New recruits	Introduction to environmental issues	-

Numbers of Staff with Major Environmental Qualifications (Yanmar Co., Ltd.)

No.	Site Qualification	Shiga Zone	Amagasaki	Tsukaguchi	Research Institute	Head Office	Total
1	Pollution Control Manager (Water Quality)	11	2	1	2	9	25
2	Pollution Control Manager (Air Quality)	11	6	3	1	4	25
3	Pollution Control Manager (Noise)	9	2	1	2	2	16
4	Pollution Control Manager (Vibrations)	4	1	2	2	1	10
5	Industrial Waste Control Manager	17	4	1	0	0	22
6	Energy Control Manager (Electricity)	5	1	0	0	0	6
7	Energy Control Manager (Heat)	3	1	2	0	1	7
8	High Pressure Gas Control Manager	6	1	1	1	1	10
9	Chief Electrician	11	2	2	6	3	24
10	Boiler Maintenance Man	27	4	2	2	3	38
11	ISO 14001 Auditor Assistant	2	2	0	0	2	6
12	Internal Environmental Auditor	38	17	8	0	2	65
13	Total	144	43	23	16	28	254

3.6.4 Environmental Accounting

The purpose of environmental accounting is to grasp and analyze the costs of environmental conservation in business activities and the resulting effects quantitatively as far as possible and provide feedback for business activities. The processes are disclosed to persons concerned both externally and internally in order to secure their understanding of the company's activities. The methods of compilation comply with the Environmental Accounting Guidelines of the Ministry of the Environment.

- **Environmental Conservation Costs**

The total cost in the 2005 fiscal year amounted ¥3.8 million, 92% of which was for R&D. Since the principal businesses of Yanmar are the manufacture and sale of engines and R&D to develop new engines with improved environmental performance, such as raised fuel economy and cleaner exhaust, almost all R&D costs of our company fall within the category of environmental conservation.

- **Effects of Environmental Conservation Activities**

We have been successful in reducing energy consumption per production unit volume.

- **Future Developments**

We started the disclosure of environmental accounting information in the year before last. We will continue to disclose the information for use in environmental management tools and indices.

Environmental Conservation Costs

unit: ¥1 million

	Classification of environmental conservation costs	Main items	Investment	Cost amount
1	Cost of Controlling Environmental Load within Business Areas:		45.8	242.1
	(1) Public nuisance prevention cost	Air quality, water quality, wastes, vibrations and noise	24.8	194.2
	(2) Global environment conservation cost	Prevention of greenhouse effect, energy-saving, raising distribution efficiency	21.0	21.9
	(3) Resources recycling cost	Reduction of oil & grease, water and wastes	0	26.1
2	Cost of controlling environmental load up & down stream	Green procurement, removal of products from market, recycling, etc.	0	0
3	Environmental conservation cost in administrative activities	Environmental education, EMS, greenery promotion, information disclosure, environmental advertising, management personnel cost, etc.	0.4	78.0
4	Environmental conservation cost in R&D activities	Engine exh. gas improvement; R&D to improve environmental performance	212.2	3509.3
5	Environmental conservation cost in social activities	Environmental volunteer, etc.	0	2.0
6	Costs of repairing environmental damage		0	0
	Total		258.3	3,831.4

Quantitative Effects

	Outline of Effect	Environmental effect index	Reduction volume	F.Y.2005
1	Energy Consumption per production unit volume	kl(in term of crude oil) / ¥100 million	3.7%	30.31
2	Oil/grease consumption per production volume	kl / ¥100 million	17.1%	0.97
3	Water consumption per production unit volume	ton / ¥100 million	1.8%	407.63
4	Discharge of waste per production unit volume	ton / ¥100 million	1.5%	2.88

Economic Effects

unit: ¥1 million

	Outline of Effect	Economic items	F.Y.2005
1	Income from recycling	Sales of wastes, etc.	60.0
2	Cost reduction through energy saving	Raising equipment efficiency, use of cogeneration system, production process restructuring	332.2
3	Cost reduction through resource-saving	Oil and grease, water resource recycling	115.5
4	Reduction of waste treatment cost	Improved yield, recycling, simple packing	4.4

Compilation Method

- (1) Period of compilation: Mar. 21st, 2005~Mar.20th, 2006
- (2) Range: Yanmar only, not consolidated
- (3) Method complies with Environmental Accounting Guideline of Environment Ministry
- (4) Cost amount includes personnel cost and depreciation cost
- (5) For complex items, the portion relating to environmental improvement is extracted or calculated proportionally
- (6) The R&D for new engine development relates mostly to combustion and exhaust gas improvements. Accordingly, almost all such costs have been appropriated
- (7) For economic effect, only the measurable items are appropriated; no assumed effect is appropriated

3.6.5 Social Activities

(1) Participation in Local Clean Up Activities

[Shiga Zone]

6 plants in Shiga Zone annually carry out cleanup activities and volunteer activities as social contribution activities.

On July 17th, 15 employees from 6 sites participated in 'Nagahama Shinkawa Clean-up Volunteer' organized by Kohoku Area Promotion Bureau of Shiga Pref., picking up trash and cleaning up the bed of the Nagahama Shinkawa River running the center of Nagahama City for about 2 hours. The collected trash, including empty cans, plastic bottles, and household goods, filled about fifty 40-liter vinyl bags.

We were surprised that a river running into Lake Biwa was contaminated with so much trash and recognized the importance of promoting better social behavior as well as environmental conservation.



