

Fujitsu Group's Activities for Global Warming Countermeasures

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In the Kyoto Protocol, Japan is committed to reducing its average emissions of greenhouse gases (GHGs) between 2008 and 2012 by 6% of its 1990 emission level. However, in fiscal 2005, Japan's GHG emissions actually increased by 7.8% versus the 1990 level. In Japan, where industry is responsible for about 65% of the national CO₂ emissions related to energy consumption, each sector has organized a voluntary action plan to promote activities to achieve the mandatory goal set by the Japanese government. Also in the electronics and IT sectors, there is a need for further reinforcement of those activities in association with the enhancement of the current voluntary action plan. In fiscal 2007, the Fujitsu Group started its Environmental Protection Program (Stage V) to comply with increasingly demanding laws and regulations. In this program, the Fujitsu Group announced its target to reduce absolute CO₂ emissions related to energy consumption as its continued efforts from Stage IV, within the framework of its activities for global warming countermeasures. Fujitsu's activities in the areas of manufacturing processes and office division, areas which the Group considers to still be the subject for future challenges, are introduced in this paper in addition to the Group's conventional activities.

1. Introduction

Laws and regulations related to global warming countermeasures have been reinforced every year and the framework of greenhouse gas (GHG) emissions trading systems has been improved to date in 2008, when the first commitment period defined in the Kyoto Protocol is scheduled to start.

While the IT industry has been regarded as an industry that consumes fewer resources in comparison with the steel, chemical and electric power industries so far, it is being exposed to increasing pressure to reduce its energy consumption amid the trend of a drastic increase of electric power consumption in data centers.

This paper describes the milestones of laws and regulations as well as the Fujitsu Group's countermeasures related to global warming. To be specific, in addition to the conventional counter-

measures for reducing consumption implemented by its production divisions, Fujitsu's efforts in its office division and the countermeasures it will take in its manufacturing processes are discussed as challenges to be addressed by the Group in future.

2. Milestones of laws and regulations

As the government's policy to promote operators' commitments to suppressing energy consumption after the second oil shock, the Law concerning the Rational Use of Energy was established and enforced in 1979.

Based on a revision of that law in 1993, periodic reporting by designated energy management factories has become mandatory. In 1998, factories that consume a large amount of energy were obliged to formulate and submit medium-

term and long-term energy-saving programs as a part of the requirements for reducing energy consumption in the place of business.

Based on a further revision of the same law in 2006, more stringent factory designations came into force, with an integration of conventional categories of heat and electricity. Following these changes, laws related to the promotion of global warming countermeasures were revised in 2007, and it was made mandatory for establishments larger than a specific scale to calculate and report their CO₂ emissions related to energy consumption, as well as their GHGs emissions other than CO₂ emissions related to energy consumption.¹⁾

In recent years, a nationwide delay in taking countermeasures in offices and households has been pointed out and companies are being asked to make greater efforts in the office environment to address global warming.

Meanwhile, at the government's request for cooperation to achieve the goal set by the Kyoto Protocol, the electric and electronic industries have also formulated their voluntary action plans and started activities based on those plans. In the electric and electronic industries, not only the reduction of energy consumption in their own places of business, but also contributions to energy savings achieved through their products to be used by customers play a significant role. As an index of their voluntary target while giving consideration to the growth of the sectors, the reduction of CO₂ emissions based on energy consumption per item produced was announced. However, in the current situation where it seems unlikely Japan will achieve the target set by the Kyoto Protocol, a decision was made to upwardly revise the target and the government made an effort to set a goal based on an absolute target.

Among other things, the target for reducing CO₂ emissions related to energy consumption per item produced has been upwardly revised more than once in the last two years, from 25% through 28% to 35%.

While the laws and regulations concerning

global warming countermeasures are becoming more and more stringent each year, the Fujitsu Group has announced its long-term quantitative target and is implementing various activities to achieve that target.

3. Milestones of Fujitsu Group's Environmental Protection Program

In the Environmental Protection Program, Fujitsu has been making continued efforts in global warming countermeasures since the initial stages, being aware of its importance in the company's management. In Stage I and Stage II, Fujitsu reduced the energy consumption per sales amount in its production sites (**Figure 1**).

From Stage III, giving consideration to the switch to a business mode centered on software services, it has expanded the scope of countermeasures to include non-production sites, such as those related to software services, with the purpose of enhancing the targeted values.

