Greenhouse Gas Emissions in Japan

Analysis of First Data Reported (FY2006) from
Emissions Accounting, Reporting and Disclosure System for Large Emitters under Japan's
"The Law Concerning the Protection of the Measures to
Cope with Global Warming"

May 2008

Kiko Network

Executive summary

- Japan is the world's fourth largest emitter of greenhouse gases. Its emissions have increased by 6.2% (as of FY2006) from the 1990 base year under the Kyoto Protocol, representing a gap of 12.2% compared to the country's emission reduction target. Efforts to date have been inadequate, and at the current pace Japan will fail to meet its reduction target.

- Indirect CO_2 emissions have increased considerably in the residential and commercial sectors since 1990, but industrial emissions account for the largest share, at 36% of total emissions. More than half of the increase in Japan's emissions has come from increases in emissions from electrical power plants, and a considerable increase in generation from coal-burning power plants has resulted in a considerable deterioration in Japan's emission factor of electricity.

- An industry-by-industry review of emissions from 14,225 facilities that released data under the mandatory emissions accounting, reporting and disclosure system show that:
  - The power sector accounts for 40% of total emissions. The top three emitting companies are Tokyo Electric Power Company, JFE Steel Corporation, and Nippon Steel Corporation.
  - Direct emissions from facilities subject to this system account for 67% of Japan's total emissions, and 200 facilities account for about 50% of Japan's total emissions. The bulk of emissions come from a small number of big emitting facilities.
  - Data on GHG emissions from 36 facilities have not been released publicly, but it was still possible to determine emissions by referring to certain numbers available under local regulations. Based on this data, it is clear that of the top ten big emitting facilities, seven are in the steel industry (all with blast furnaces), and three are coal-fired power generation facilities.

- As for Japan's mandatory GHG accounting, reporting and disclosure system, Japan should delete clauses referring to "protection of rights," which have no practical justification, and in order to make climate policies reflect the real situation, information reported periodically under the Law Concerning the Rational Use of Energy (usage of fuels by type, electricity consumption by type, and energy intensity, etc.) should be released publicly.

- Analysis of emissions reduction potentials
  - An analysis of fuel consumption at two large thermal power stations belonging to Chubu Electric Power Co.—the Hekinan Thermal Power Station (coal), and the Kawagoe Thermal Power Station (liquefied natural gas)—revealed that the Hekinan plant consumes 1.4 times as much fuel as the Kawagoe plant to produce electricity, although its CO_2 emissions are 2.5 times greater. If fuel-specific data could be obtained, it would be possible to determine the reduction potentials by shifting fuels from coal to natural gas.
  - The energy intensity for Japan's manufacturing industry has deteriorated since 1990. Also, there are differences in energy efficiency between different facilities within the same industry. By making the less efficient ones achieve "top runner" levels (the highest efficiency in the market), it would be possible to reduce emissions in the medium term by improving energy efficiency. By sorting through data this way, Japan could find considerable potential for emissions reductions in each industry.
  - By properly obtaining and clarifying the data, and making it widely available, Japan could properly assess its potential for emissions reductions. Such an effort would also be beneficial for the design of Japan's domestic emissions trading system and carbon tax.

I. Introduction

The Kyoto Protocol entered into force in February 2005, and its first commitment period begins in 2008. In 2004, as part of a complete review of policies to address climate change in order to establish the necessary basic information, the Japanese government decided to introduce a system for mandatory accounting, reporting and disclosure of greenhouse gas emissions, targeting big emitters of greenhouse gases. In April 2005, Cabinet adopted the Kyoto Protocol Target Achievement Plan, which included the new system. This system was incorporated into the law concerning the protection of the Measures to Cope with Global Warming [Global Warming Law] (jurisdiction of the Ministry of the Environment), and in March 2008, data on the emissions of large emitters (for fiscal 2006) was released publicly for the first time.

This paper is an analysis of information disclosed based on requests for information under the said Law, for data on emissions from each of the designated facilities (14,225) as well as transport businesses (617) covered under the system.

The Kiko Network also requested data on annual consumption by fuel type and by type of electricity, covered by mandatory periodical reporting requirements for large businesses under the Law Concerning the Rational Use of Energy (jurisdiction of the Ministry of Economy, Trade and Industry), and has released the results of analysis based on information disclosed for fiscal 2000, 2003, and 2005.

Because the newly-released CO_2 emissions data under the mandatory accounting, reporting, and disclosure system was calculated as a basis for annual reporting under the Law Concerning the Rational Use of Energy, we conducted our analysis using all of the above data.

II. Trends in Japan's total GHG emissions

(1) GHG emission trends

Under the Kyoto Protocol Japan has made a commitment for a 6% reduction in greenhouse gas emissions compared to the base year (1990).

Japan’s GHG emissions (fiscal 2006) amounted to 1.34 billion tons (CO_2 equivalent), representing a 6.2% increase compared to the base year, and representing a 12.2% gap compared to the target reduction of 6%. Carbon dioxide (CO_2) emissions account for about 90% of the total GHG emissions, and CO_2 emissions have increased by 11.3% since 1990 (Figure 1).

Although the first commitment period begins in 2008, a declining trend in emissions is not yet evident. In the absence of any dramatic changes, there is little hope for Japan to achieve the Kyoto Protocol targets. The government plans to meet its target by utilizing forest sinks (3.8%) and purchasing carbon credits overseas (1.6%), but even with those measures, Japan would be unlikely to meet its target.