Shinkawa Cleanup Volunteer Activity

[Amagasaki Plant]

The Amagasaki Plant participates in neighborhood clean-up campaigns every year in cooperation with various civic movements with the aim of cleaning up the Oda area. These are coordinated by the Oda Area Promotion Council. May 13th, the day of the event, was a perfect day for cleaning with strong sunshine. Six employees of the Admin Department and 3 from Production Technology participated. They separated to 2 groups for the plant surroundings and football ground, gym and a nearby railroad, picking up trash and fallen leaves and clearing the roads. Another company was involved in a similar activity on the previous day. We are keenly aware of the importance of joint activities of this kind performed together with local citizens and local authorities.



Local Cleanup Campaign at Amagasaki Plant

[Tsukaguchi Plant]

The Tsukaguchi Plant annually cleans the street gullies on the south side and sidewalk on the west side of the plant.

The street gullies on the south side are located outside the plant walls and separate the plant from a residential area. They become contaminated with sludge and trash. The sidewalk on the west becomes messy with weeds and fallen leaves. This cleaning activity raised the plant employees' recognition about the environment.



Local Cleanup Campaign at Tsukaguchi Plant

[Head Office Area]

In the head office area, we conduct cleaning of roads around the head office twice a month. This campaign has continued for more than 10 years.



Cleaning roads in head office area

(2) Local Cleaning Activities by Group Companies

The Yanmar Group Global Environmental Committee regards these cleaning campaigns as environmental conservation measures and encourages group companies to implement such cleaning. Each company of the Yanmar Group participates actively in local cleanup campaigns.

[Seirei Industry Co., Ltd.]

The Okayama site of Seirei Industry has been carrying out a clean-up campaign around the plant since 1998. This 'Clean Operation' consists of park and road cleaning 5 times a year. The company has also registered an NPO to foster the beauty of the Asahikawa river and participate in cleaning of the riverbanks and riverbed.



Local Cleanup Campaign at Seirei Industry

[Kanzaki Kokyukoki Mfg., Ltd.]

The staff of the general affairs division conduct cleaning of the commuting road from the railway station to the plant once a month. This campaign was initiated in September 2004 and has been continued in 2005. The huge number of cigarette butts around the station is indicative of very poor social behavior.



Local Cleanup Campaign at Kanzaki

[New Delta Industrial Co., Ltd.]

All employees of the plant have been participating in the cleaning of side ditches inside the plant and water channels outside the plant once a year since 2003.

[Koga Precision Foundry Co.]

All employees of the plant participate in the cleaning inside the plant once a month. In addition to this, the security personnel and volunteers together clean the neighbouring roads in each season.

[Yanmar Energy System Mfg. Co., Ltd.]

Yanmar Energy System Mfg. Is a certified participant in 'Okayama Adopt' (roads, rivers and coasts are regarded as an adopted children of citizens and/or companies), organized by Okayama Pref. as a local clean-up campaign. They cleaned up the Senmachi River in Saidaiji, Okayama city, twice.



Local Clean-up Campaign of Yanmar Energy System

[Yanmar Shipbuilding & Engineering Co., Ltd.]

Yanmar Shipbuilding & Engineering Co., Ltd, as a part of the Zero Trash Campaign of Oita Pref., clears 1.3 km of roads between Oita Airport Observation Park and Marine Pier Musashi Parking Lot as well as the parking lot itself in August each year (on the day before summer holidays commence). The participants consist of about 12 employees from various departments of the company, and work on the cleaning for an hour and a half.

Also, the company tries to reduce exhaust gas from cars with a 4-5 day car pool, in support of the 'CO2 Diet Campaign' of Oita Pref. We collect trash around the fishing harbour after a typhoon or heavy rain together with local fishermen, and participate in a flower increasing campaign of the local townspeople (3 times a year).



Local Cleaning at Airport Observation Park



Cleaning of Marine Pier Musashi Parking Lot



Cleaning of bushes of road-side



Cleaning around roads

[Yanmar Agricultural Equipment Co., Ltd.]

Yanmar Agricultural Equipment Co., Ltd, has been participating in the 'Zero Trash Operation' (Local simultaneous clean-up) of Santo-cho (the present Maibara city) since 1998, to pick trash around the plant and in nearby bushes and creeks. Some of the trash collected seems to come from our company, making us aware of the need to improve systems within the plant so that we won't cause further nuisance.



Local clean-up at Yanmar Agricultural Equipment

(3) Beautifying Plant Sites

Flowerbeds are arranged around the plant at Nagahara, located at the north of Lake Biwa. People can enjoy flowers in every season through this voluntary activity. This campaign was initiated over a decade ago by the shop unit of the plant as a part of the plant cleaning campaign. This campaign to plant flowers of each season was implemented this year, too, on a voluntary basis, as shown in the photo below.

Each shop unit brings its own ideas to this enjoyable activity.



Beautifying Plant, Nagahara



Volunteers

(4) Essay Contest for Students

Yanmar Agricultural Equipment Co., Ltd. launched a prize contest on the theme, *Proposal to Agriculture by Students*, in 1990. We held the 16th essay contest in 2005.

The contest started at a time of deep pessimism in Japanese farming households as well as in the entire Japan. Too many people were stressing only the depressing aspects of the Japanese agriculture, believing that its days were numbered. We noted, however, the existence of a new generation and vigorous farming households with new approaches to the challenges of agriculture in Japan. We knew, too, about the global population problem, worsening global environment and concern about food shortages.