From Stage IV, the Group has further extended its activities for global warming countermeasures to include whole aspects of product life cycles, including distribution and recycling of products, as well as energy conservation achieved through those products. At the same time, Fujitsu has converted the targets based on a basic unit into an absolute target, and managed to reduce the CO₂ emissions related to energy consumption at the places of business in FY2006 by 29% versus the level of FY2000, when the emissions were at their highest. (**Figure 2**).

In Stage V, which started in FY2007, the Group decided to reduce the absolute amount of emissions in the domestic arena while it targeted a reduction of CO₂ emissions related to energy consumption per sales amount in the global arena, based on the judgment that the conventional target was not appropriate any more when taking into account the estimated increase of emissions caused by an increased used of electronic devices, outsourcing and overseas HDD businesses, as

	Stage I–Stage II (1993–2000)	Stage III (2001–2003)	Stage IV (2004–2006)	Stage V (2007–2009)
Orientation	Reduction per unit sales		Absolute reduction (Suppression to the level of FY1990)	
Target				
Base FY	FY1990	FY1990	FY1990	FY1990
Target FY	FY2000	FY2003	FY2010	FY2010
Item	Power consumption per unit sales	Energy consumption per unit sales	CO ₂ emissions related to energy consumption	(Domestic) CO ₂ emissions related to energy consumption (Overseas) CO ₂ emissions based on energy consumption per product sale
Value	Reduction by 20–30%	(Individual) Reduction by 40% (Consolidated) Reduction by 25%	±0%	(Domestic) ±0% (Overseas) Reduction by 28%
Scope	Individual Production site	Consolidated (Global) Production sites and non-production sites	Consolidated (Global) Production sites and non-production sites	Consolidated (Global) Production sites and non-production sites

Figure 1
Changes of targets for global warming countermeasures based on Fujitsu Group's Environmental Protection Program.

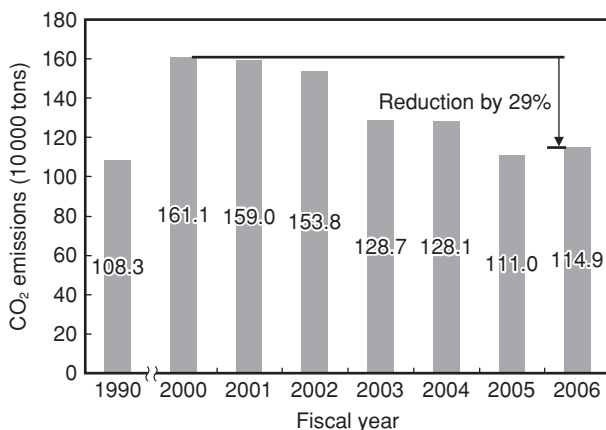


Figure 2
Changes of CO₂ emissions related to energy consumption.

well as the expanded scope of consolidated companies.

4. Current energy use of Fujitsu Group

In reducing its energy consumption, the

Group understands facts about its energy consumption for applications and conducts efficient investments.

The amount of CO₂ emissions related to energy consumption at the domestic place of business for applications is indicated in **Figure 3**.

In Fujitsu's manufacturing establishments, emissions from air conditioning and heat sources account for 40 to 50%, followed by emissions related to energy consumption through manufacturing equipment such as those for assembling and processing products (30 to 40%). It is essential to suppress CO₂ emissions related to energy consumption in these applications.

On the other hand, in the non-manufacturing establishments (establishments owned by Fujitsu only), while emissions from air conditioning and heat sources occupy about 40%, another 40% of emissions is attributable to emissions related to the operation of IT equipment such as servers. The increase of emissions in these applications has become conspicuous, particularly with the re-