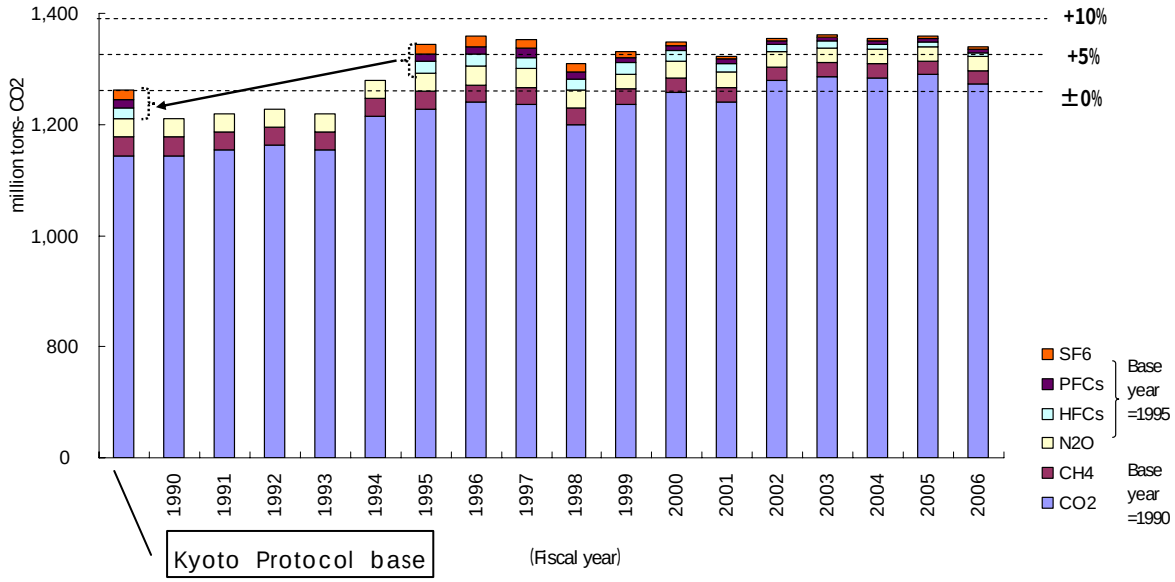

Figure 1. Trends in Japan's GHG emissions

Source: Ministry of the Environment, “Fiscal 2006 Greenhouse Gas Emissions (Confirmed Amounts)” .

(2) CO_2 emission trends, by sector

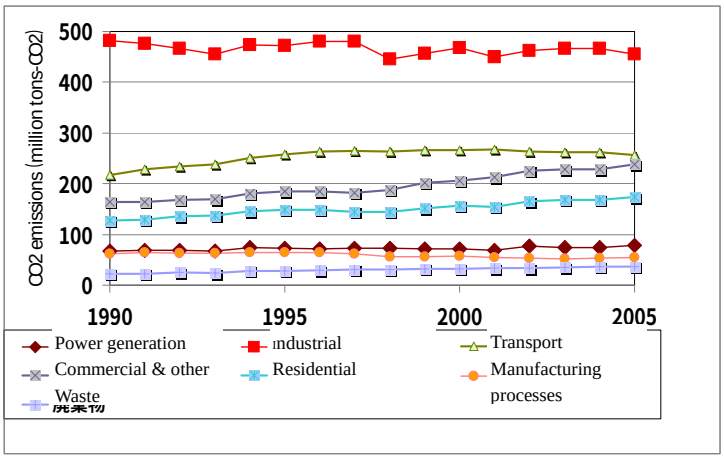

Figure 2. Sector-by-sector trends in CO2 emissions (indirect emissions from end user side)

Source: Prepared from GHG emissions inventory by Japan’s National Institute for Environmental Studies.

Looking at sector-by-sector trends, in indirect emissions, one notices a remarkable increase in CO_2 emissions since 1990 in the transport, commercial and residential sectors, calculated using emissions from the power generation sector (energy conversion sector) allocated to the final consumption sectors (transport sector showing a 16.7% increase, residential sector a 30.0% increase, and commercial sector a 39.5% increase), but the industrial sector (manufacturing) continues to account for a large part of emissions (a 4.6% reduction since 1990, but this sector accounts for 36% of total emissions) (Figure 2). Based on this statistics, industry repeatedly claims that industry sector has made significant efforts. It also claims that the effort to address climate change should be focused on changing individual’s lifestyle but not regulation to the industry.

(3) Increased emissions in electrical sector, and expansion of coal-fired power plants

Looking at direct emissions, one sees that emissions from the power generation sector (energy conversion sector) are the largest, and the most noticeable increase is also in power generation (Figure 3). More than half the increase in Japan's emissions from 1990 to 2006 was from power plants. The reasons for this increase are an increase in electricity consumption in the commercial and residential sectors, as well as a deterioration in emission factors in the electricity sector (Figure 4). The reason behind of this major increase in emission factors is the dramatic increase in emissions from coal-fired power plants (Figure 5). The increase in emissions from coal-fired power plants since fiscal 1990 is greater than the increase in emissions from Japan overall.