We thought it necessary to make proposals that were full of optimism and bright dreams for the future, and we wanted those proposals to come from the young people who would be the leaders of the future. There were many entries on the theme of how agriculture relates to local society and the environment (Over 40 of the 93 entries). Through the 16th contest, we have received:

- 1,765 theses from 2,190 persons
- 2,507 essays from 2,507 persons

Prize-winning theses and essays have been compiled as a booklet and 10,000 copies distributed to the relevant organs. Some of these are also posted on the Yanmar website. This program is backed up by the following organizations:

- Ministry of Agriculture, Forestry and Fisheries
- City and Rural Village Exchange Promotion Foundation
- Japan Farming Village Youth Education Association



Prize winners of theses and essays

(5) Scholarship

● "Beautiful World With Sincere Thankfulness"

Magokichi Yamaoka, the first president of Yanmar Co., Ltd., established Yamaoka Scholarship Foundation with his private fortune in 1950 when Japan stepped out into reconstruction of the country from the ashes of defeat. Magokichi Yamaoka, born in a poor farm household in Shiga Prefecture, overcame many hardships to found Yanmar Diesel Co., Ltd. and build it into a global engine maker.

"Beautiful World With Sincere Thankfulness"

This was the motto of Magokichi Yamaoka, who regarded his success as an entrepreneur to be a result of the cooperation and assistance he received from many friends and acquaintances. From this same sense of gratitude and the spirit of social service, Magokichi Yamaoka established a foundation with the objective of fostering people who could contribute to global peace and prosperity and the advancement of culture.

● Over 5000 ex-recipients of the scholarship performing actively in various fields in society

The spirit of Magokichi Yamaoka was inherited through Yasuhiro Yamamoto, the second generation and by the foundation's present chairman, Tadao Yamaoka, and the foundation continues to replenish the treasury for the expansion of its scholarship operations. Presently, the foundation makes scholarship grants and loans to high school, college and university undergraduate students, and grants to graduate school students engaged in mechanical and agricultural engineering and foreign students studying in Japan.

About 5,000 people have already received these scholarships and moved on to perform active roles in various fields. Their contributions to society are intangible assets of the Yamaoka Scholarship Foundation.

Scholarship Expended in 2005 (unit: persons / ¥1 million)

Classification	No. of Students	Amount
Graduate Student	44	37
Japanese Student	32	23
Foreign Student	12	14
College Student	101	32
High School Student	30	4
Total	175	72

- **Outline of Scholarships**

1. Scholarship grant: To university students recommended by designated universities, and high school students recommended by designated education boards.
2. Special scholarship grant: To graduate students engaged in mechanical and agricultural engineering, recommended by the graduate school.
3. Scholarship for foreign students: Privately-financed foreign student from East and South East Asian countries, recommended by designated graduate school of science and technology.
4. Scholarship loan: To university students.

- **Exchange among scholarship students**

Seeking to foster the recipients as persons who will contribute to society, besides the giving of monetary bursaries, various gatherings are also organized where recipients can meet, exchange ideas and develop a spirit of friendly competition.

(6) Children's Picture Exhibition

Yanmar Agricultural Equipment Co., Ltd. backs the *Countryside Paddies and Streams* Children's Picture Exhibition organized by the Japan Land Improvement Organization Federation.

The 6th exhibition (the series started in 2000) received more than 8,000 entries and 26 won prizes, 26 pieces given the Group Prizes, and 108 pieces were selected after careful judgement. The Yanmar Prize went to a picture drawn by Rinsei Yamamoto, a fifth grader at a primary school in Sasebo city.

The pictures were displayed in the Yaesu underground mall for a week from October 29 so that many people would be able to view the children's wonderful pictures and reflect on the importance of agriculture and farming communities.



Prize-winning pictures displayed in Yaesu Underground Mall



2004 Yanmar Prize Winner, Rinsei Yamamoto and His Picture

(7) Team Minus 6%

Yanmar Co., Ltd. participates in 'Team Minus 6%'. With the effectuation of the Kyoto Protocol on climate change on Feb. 16, 2005, Japan is committed to a 6% reduction of greenhouse effect gas emissions. 'Team Minus 6%' is a national project to realize this target.

In line with the global warming prevention activities promoted by the Ministry of the Environment, Yanmar Co., Ltd. started introduction of 'Team Minus 6%' to Yanmar Group companies in November 2005.

Stop global warming!

Team Minus 6%

6 actions:

Act 1: Reductions through temperature control

Act 2: Reductions through uses of tap water

Act 3: Reductions through uses of cars

Act 4: Reductions through choice of products

Act 5: Reductions through shopping and trash

Act 6: Reductions through use of electricity

3.6.6 Environmental Conservation Activities of Group Companies

The Yanmar group, including subsidiary companies, works in a unified manner to promote environmental conservation activities.

The environmental conservation activities of each group company are administered by the Yanmar Group Global Environmental Committee, Group Environmental Coordination Committee, and Product Sub-committee. Some examples of successful environmental conservation activities by group companies in 2005 are shown below:

(1) Matsue Diesel Co., Ltd. (Recycling & energy-saving)

Matsue Diesel Co., Ltd. engages in cast metal manufacturing and tooling. It reduced electrical power consumption by shortening tooling time for machine tools, resulting in a 3.2% reduction of energy consumption compared to the previous year. Its energy saving activities are as follows:

- **Reduction of electric power consumption by shortening time of tooling in machine tool equipment**

In view of the production volume increase started in F.Y.2004, it has been trying to reduce time for tooling. This has not had much effect because little equipment is involved. As a further increase of production volume was planned in F.Y.2005, and (7) new equipment items were to be introduced, it shortened the tooling time for the production capacity increase. In the drilling process for the main axis of cylinder, the drill blades (with steps), rotation feeding speed and program were changed, and the time required for tooling was cut by 3,480 hours (15 minutes/unit). As a result, electric power was reduced by 3.0%, and 3.2% of energy was saved compared with previous year.