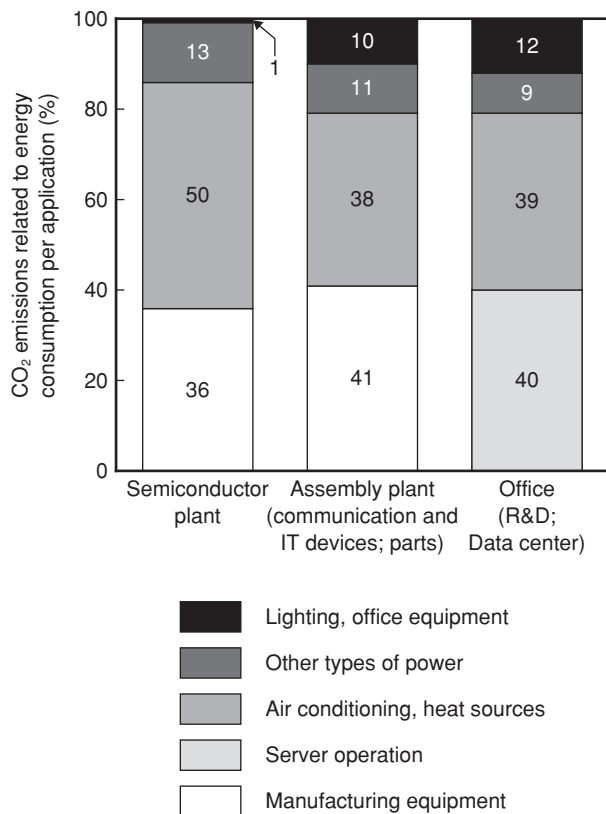


Figure 3
Current status of CO₂ emissions related to energy consumption based on application.

cent growth of the outsourcing business.

Giving consideration to the above-mentioned facts, Fujitsu's main activities for reducing emissions are introduced in the next section regarding the facility areas in which the focus of the Group's activities has been placed up to Stage IV.

5. Main reduction activities up to Stage IV

Among the activities up to Stage IV, one of the most effective reduction policies has been the introduction of high-efficiency equipment. In general, to reduce the amount of energy consumed by air conditioning and heat source facilities and equipment in the place of business, the Fujitsu Group has reduced its energy consumption by replacing these items of equipment with high-efficiency equipment on occasion of its mandatory

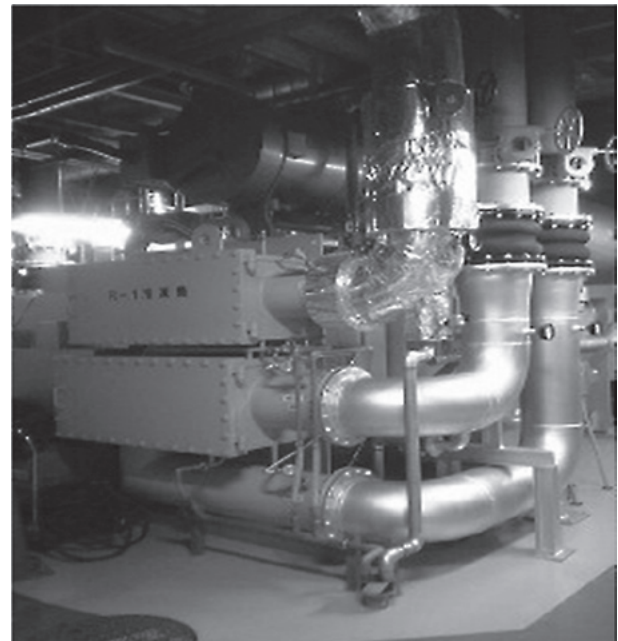


Figure 4
Introduction of highly efficient turbo-chiller (Aizu-Wakamatsu Plant).

renewal after a specified period of use.

As an example, cases of introducing high-efficiency boilers and chillers into some Fujitsu Group sites characterized by high energy consumption such as those related to electronic devices and processes are introduced in this paper. In the Aizu-Wakamatsu Plant, the Group managed to reduce CO₂ emissions by approximately 600 t/unit by replacing the conventional system with high-efficiency turbo-chillers (**Figure 4**).

Also, switching to fuels that involve less CO₂ emissions has proved to be very effective. Shinko Electric Industries, a group company, switched from using heavy fuel oil to using natural gas as its boiler fuel between 2005 and 2006 and changed its equipment to high-efficiency types (from multiple, compact one-through boilers, its control system enables operation of only a specific number of units depending on the load fluctuation). Through these measures, that company could reduce the CO₂ emissions from its boilers by about 30% as a total figure for three plants (**Figure 5**).

Besides, several other measures have proved



Figure 5
Reduction of CO₂ emissions by switching boiler fuels (Arai Plant, Shinko Electric Industries Co., Ltd.).

to be effective including the use of a co-generation system, the introduction of NAS cells and the use of inverters.