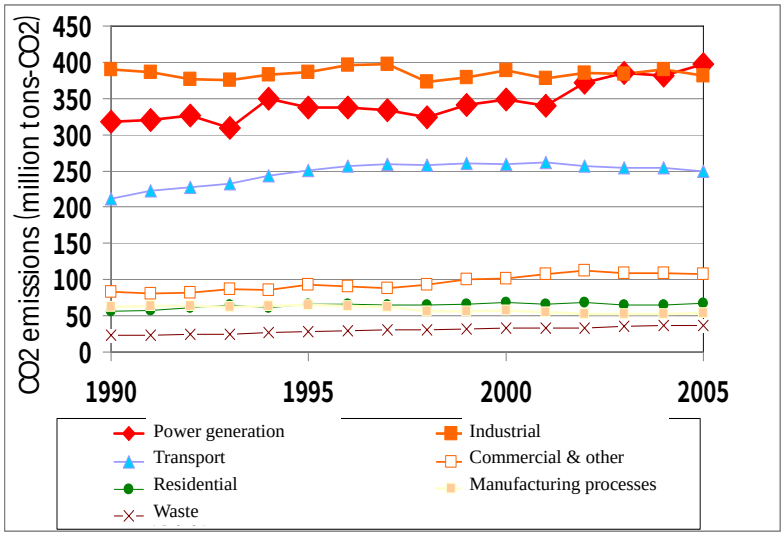

Figure 3. Sector-by-sector trends in CO_2 emissions (direct emissions)

Source: Prepared from GHG emissions inventory by Japan's National Institute for Environmental Studies.

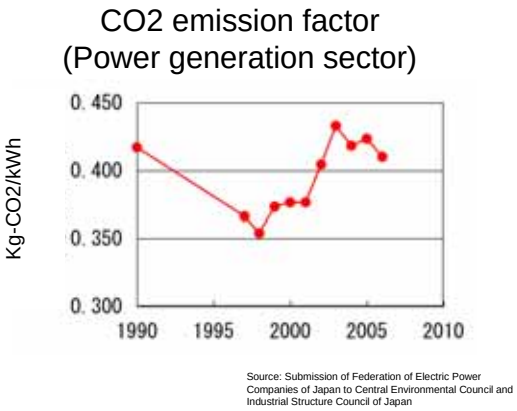

Figure 4. Emission factor trend in power sector

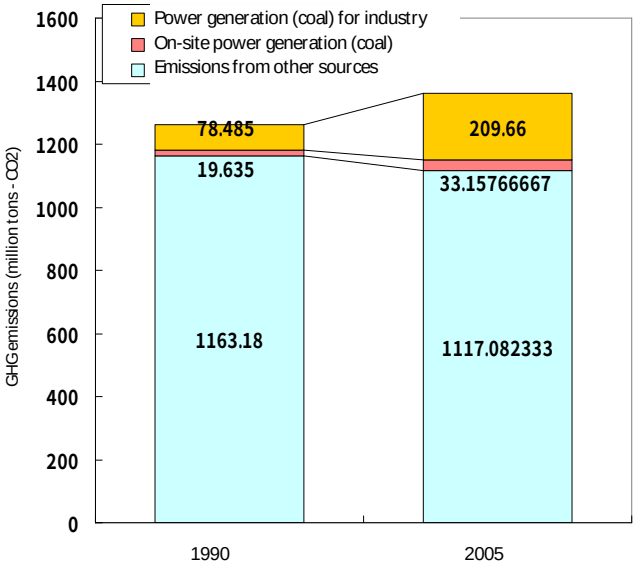

Figure 5. Trend in CO_2 emissions from coal

Source: Prepared from reporting data submitted to Central Environment Council and Industrial Structure Council, and from energy balance sheet of the Resources and Energy Agency.

BOX：Difference between emissions calculation based on direct and indirect emissions (calculated from end user side).

To determine the amount of Japanese emissions, it is essential to understand the difference between direct and indirect emissions. 'Direct emissions' are calculated as the CO_2 emissions the entire power industry for electricity generated at power stations, whereas 'indirect emissions' are calculated by allocating emissions associated with the generated electricity to the final consumption sectors, such as factories, offices, and households.

Internationally, it is common practice to calculate direct emissions, but in Japan the conventional approach is to calculate indirect emissions. Calculations using indirect emissions make it possible to ascertain the energy consumption that includes electricity in the final consumption sector. This approach, however, also makes it more difficult to see problems such as the deterioration in per unit CO_2 emissions in the power sector, for example, from an increase in the use of coal or drop in efficiency, and an increase in emissions could be blamed upon the final consumption sectors.

In principle, Japan's mandatory GHG accounting, reporting and disclosure system, uses indirect emissions data, but direct emissions from the power generation sector are also to be reported. The Kiko Network conducts its analyses based on both approaches.

III. Revelations from data available under the mandatory GHG emissions accounting, reporting, and disclosure system

(1) Sector-specific emissions ratios: Power sector accounts for 40% of total direct emissions

The publicly announced emissions of 14,225 designated facilities and 617 designated transport businesses subject to disclosure requirements are summarized by industry in Table 1. Under the statistics for indirect emissions, the manufacturing sector accounts for more than half of emissions from designated facilities and transport businesses. In the manufacturing sector, five industries (steel, chemicals, petroleum products, cement, pulp and paper) account for 80% of indirect emissions. If we count direct emissions, however (in other words, emissions from power plants as the CO_2 emissions from the power sector), it becomes clear that the power sector is a giant emitter, accounting for more than 40% of overall emissions. Table 2 lists the top twenty emitters.