Machine tooling



(2) Kanzaki Kogyukoki Mfg., Ltd. (Energy-saving & Recycling)

Kanzaki worked on energy saving in the air compressor, and 320,000 kWh of electric power has been saved per year.

Its energy saving activities are as follows:

- **Energy-saving**

Plant air was supplied by 10 automated compressors commanded from the Unit Control Device. Driving without load during recesses and holidays was causing unnecessary consumption of electric power.

By adding a timer to the existing control device, Kanzaki modified compressor operation during periods of low consumption, setting the number of units on the basis of consumption, and realized a reduction of 320,000 kWh power per year.



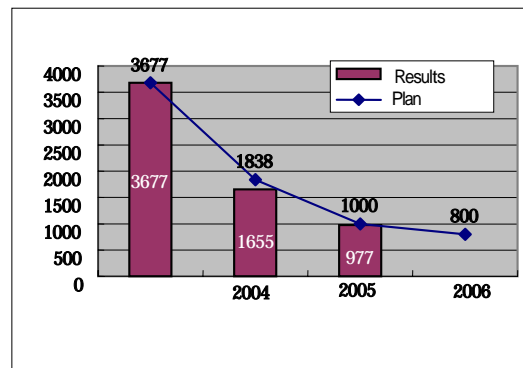
Compressor Control Unit

(3) Yanmar Energy System Mfg. Co., Ltd. (Waste, Chlorofluorocarbon)

Yanmar Energy System Mfg. mainly manufactures air conditioning and power generation systems. Its resource saving and waste reduction activities to reduce environmental load are as follows:

- **Reduction of Waste**

Exclusive returnable containers were introduced to avoid waste at the time of part supply, but some suppliers were still using corrugated cardboard. The use of returnable boxes was promoted and the use of corrugated cardboard fell to 977 pieces from 3,677 per month in 2 years, or 73% ..



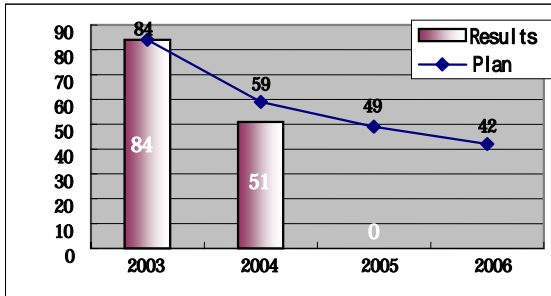
Progress of Corrugated Cardboard Waste Reduction



Introduction of Returnable Containers

Resource-saving (Reduction of CFC waste)

Chlorofluorocarbon (HCFC) is used as refrigerant for air conditioning equipments (GHP). This gas doesn't destroy the ozone layer but is a greenhouse gas and must not be leaked from air conditioning equipment. In the past, remnant CFC's in filling hoses had to be bottled.



Transition of Destroyed CFC Volume

An improvement in the CFC equipment now makes it possible to move the remnant CFC in the filling hose back to the filling equipment.



CFC Filling Control Device

(4) Yanmar Construction Equipment Co., Ltd. (Waste)

Yanmar Construction Machine Co., Ltd., which acquired ISO14001 certification in 1998, is working on environmental conservation with the 3 targets of:

- (1) Conservation of discharged water (water quality)
- (2) Energy-saving
- (3) Reduction of waste

Through rigorous sorting, waste has been reduced by 15%. The activities include:

Resource-saving (Reduction of CFC waste)

Waste is sorted into 32 types for collection and recycling. As a result, 24 kinds out of 32 are recycled. The recycled items are (1) recycled raw materials (12 kinds) (2) Heat energy (9 kinds) and (3) cement raw materials (3 kinds). General trash and scrap paper are not recycled yet.

In the future, it will promote further waste reduction activities through reduction of final disposal volume of waste as well as further paper recycling as set out in Yanmar's Mid-term Environmental Plan.



Waste Yard

(5) Yanmar Agricultural Equipment Co., Ltd. (Waste)

Yanmar Agriculture and Engineering Co, Ltd. is specialized in manufacturing tractors. Iron palettes were already used for shipping tractors, but the structure required wooden palettes for loading by forklift. We modified the palettes to avoid the use of wooden palettes.

● Reduction of Waste

Yanmar Agriculture and Engineering has been working on wooden palette reduction since F.Y.1999 when we acquired ISO14001, without radical measures, and the waste volume was increased to 10,463 in F.Y.2004. We focused on the wooden palettes for transportation, which are used when steel palettes for export tractors (accounting for 50%) are returned and started aiming at '0' return.

This improvement required a change of palette shape, and, taking the opportunity provided by a model change of the LV-type tractor, we made palettes that can be used for both the LV and four compact tractor types, with considering efficient transportation and packing. Improvement was done through examination of opening work and transportation conditions at the customers' end to eliminate of wooden palettes. As a result, a reduction of 4,852 palettes per year has been achieved, with cuts in transportation and packing costs of 30% and 27%, respectively. We will work on further improvement in understanding that what is good for the environment is also good for costs.



Before improvement



After improvement

Improvement of Palettes

(6) Koga Precision Foundry Co. (Waste Disposal Yard)

Koga Precision Foundry manufactures cast metal products. We transformed a disposal yard using sand used for casting to make a football pitch.