NAS cells have been introduced to several electronic device-related sites including the Mie Plant. Electric power is stored during the night-time when the power demand is low and the stored power is discharged during the daytime, thus making it possible to efficiently use the electric power equipment (**Figure 6**).²⁾

Further, by introducing a free cooling system, in which cooling water to be used in the plant is obtained by cooling water with external air during the winter, the Group has reduced the amount of heavy fuel oil needed for its chillers. Yamagata Fujitsu Ltd. managed to reduce CO₂ emissions related to energy consumption by about 1500 t/year by introducing two units of this system (**Figure 7**).

While Fujitsu has made continued efforts in its facilities, it has prioritized cases that it expects will have a high investment efficiency when selecting cases to invest in. As a consequence, a drop in efficiency versus investment is observed in comparison with the previous cases.

Therefore, in addition to the conventional approaches in the area of facilities, the Group is currently focusing on another important challenge,



Figure 6
Introduction of NAS cell (Mie Plant).



Figure 7
Introduction of free cooling system (Yamagata Fujitsu Ltd.).

namely, the reduction of energy consumption during the manufacturing processes, which occupies a significant percentage in the applications. The Group is promoting various activities in this area to seek better solutions.

6. Activities to reduce energy consumption in manufacturing processes

As mentioned in the previous section regarding the energy consumption in applications, the percentage of electric power consumed by manufacturing equipment was identified as the second largest following the power consumed by air conditioning and heat sources. However, the approaches to reducing energy consumption by manufacturing equipment have been considered more difficult than the approaches in the area of

facilities in general, because the operation of that equipment is directly related to profit and loss.

Moreover, no power meters are connected to individual items of manufacturing equipment and it is extremely difficult to measure the power level on a real-time and quantitative basis. It is important to make apparent the level of effect achieved by implementing specific reduction measures by identifying the electric power consumed by each item of manufacturing equipment that consumes a higher level of energy. Currently, the Group places the main emphasis on the reduction of electric power consumption during non-productive periods (times when the works are not running including idle and maintenance periods) of the manufacturing process. As part of these efforts, Fujitsu has started trial activities in the Electric Device division.

7. Activities for global warming countermeasures in offices

Individual office workers in the Fujitsu Group are using energy-saving settings of their computers as one of the accessible energy conservation activities. While there are several energy-saving settings for computers, the following settings were employed while giving consideration to work efficiency:

- 1) Monitor power shut-off, and
- 2) System stand-by (20 minutes).

Further, when a computer is not in use, the stand-by power that is consumed is reduced by disconnecting its power cable. The efficacy of this measure was tested by comparing the power levels spent during a specific period for computers that were not subject to any of the above-mentioned energy-saving settings and those that were (**Table 1**).

In both offices, it was confirmed that power consumption levels were reduced by several percent. These activities are being promoted across all levels of employees, because a saving of approximately 30 million yen/year can be expected, although the level of reduction per computer is

Table 1
Verification results for reduction of CO₂ emissions related to energy consumption based on energy-saving settings.

	Scope of verification	Measurement method	Reduction rate
Office A (In-house office)	About 57 units	Measurement by clamp meter	4.4%
Office B (Tenant)	About 400 units	Measurement by existing meter	3.2–6.5%

insignificant.

8. Conclusion

This paper introduced the Fujitsu Group's activities particularly regarding the milestones of laws and regulations related to global warming countermeasures, the current energy use of the Fujitsu Group, the main reduction activities up to Stage IV, and the approaches taken in manufacturing processes, which is a main focus for future activities.

The Group believes laws and regulations related to global warming countermeasures will become more stringent in future. Because company-level commitments are essential in implementing global warming countermeasures, while the level of involvement varies between each employee, the Group is determined to continue promoting its initiatives by improving accessibility to these activities by making them easy to understand.

Although the Group plans to make continued efforts for reducing energy consumption through equipment investment and manufacturing process improvement in future, it is inevitable that its energy consumption will increase accompanying the growth of the business. However, Fujitsu, as an IT company, needs to emphasize its sincere efforts in environmental initiatives to the general public in a quantitative manner so that people can understand them easily. It will do this by striving to reduce its absolute energy consumption and introduce efficacy indexes such as a basic unit. In Stage V, the Fujitsu Group is promoting its activities by setting new targets in logistical areas while reducing direct CO₂ emissions related to

energy consumption at its places of business. To address increasing demands, Fujitsu needs to clearly identify the activity index for the whole product life cycle while giving consideration to its contributions to general consumers and society as a whole, achieved by offering energy-saving products and solutions in addition to the direct and indirect reduction of its energy consumption.



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