Table 1. Emissions, by sector

	CO_2 emissions from energy sources (1,000 tons)		Total emissions of 6 GHGs (1,000 tons)	
	Direct emissions	Indirect emissions from end user side	CO_2 calculated from direct emissions	CO_2 calculated from indirect emissions from end user side
Total	**826,000***	**557,030**	**912,000***	**642,860**
Power sector	379,630	20,590	389,480	21,360
Manufacturing sectors		463,350		534,510
- Steel making		188,370		196,530
- Chemicals		77,400		91,010
- Petroleum and coal products		37,540		37,960
- Cement and related		35,760		72,630
- Pulp & paper products		28,420		31,680
- Other manufacturing		96,060		104,610
Non-manufacturing sectors		2,480		2,850
Commercial sector		32,760		46,510
Transport sector		37,640		37,640

Source: Prepared from GHG emissions reporting under Japan's Global Warming Law

Note 1: Asterisks indicate estimate by Kiko Network.

Table 2. Corporations ranking as top-twenty emitters

Rank	Company	Industry	Major sites (names in parentheses indicate prefecture)	GHG emissions (1,000 tons)	
				CO_2 (direct emissions)	CO_2 (indirect emissions from end user side)
1	Tokyo Electric Power Co., Inc.	Power generation	Futtsu (Chiba), Yokohama (Kanagawa), Ichihara (Chiba), Hirono (Fukushima)	68,920	
2	JFE Steel Corp.	Steel	Kurashiki (Okayama), Fukuyama (Hiroshima), Chiba (Chiba), Kawasaki (Kanagawa)		60,290
3	Nippon steel Corp.	Steel	Kimitsu (Chiba), Oita (Oita), Nagoya (Aichi), Kitakusyu (Fukuoka)		59,340
4	Chubu Electric Power Co., Inc.	Power generation	Hekinan (Aichi), Kawagoe(Mie)	55,340	
5	Electric Power Development Co., Ltd.	Power generation	Matsuura (Nagasaki), Anan (Tokushima)	43,940	
6	Tohoku Electric Power Co., Inc.	Power generation	Haramachi (Fukushima), Noshiro (Akita)	34,180	
7	Chugoku Electric Power Co., Inc.	Power generation	Yanai (Yamaguchi), Hamada (Shimane)	25,510	
8	Sumitomo Metal Industries, Ltd.	Steel	Kashima (Ibaraki), Wakayama (Wakayama)		22,140
9	Kyushu Electric Power Co., Inc.	Power generation	Oita (Oita), Kitakushu (Fukuoka), Reihoku (Kumamoto)	21,300	
10	Kansai Electric Power Co., Inc.	Power generation	Himeji (Hyogo), Osaka (Osaka), Maizuru (Kyoto)	20,500	
11	Hokuriku Electric Power Co., Inc.	Power generation	Tsuruga (Fukui), Nanao (Ishikawa)	17,560	
12	Kobe Steel Ltd.	Steel	Kakogawa (Hyogo), Kobe (Hyogo)		17,420
13	Taiheiyo Cement Corporation	Cement production	Hokuto (Hokkaido), Tsukumi (Oita)		16,860
14	Hokkaido Electric Power Co., Inc.	Power generation	Atsuma (Hokkaido)	13,920	
15	Nippon Petroleum Refining Company, Limited	Petroleum refining	Yokohama (Kanagawa), Kurashiki (Okayama)		10,530
16	Soma Kyodo Power Company Ltd.	Power generation	Shinchi (Fukushima)	10,520	
17	Sumitomo Osaka Cement Co., Ltd.	Cement production	Kochi (Kochi), Ako (Hyogo)		9,290
18	Mitsubishi Materials Corp.	Cement production, nonferrous metals	Karita (Fukuoka), Naoshima (Kagawa)		8,940
19	Ube Industries Ltd.	Cement production	Mine (Yamaguchi)		8,780
20	Shikoku Electric Power Co., Inc.	Power generation	Anan (Tokushima), Sakaide (Kagawa)	9,720	

(2) Disparities in emissions, by size of facility

- **Analysis of indirect emissions (end user side)**

Turning now to CO_2 emissions from energy sources, by analysis calculated from the indirect emissions approach (end-user side), the emissions from 14,225 designated facilities and 617 designated transport businesses accounted for 48% of Japan's total emissions (CO_2 from energy sources on end user side), of which 7,586 Type I facilities under the Law Concerning the Rational Use of Energy account for about 50% of the subject facilities, representing more than half of those emissions.

- **Analysis of direct emissions**

Emissions from power plants plus the totaled direct emissions account for 67% of Japan's total CO_2 emissions. Furthermore, the direct emissions from just 200 facilities account for 50% of Japan's GHG emissions. Of particular note, just 111 facilities in the power generation and steel sectors account for 40% of Japan's emissions (Figure 6, Figure 7).