● Closing of Industrial Waste Yard

We used land at the back of our plant after collecting gravel there as an industrial waste yard between 1970 and 1999. A legal revision necessitated outsourcing to an industrial waste handler, and we needed to report the close down of the waste yard and apply for confirmation of its discontinuation. Unfortunately, the fluorine level was higher than the standard for groundwater. With support from Yanmar Co., Ltd., we started work to seal in the waste yard with a new technology proposed by a local construction company, and transformed the waste yard of 26,000 m³ to the big sports ground shown below. The football pitch will be opened to local residents.



Waste Yard transformed into a Football Pitch

(7) New Delta Industrial Co., Ltd.

New Delta Industrial Co., Ltd. is an affiliate of Yanmar Agriculture Equipment and manufacturer of agricultural machines. Our environmental efforts are as follows:

● Reduction of Electric Power Consumption

The following efforts reduced power consumption per production requirement unit by 3.3%.

- (1) Control by check sheets to make sure turning off of lights during lunchtime and the 3 p.m. break and when leaving each department.
- (2) By measuring illumination intensity, unnecessary mercury lamps in the plant were identified, resulting in 10% reduction.
- (3) Old reciprocal compressor replaced by inverter compressor.

	F.Y.2004	F.Y.2005	Percentage
Purchased Power	881kWh	870kWh	98.8%
Production Requirement Unit	30.3kWh/¥100 million	29.3kWh/¥100 million	96.7%

● Reduction of Copy Paper Consumption

(1) Reducing Paper

- Minimizing data, reduction of meeting documents for copy.

- 20% reduction of copy paper by using projector

(2) Efficient use of copy paper

- Each department is given a key counter to grasp copy volume, and to set up a reduction plan for the following month with an enhanced recognition to reduce.
- Examine and review the number of copies for meetings (1 set per department etc.)
- Using both sides of paper
- Eliminating copy errors by checking beforehand.

	F.Y.2004	F.Y.2005	Percentage
Consumption	437,000 sheets	426,610 sheets	97.6%

● Reduction of Water Consumption

In order to reduce water consumption, we took the following measures.

- (1) 85 water-saving taps installed in the cafeteria, hand wash stations, kitchens at each department
- (2) Thorough control by check sheets installed in each spot.
- (3) Thorough control by installing a meter at final washing device after painting.

	F.Y.2004	F.Y.2005	Percentage
Consumption	3,726m ³	2,728m ³	73.2%
Production Requirement Unit	128m ³ /¥100 million	91.9m ³ /¥100 million	71.5%

(8) Yanmar Agricultural Equipment Co., Ltd. (Environmental Conservation Committee)

Yanmar Agricultural Equipment acquired ISO9001 and 14001 certificates simultaneously in October 2004. In line with the acquisition process, we established Yanmar Co., Ltd. Environment Conservation Committee with our president as the Chairman, as well as Site Environment Conservation Committee in each site.

A Site Environment Conservation Committee is held monthly to discuss plans and progress, to promote continuous improvement through reporting environmental efforts in detail. Each site carries out Environmental Patrols for site improvements. In addition, awareness of environmental efforts is reinforced by chanting environmental policies and action plans in unison at morning and after-lunch gatherings.

At first, the environmental target was subjected only to 'paper, trash and electricity', but we've been shifting our focus to our own business of each department in setting up targets.

With an idea to start environmental conservation around oneself, we've been promoting the new 5S's campaign, '*SHITSUKE, SEIRI, SEITON, SEISO, SEIKETSU*' (Discipline, Organizing, Arranging, Cleaning, and Cleanliness). Consciousness of these new 5S's is important in our work, and we try to organize, arrange and clean before working.

In order to execute the Mid-term Environmental Plan (2006-2010) of the Yanmar Group Environment Committee set up in June 2005, we compiled our own mid-term plan which we promote in our business operation within each department of Yanmar Agricultural Equipment. Not only in departments in the head office, but also manufacturing plant, sales companies in Japan as well as production facilities in overseas are included to expand our environmental conservation globally. We expand our effort, with positioning the environmental efforts as a key management theme, so that we can contribute to 'retainable society'.



Environmental Conservation Committee of Yanmar Agricultural Equipment Co., Ltd.

3.6.7 Affiliated Environmental Organizations

We participate in the following environmental organizations for the promotion of environmental conservation activities:

- Environmental Committee, Japan Machinery Federation
- Internal Combustion Engine PRTR Committee, Japanese Marine Equipment Association
- Small Boat Exhaust Gas Committee, Japan Small Boat Inspection Organization.
- Kansai Environmental Committee, Japan Machinery Center for Trade and Investment.
- Environmental Committee, Osaka Chamber of Commerce
- Japan Forum, LCA, Japan Environment Management Association for Industry
- Japan Audit and Certification Organization for Environment and Quality
- Eco Brain Selection, Dai-ichi Hoki Co.
- Green Procurement Network

3.7 Site Data

The major products, business outline and environmental activities (energy-saving, recycling and reduction of waste) by major plant of Yanmar are shown below.