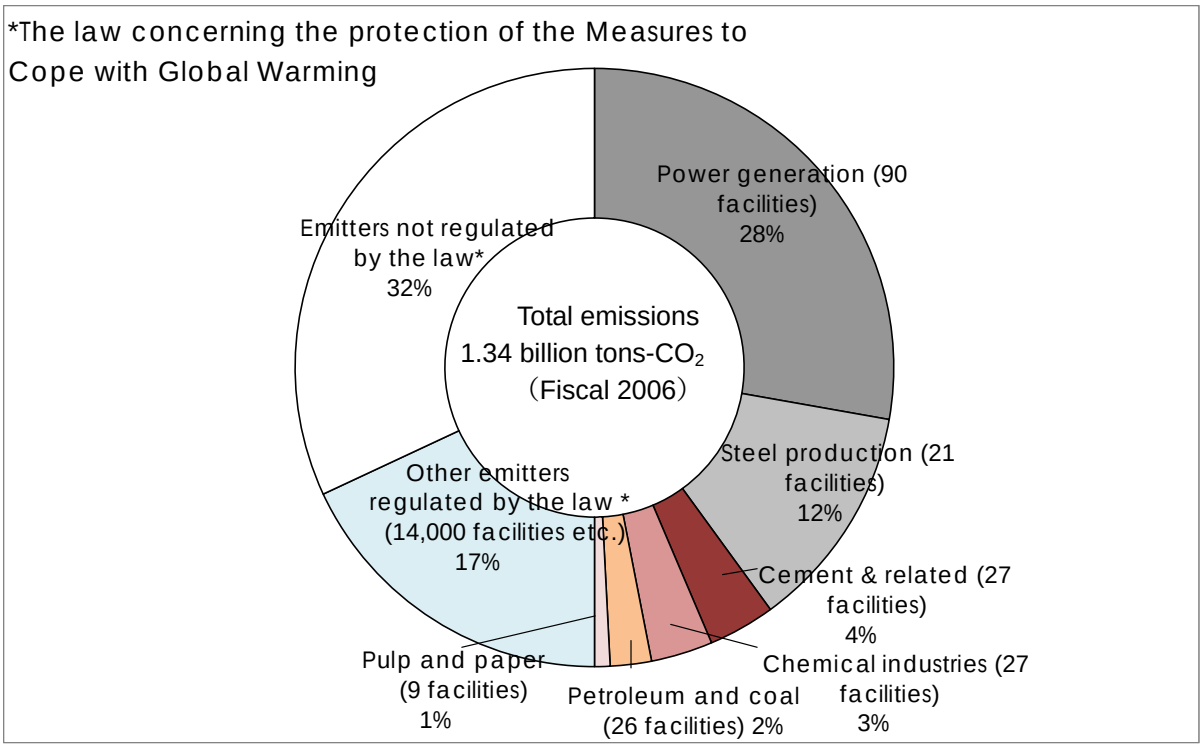

Figure 6. Ratio of emissions from Japan's big emitters (direct emissions)

Source: Estimated from GHG inventory and emission reports under the Global Warming Law.

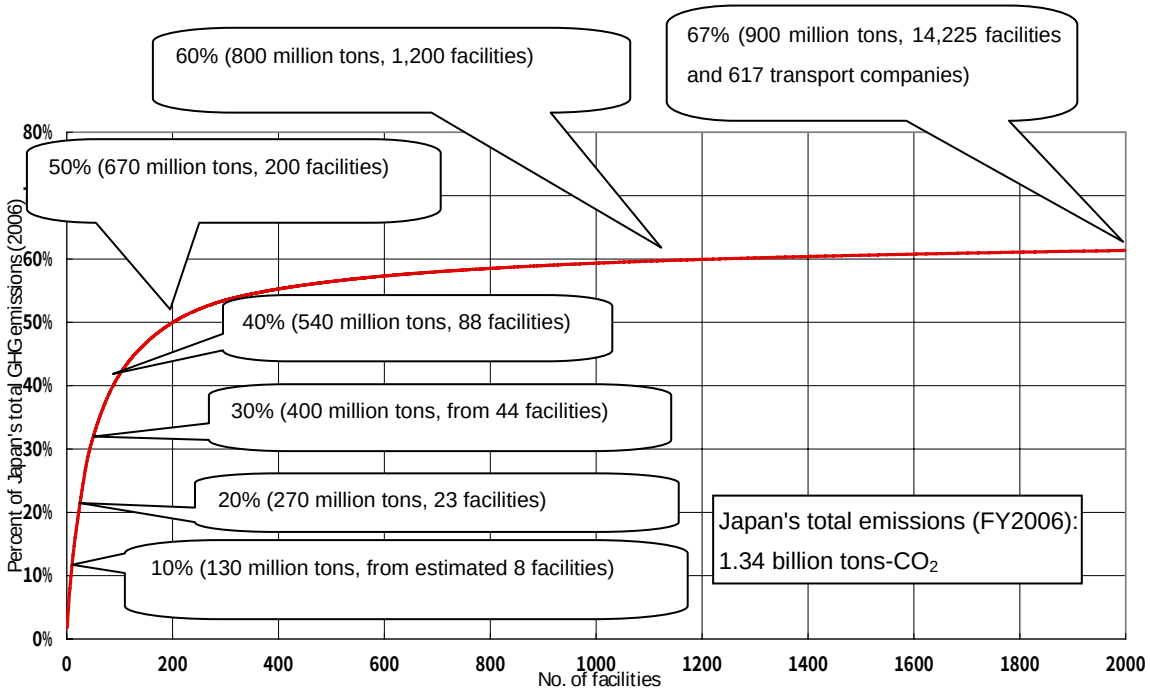

Figure 7. Ratio of large facilities in Japan's GHG emissions

Source: Prepared from GHG inventory and emission reports under the Global Warming Law. Direct emissions are estimated from statistics on direct and indirect (end user side) emissions, as indicated in emissions inventories.