Outline of Business and Environmental Preservation Activities by Site

	Business Unit	Biwa Plant	Yamamoto Plant	Nagahama Plant	Kinomoto Plant
1	Location	Kawamichi 1009-2, Biwa-cho, Higashi Azai-gun, Shiga Pref.	Yamamoto 3198, Kohoku-cho, Higashi Azai-gun, Shiga Pref.	Sanwa-cho 7-35, Nagahama, Shiga Pref.	Kuroda 650, Kinomoto-cho, Ika-gun, Shiga Pref.
2	Products	Vertical WC diesel engines, Gas engines	Air-cooled gasoline engines, Horizontal WC & Vertical air-cooled diesel engines; Casting of aluminium alloy parts	Diesel outboard engines, Sail drive units, Metal molds	Tractors, Golf carts and related equipment.
3	Tel.	0749-72-5151	0749-79-0305	0749-65-3008	0749-82-3322
4	Business Outline	Integrated production (development, machining, assembly, test operation, painting, and shipping) of vertical WC diesel engines for use with farm machinery, construction equipment and industrial equipment in general; assembly of gas engines for air conditioning	Casting and machining of aluminium alloy parts for engine weight reduction. Integrated production (assembly, test operation, painting and shipping) of air-cooled gasoline engines, horizontal WC engines and Vertical air-cooled engines.	Design and development of engines for agriculture, construction machinery, industrial machinery and marine uses; Design and manufacturing of jig and tools for engine parts; Distribution center of the products from 6 plants in Shiga Zone.	Tractor and golf carts (production, test operation and shipping) ; crankshaft and cyl. head machining, tractor parts machining, press, welding, resin shaping and coating.
5	Environment Preservation Activities	<p>1. Energy conservation</p> <p>(1) Repair of air leaking spots</p> <p>(2) Compressor load reduction</p> <p>(3) Adoption of energy-saving oil pressure pump</p> <p>(4) Shift to low exhaust gas forklift.</p> <p>2. Resource Saving</p> <p>(1) Reduction of machine cutting solution through concentration control</p> <p>(2) Promotion of waste recycle (cotton work gloves, cotton waste, paper scrap, wooden chips, corrugated cardboard)</p> <p>(3) Prevention of water supply leakage</p> <p>3. Legal compliance</p>	<p>1. Energy conservation</p> <p>(1) Quick repair of air leaking spots</p> <p>(2) Restraining melting furnace combustion efficiency decrease by periodical check</p> <p>2. Resource Saving</p> <p>(1) Reduction of oil & grease use</p> <p>(2) Control of cutting oil for machine tooling by line.</p> <p>(3) Promotion of waste recycle (used paper, corrugated cardboard, partial discontinuation of wooden palettes)</p> <p>3. Others</p> <p>(1) Environmental education</p> <p>(2) Periodical holding of Environmental Conservation Committee</p>	<p>1. Energy conservation</p> <p>(1) Reduced loss in electric transformer by pausing it in the area where electric power consumption becomes low.</p> <p>(2) Shift to forklifts and trucks with low fuel consumption and low exhaust gas specifications.</p> <p>2. Expansion of modal-shift (shipping engines by railroad).</p> <p>3. Legal compliance</p>	<p>1. Energy conservation</p> <p>(1) Compressor load reduction</p> <p>(2) Reduction of electric power for lighting (shifted to inverter type).</p> <p>(3) Shift to energy-saving oil pressure unit</p> <p>(4) Enhanced efficiency of boiler operation</p> <p>2. Resource saving</p> <p>(1) Efficient use of oil & grease</p> <p>(2) Prevention of water supply leakage</p> <p>3. Reduction of grinder slag, wooden chips, polluted sludge, paper scrap etc.</p> <p>4. Legal compliance</p>

	Business Unit	Omori Plant	Nagahara Plant	Amagasaki Plant	Tsukaguchi Plant
1	Location	Shigenori 354, Takatsuki-cho, Ika-gun, Shiga Pref.	Sho 18, Nishi-azai-cho, Ika-gun, Shiga Pref.	Higashi-dori 1-1-1, Nagasu, Amagasaki	Honcho 5-3-1, Tsukaguchi, Amagasaki
2	Products	FO injection pump	FO injection pump	Large diesel engines, gas engines, gas turbines	Medium diesel engines
3	Tel.	0749-85-3000	0749-89-1151	06-6489-8005	06-6428-3122
4	Business Outline	Integrated production (machining, assembly, test operation, shipping) of FO injection pump, which represents the core of diesel engines.	Integrated production (machining, assembly, test operation, shipping) of FO injection pump, which represents the core of diesel engines.	Integrated production (machining to test operation) of marine main and aux. engines, large industrial diesel and gas engines and gas turbines.	Integrated production (machining to test operation) of marine main & aux. engines, industrial & gas engines and compressor
5	Environment Preservation Activities	<p>1. Energy conservation</p> <p>(1) Compressor load reduction by introducing a unit control device.</p> <p>(2) Shift of lighting equipments to inverter type</p> <p>(3) Fixed setting of air conditioners</p> <p>2. Resource Saving</p> <p>(1) Collecting cutting oil after separating it from cut powder</p> <p>(2) Oil leakage prevention</p> <p>3. Waste Reduction</p> <p>(1) Wooden pallets abolished.</p> <p>4. Others</p> <p>(1) Legal compliance</p> <p>(2) Pollution Prevention</p> <p>(3) Reduction of toxic chemicals</p>	<p>1. Energy conservation</p> <p>(1) Reduction of compressor load</p> <p>(2) Reduced consumption of boiler fuel oil</p> <p>(3) Reduced LPG consumption for heat treatment</p> <p>2. Resource Saving</p> <p>(1) Prevention of oil & grease leakage and filtering</p> <p>(2) Recycling of cleaning oil</p> <p>(3) Extending service life of water soluble coolant</p> <p>3. Legal compliance</p>	<p>1. Harmony with Community: use of mesh fence</p> <p>2. Energy Conservation: Use of cogeneration system and energy-saving equipment; use of city gas fuel for air conditioners</p> <p>3. Prevention of air pollution: HFO and kerosene changed to city gas for heater fuel.</p> <p>4. Water used for test operation load equipment recycled.</p> <p>5. Reduction of Waste: Used papers, fluorescent mercury lamps recycled; use of longer service life pallets.</p> <p>6. Unuse of lead in paint and hexavalent chromium.</p> <p>7. Correspondence for IMO ship recycling convention.</p>	<p>1. Energy conservation</p> <p>(1) Shift to energy-saving lighting equipments</p> <p>(2) Improved production efficiency and reduced time for facility operation</p> <p>(3) Reduced fuel consumption by reducing labor hour of test operation</p> <p>2. Resource Saving & Recycle</p> <p>(1) Reduction of industrial waste by complete return of packing pallets and plastic cases to manufacturer.</p> <p>(2) Reduction of scrap wood by shifting to returnable iron pallets.</p> <p>(3) Water saving, Zero leakage of water</p> <p>3. Legal compliance for air, water quality, vibration, noise (voluntary regulation added)</p> <p>4. Harmony with Community Cleanup around the plant</p>