(3) Top emitting prefectures

Statistics of indirect emissions from end user side show the large prefectural emitters, including Chiba Prefecture at 50.29 million tons (about 8% of Japan's designated facilities and transport businesses), and Aichi Prefecture at 42.73 million tons (about 7%). The top ten prefectures, down to Okayama Prefecture, exceed 50% of the national figure. Each of the top 10 prefectures has steelmaking plants and chemical complexes. For example, Chiba Prefecture is the home of two blast furnace steel plants and Ichihara City with a chemical complex, while Aichi Prefecture has a steel plant in Tokai City.

(4) Emissions from major transport businesses

Fiscal 2006 CO_2 emissions (end user side) from 625 designated transport businesses (large transport operators) amounted to 37.64 million tons, accounting for about 15% of emissions from Japan's transport sector (Figure 8). Cargo vehicles accounts for 3% of emissions from the transport sector in Japan, passenger trains account for 4%, and air travel accounts for 3%. The concentration of emissions in these sectors is

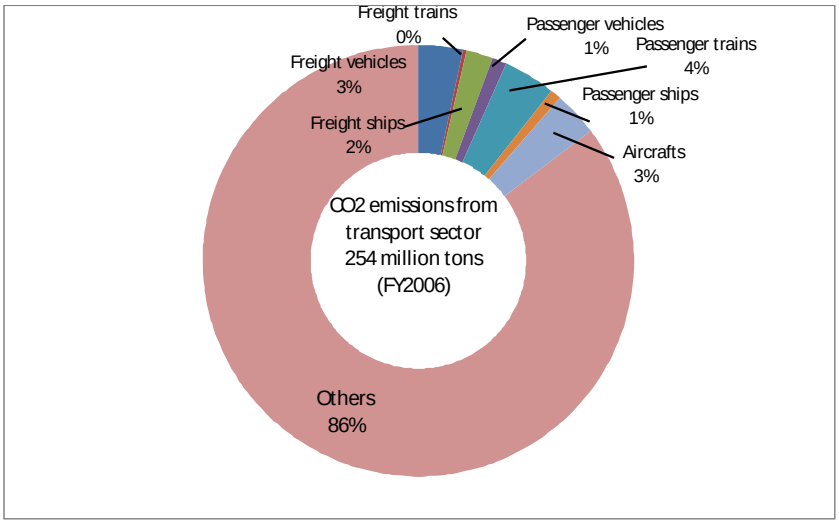

Figure 8. Ratio of emissions in transport sector

shown in Figure 9. Two companies (both being airlines) account for 23% of emissions from designated transport businesses, and 16 companies account for 50% of emissions from designated transport businesses.

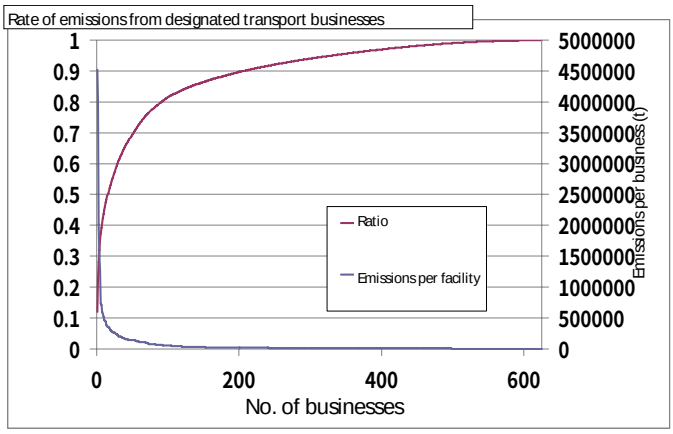

Figure 9. Concentration of emissions from transport businesses

(5) Emissions from designated shippers

The CO_2 emissions from energy sources from 846 designated shippers that ship over 30 million kilogram-kilometers in transport volume per year amounted to 19.28 million tons, accounting for about 20% of the CO_2 emissions from the entire transport and freight sector (about 100 million tons) in fiscal 2006.

The manufacturing sector accounts for 80% of designated shippers overall, and within the manufacturing sector, five industries (steel, chemicals, cement, petroleum and coal products, pulp and paper) accounted for 40% of designated shippers overall. Seventy designated shippers accounted for 50% of emissions (Figure 10).

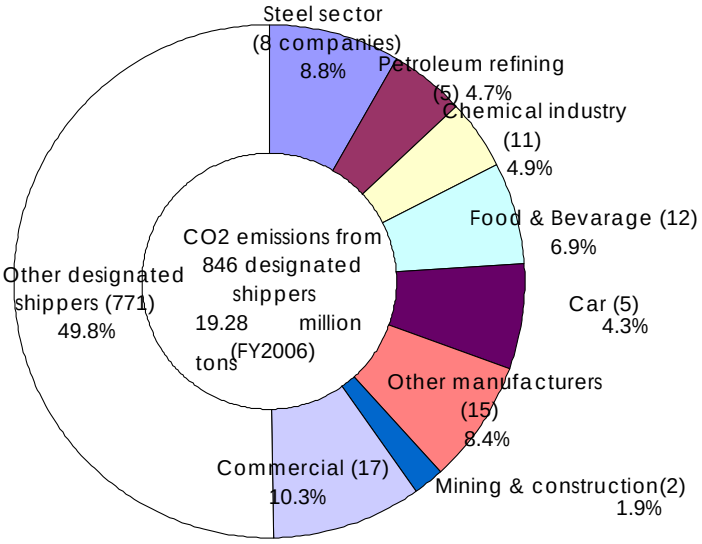

Figure 10. Sectoral share of 70 top emitters (designated shippers)

Note: Prepared from GHG inventory and emission reports under the Global Warming Law.

IV. Facilities that did not disclose emissions data

In response to requirements, 14,189 (99.7%) of 14,225 facilities provided information. Among those that did not disclose emissions data there were 36 facilities of 14 companies (31 facilities of 11 companies in steel, 3 facilities of 2 companies in chemicals, and 2 facilities of 1 company in metal products industries) (Table 3). They account for a significant share of Japan's total emissions. In particular, 100% of large companies using blast furnaces to manufacture steel failed to provide data.

(1) Estimates for 36 facilities that did not disclose emission data

(a) Some estimates can be done for non-disclosing facilities by using local regulations

Data for six of the facilities that did not disclose data could be determined through additional analysis of data available under local reporting and disclosure systems in Osaka, Hiroshima, and Mie Prefectures (currently available up to fiscal 2005) (Figure 4). While these companies had disclosed data under local prefectural regulations, citing certain reasons, they had requested and received permission from the Minister of Economy, Trade and Industry not to disclose information to the national government. No explanations have been provided publicly for the reasons cited by these companies or the decision of the government, and these actions are clearly in violation of regulations. In fact, on 2 April 2007, the ministers having jurisdiction for these matters under the Prime Minister jointly signed a statement titled "Criteria for judgment on possible damage to rights or benefits", the text of which states clearly that "In cases where information associated with reports about amounts of calculated greenhouse gas emissions can normally be obtained publicly, it has been determined that there is no threat of damage to rights or benefits by disclosing such information." These cases of failure to disclose information are also in violation with this judgment.

The steel industry is believed to have the greatest impact on Japan's emissions. The fact that the status of the emissions of several companies was not reported due to faulty judgment exposes a serious flaw in the information disclosure regulations under existing legislation. This situation also reveals the impropriety of the METI minister's decision to approve the request for permission not to disclose data.

(b) Calculations based on other facilities, independent estimates

It was possible to ascertain emissions for five other facilities by making inferences from industry totals, prefectural totals and so on, or by making inferences from emissions data obtained from local governments as stated in (a) above. Kiko Network was able to make estimates for the remaining 25 facilities based on the information indicated above.

(2) Rankings of top-twenty big emitting facilities

After compiling the data indicated above, it became clear that seven of the top ten big emitters of Japan's total emissions are in the steel industry (all steel mills with blast furnaces), and that three of the top ten are coal-fired power generation facilities (Table 5). Furthermore, we estimate that the top twenty facilities account for about 20% of Japan's direct GHG emissions; these findings reveal the high proportion of emissions coming from a small number of large facilities.

Table 3. Facilities not disclosing data

Industry		No.	No.	Company	Site	Prefecture	City or town	Company's overall emissions 1,000t- CO_2	Ratio to Japan overall
Main	Sub-sector								
Steel	Blast furnace steel	1	1	Nippon Steel Corp.	Kimitsu Works	Chiba	Kimitsu	5,934	4.4%
			2		Nagoya Works	Aichi	Tokai		
			3		Oita Works	Oita	Oita		
			4		Yahata Works	Fukuoka	Kitakusyu		
			5		Sakai Works	Osaka	Sakai		
			6		Muroran Works	Hokkaido	Muroran		
			7		Kamaishi Works	Iwate	Kamaishi		
		2	8	JFE Steel Corp.	West Japan Works, Kurashiki	Okayama	Kurashiki	6,029	4.5%
			9		West Japan Works, Fukuyama	Hiroshima	Fukuyama		
			10		Chita Works	Aichi	Handa		
			11		East Japan Works, Nishinomiya	Hyogo	Nishinomiya		
			12		East Japan Works, Keihin	Kanagawa	Kawasaki		
			13		East Japan Works, Chiba	Chiba	Chiba		
		3	14	Sumitomo Metal Industries, Ltd.	Kashima Works	Ibaraki	Kashima	2,214	1.7%
			15		Wakayama Works	Wakayama	Wakayama		
			16		Wakayama Works（Kainan）	Wakayama	Kainan		
		4	17	Kobe Steel Ltd.	Kakogawa Works	Hyogo	Kakogawa	1,742	1.3%
			18		Kobe Works	Hyogo	Kobe		
		5	19	Nisshin Steel Co., Ltd.	Kure Works	Hiroshima	Kure	833	0.6%
			20		Sakai Works	Osaka	Sakai		
			21		Ichikawa Works	Chiba	Ichikawa		
			22		Osaka Works	Osaka	Osaka		
			23		Toyo Works	Ehime	Saijo		
			24		Amagasaki Works	Hyogo	Amagasaki		
		6	25	Sumitomo Metal Industries, Ltd., Kokura		Fukuoka	Kitakushu	327	0.2%
		7	26	Hokkai Iron & Coke Corporation		Hokkaido	Muroran	378	0.3%
	Other	8	27	Sumitomo Metal Industries, Ltd., Naoetsu		Niigata	Joetsu	Undisclosed	
		9	28	Nippon Steel & Sumikin Stainless Steel Corporation	Kashima Works	Ibaraki	Kashima	88	0.1%
			29		Yawata Works	Fukuoka	Kitakusyu		
		10	30	Nisshin Garuba		Chiba	Yachiyo	Undisclosed	
		11	31	Nisshin A&C Co., Ltd.	Yachiyo Plant	Chiba	Yachiyo	Undisclosed	
Chemicals		12	32	Tosoh Corporation	Yokkaichi Complex	Mie	Yokkaichi	769	0.6%
			33		Nanyo Complex	Yamaguchi	Shunan		
		13	34	Ube Ammonia Private Limited Company		Yamaguchi	Ube	155	0.1%
Metal product manufacturer		14	35	JFE Container Co., Ltd.	Sakai Plant	Osaka	Sakai	0.5	0.0%
			36		Kawasaki Plant	Kanagawa	Kawasaki		