Remarks	<p>AAA</p> <p>Enhance performance of pre-treatment of oil in the drainage process facility stabilized the concentration of nitrogen of water discharged to sewage.</p>	<p>BBB</p> <p>Measurement Spots (1) Water quality: Drain outlet from the final separation tank to outside the plant. (2) Air: Dust collecting machine of aluminum melting furnace for die-cast. Noise: 7 measuring spots at the boundaries around the plant</p>	<p>CCC</p> <p>Water quality (water discharged to river): Among 3 drainage spots, the highest and lowest values are adopted. The average is the one among the 3.</p>	<p>DDD</p> <p>As T-P of water discharged to river exceeded the standard, we reported to the government. Cause: It was because the fluid leaked from the circulation pump, as well as cleaning water over-flown due to the clogged filter ran into the rainwater pit Measure: A drainage pit was installed to drain to the industrial waste fluid, and a rise was built around the rainwater pit so that leaked water won't run into the floor.</p>	<p>EEE</p> <p>There was no values exceeded the regulation standard and/or the voluntary standard.</p>	<p>FFF</p> <p>Each value is below the regulatory standard and the voluntary standard, but some values suddenly got higher in winter. Measure: Renewal of floated oil recover equipment installed in the final drain outlet is scheduled.</p>		<p>GGG</p> <p>The temperature of water discharged to sewage slightly exceeded the voluntary standard due to exhaust heat in trial operation in summer. Measure: Implementing a cooler tower for coolant for trial operation is scheduled in May 2006, the effect of enhanced performance of the equipment is being examined.</p>
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History of Yanmar Group Environmental Activities

Year	Yanmar Group Activities	Movement of Japan and World
1993		11. The Basic Environment Law established.
1994	06. Environmental Division established. 09. Yanmar Global Environment Committee established 12. First Global Environment Committee held.	07. Waste Disposal Law revised. 12. Environment Basic Plan guidelines
1995	02. Yanmar Global Environmental Charter established and distributed. 03. Environmental voluntary plan submitted to MITI. 12. Environmental Preservation Basic Rule and organization implementation rules established.	04. Foul Smell Control Law revised. 06. Containers and Packing Recycling Law established.
1996	06. Standard for selecting and displaying resin parts established. 09. Environmental Preservation Activities Mid-Term Plan (1999~2003) formulated. 10. Survey on environment load of administrative divisions	05. Air Pollution Control Law revised. 06. ISO 14001 Standard issued. 06. Water Pollution Control Law revised. 10. JIS 14001 established.
1997	06. Large Power Products Operations Div. certified under ISO14001.	04. New Energy Use Special Measures Law (RPS Law) established. 06. Environmental Impact Assessment Law established. 12. Kyoto Protocol
1998	03. Six plants of Small Power Products Operations Div. certified under ISO14001 together. 11. Participated in the 1 st Lake Biwa Environmental Business Messe. 12. Three plants of Seirei Industry Co. Ltd. certified under ISO14001 together.	06. Energy Saving Law revised. 06. Electric Appliance Recycling Law established. 10. Global Warming Prevention Law established.
1999	03. Three plants of Kanzaki Kokyukoki Mfg. Co. Ltd. certified under ISO14001 together. 11. Recycling goal established for major products 12. Showa Precision Machinery Co., Ltd. certified under ISO14001.	07. Dioxin Special Measures Law established. 07. Toxic Substance Control Law, (PRTR), established.
2000	06. Voluntary Action Plan submitted to Kansai Economic Federation. 06. Annual Environmental Report (2001 edition disclosed on website). 09. Environmental accounting approach introduced. 12. The 2 nd Stage Environmental Preservation Mid-Term Plan formulated, (2001~2005) 12. Standardization and unification of environmental data of all group companies. 12. Environmental Performance Assessment Standard for Products formulated (recycling, etc.).	05. Green Procurement Law established. 05. Construction Recycling Law established. 06. Recycling Society Formation Basic Law established. 06. Food Recycling Law established. 06. Resources Recycling Law revised.
2001	01. Rationalization of packing & wrapping fully in progress 08. Yanmar Group arranged measures to comply with PCB Special Measures Law. 09. Complied with Electric Appliance Recycling Law by using GHP system. 11. The 1 st Group Environmental Coordination Meeting held.	01 Environment Ministry inaugurated. 06. Automobile NOx / PM Regulation revised. 06. PCB Special Measures Law established. 06. Freon Recovery & Destruction Law
2002	03. Purchasing Division started green procurement.	05. Soil Pollution Control Law established. 05. Automobile Nox / PM Regulation revised. 05. Law on Waste Disposal & Cleaning revised. 07. The Basic Environment Law revised. 07. Global Warming Prevention Law estab-

	03. All production sites abolished the use of organic chlorine-based compounds	lished.
	04. The 1 st Group Global Environmental Committee held.	07. Disused Automobile Recycling Law established.
	06. Yanmar Group arranged measures to comply with PRTR law.	12. Oil Alternative Energy Law established.
	12. Yanmar Global Environment Charter revised.	12. New Energy Use Special Measures Law (RPS Law) revised.
	12. Environmental Report 2002 Edition disclosed on website.	12. Nature Revitalization Promotion Law established.
2003	04. Green Procurement Guideline established.	05.. Law on Waste Disposal & Cleaning revised
	05. The 2 nd Group Global Environmental Committee held.	05. Chemical Assessment Law revised.
	07. YADIN certified under ISO14001.	06. Fire Defense Law revised.
	08. Matsue Diesel certified under ISO14001.	07. Environmental Education Law established.
	12. Environmental Report, 2003 edition disclosed on website.	
2004	05. New Delta Industry Co., Ltd. certified under ISO 14001.	05. POPs Treaty effected.
	06. The 3 rd Group Global Environmental Committee held	05. Law on Waste Disposal & Cleaning revised
	07. The 1 st Product Sub-committee held.	05. Air Pollution Control Law revised.
	07. Yanmar Energy System Mfg. Co., Ltd. certified under ISO14001.	05. Environment-conscious Promotion Law established.
	09. Yanmar Global Environmental Committee integrated to Yanmar Group Global Environmental Committee.	11. ISO14001 Standard revised.
	09. Environmental Report, 2004 edition disclosed on website.	
	Participated in the 7 th Lake Biwa Environmental Business Messe	
	10. Yanmar Agricultural Equipment Co., Ltd. certified under ISO9001 and ISO 14001 concurrently.	
2005	01. Yanmar Group Management Philosophy revised as Missions	02. Kyoto Protocol brought into effect.
	05. Environmental Vision 2012 formulated.	
	06. Yanmar Group 2 nd Stage Environmental Preservation Mid-Term Plan formulated.	05. Law on Waste Disposal & Cleaning revised
	06. The 4 th Group Global Environmental Committee held	06. Global Warming Prevention Law established.
	08. Environmental Report, 2005 edition disclosed on website.	07. Energy Saving Law revised.
	09. Harmful substances elimination activities full in progress as group.	
	12. Environmental audit started.	

Explanation of Terms

Emissions	Properties of exhaust gas in engines; wastes discharged from plants.
Environment Management	Efficient corporate activities with important positioning of environment preservation activities.
Environment Management System	System to specifically promote and manage environmental preservation activities.
Green procurement	Preferential purchasing of materials, parts, products, etc. with small environmental load from the supplier so as not to impose environmental load.
Cogeneration system	High efficiency energy supply system using both power generated and waste heat recovered; Instrumental in reducing CO ₂ emissions.
Dioxin	Harmful chemicals combinations of hydrocarbon and chlorine produced by garbage incineration, etc.
CFC's substitute	CFC with no ozone depletion potential developed for substitution with specific CFC that can cause ozone layer depletion.
Heat balance	Heat flow distribution; heat emitted from the engine is efficiently radiated from the driven machinery body so that heat will not be trapped inside.
ARB	Air Resources Board of California, U.S.A. Controls exhaust gas from engines, etc.
BOD	The amount of oxygen required for decomposition of organics contained in water. The higher the value, the worse the contamination.
COD	The amount of oxygen required by the chemicals for decomposition of organics contained in water. The higher the value, the worse the contamination.
dB	decibel ; Logarithmic unit to measure noise and vibrations.
dB(A)	Noise compensated by human auditory sense; Low and high frequency noise measured to be small.
EC	European Commission
ECE	Economic Commission for Europe.
EPA	Environmental Protection Agency, U.S.A. Controls exhaust gas from engines, etc.
HMT	The drive system that combine HST with gear transmission in parallel for variable speed change and high transmission efficiency
ISO 14001	The international standard set by International Standardization Organization. The environmental preservation management system requirements for a corporation. Revised in November 2004.
IT	Information Technology
NO _x	Nitrogen oxide produced by combustion; causes acid rain, smog, etc.
PCB	Polychloride biphenyl. An organic chloride compound. Used in insulator oil, heat transfer, additives. Production now banned.
PH	Hydrogen-ion concentration contained in solution; represents the acidity and alkalinity. 7pH is defined as neutral, 0-7pH as acid, and 7-14pH as alkaline
PRTR system	The system whereby the chemical amount discharged to the environment or waste transferred is reported to the administrative organization for public disclosure.
PM	Fine particles that can cause air pollution.
SO _x	Sulfur oxide produced by combustion of sulfur content in fossil fuels. Can cause acid rain.
SS	Suspended matter in water. Shows the extent of water turbidity.
T-N	Total nitrogen amount in water
T-P	Total phosphate amount in water

Yanmar wants to inform society at large about the effects of its business operations on the environment and environmental protection activities, in order to that these may be developed arm in arm with the whole community.

Two-way communication is essential. This environmental report is Yanmar's fourth publication of this kind but we may not have included everything you wanted to see. Please let us know your opinions, impressions and questions so that we can improve future editions. We look forward to receiving your comments at the address shown below.

[Inquiries about this Environmental Report](#)

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The latest business activities of Yanmar and Yanmar group companies are described in a simple and attractive format. The Environment page introduces various other environmental activities not covered in this report.

To send inquiries via the net, please visit the site shown below.

Yanmar Website URL
<http://www.yanmar.co.jp>

Yanmar welcomes all inquiries on both environmental and other subjects via the inquiry corner on the website. Please feel free to contact us at any time.