Table 4. Facilities and the disclosed data under local prefectural regulations

Company, facility	Site	Industry	CO_2 from energy sources (indirect emissions from end user side) 1,000 tons	CO_2 from non-energy sources 1,000 tons	CO_2 Total (incl. other gases and emissions from waste recycling) 1,000 tons	Remarks
Nisshin Steel Co., Ltd., Kure Works	Kure (Hiroshima Pref.)	Steel	6,820	480	7,310	Hiroshima prefectural ordinance
Tosoh Corporation Yokkaichi Complex*	Yokkaichi (Mie Pref.)	Chemicals	1,861	14	1875	Mie prefectural ordinance
Nippon Steel Corp. Sakai Works	Sakai (Osaka Pref.)	Steel	113		113	Osaka prefectural ordinance
Nisshin Steel Co., Ltd. Osaka Works	Osaka (Osaka Pref.)	Steel	229		229	
Nisshin Steel Co., Ltd. Sakai Works	Sakai (Osaka Pref.)	Steel				
JFE Container Co., Ltd. Sakai Complex	Sakai (Osaka Pref.)	Metal product	2		2	

Note: Figures for Tosoh Corporation (Yokkaichi site) are reference values from fiscal 2004.

Table 5. Top-twenty big emitting facilities

Rank	Company, facility	Site	Industry	GHG emissions (1,000 tons)	
				CO_2 calculated from Direct emissions	CO_2 calculated from indirect emissions from end user side
1	Chubu Electric Power Co., Inc., Hekinan Thermal Power Plant	Hekinan (Aichi Pref.)	Power generation (coal)	24,100	
2	JFE Steel Corp., West Japan Works, Fukuyama	Fukuyama (Hiroshima Pref.)	Steel		21,310
3	JFE Steel Corp., West Japan Works, Kurashiki	Kurashiki (Okayama Pref.)	Steel		21,000
4	Nippon Steel Corp., Kimitsu Works	Kimitsu (Chiba Pref.)	Steel		19,000
5	Kobe Steel Ltd., Kakogawa Works	Kakogawa (Hyogo Pref.)	Steel		14,500
6	Sumitomo Metal Industries, Ltd., Kashima Works	Kashima (Ibaraki Pref.)	Steel		14,000
7	Nippon Steel Corp., Oita Works	Oita (Oita Pref.)	Steel		14,000
8	Nippon Steel Corp., Nagoya Works	Tokai (Aichi Pref.)	Steel		13,000
9	Tohoku Electric Power Co., Inc., Haramachi Thermal Power Plant	Haramachi (Fukushima Pref.)	Power generation (coal)	12,620	
10	Electric Power Development Co., Ltd., Matsuura Thermal Power Station	Matsuura (Nagasaki Pref.)	Power generation (coal)	11,100	
11	Electric Power Development Co., Ltd., Tachibanawan Thermal Power Station	Anan (Tokushima Pref.)	Power generation (coal)	10,980	
12	Chubu Electric Power Co., Inc., Kawagoe Thermal Power Plant	Kawagoe (Mie Pref.)	Power generation (LNG)	10,800	
13	Soma Kyodo Power Co., Ltd., Shinchi Thermal Power Plant	Shinchi (Fukushima Pref.)	Power generation (coal)	10,520	
14	Hokkaido Electric Power, Tomato-Atsuma Power Plant	Atsuma (Hokkaido Pref.)	Power generation (coal)	9,580	
15	JFE Steel Corp., East Japan Works, Keihin	Kawasaki (Kanagawa Pref.)	Steel		9,000
16	JFE Steel Corp., East Japan Works, Chiba	Chiba (Chiba Pref.)	Steel		9,000
17	Tohoku Electric Power Co., Inc., Nigata Power plant	Seiro (Nigata Pref.)	Power generation (LNG)	8,560	
18	Electric Power Development Co., Ltd., Takehara Thermal Power Station	Takehara (Hiroshima Pref.)	Power generation (coal)	8,290	
19	Joban Joint Power Co., Ltd., Nakoso Power Plant	Iwaki (Fukushima Pref.)	Power generation (coal, etc.)	8,230	
20	Nippon Steel Corp., Yawata Works	Kitakushu (Fukuoka Pref.)	Steel		8,200

Note: Some figures are estimates.

V. The need to strengthen the current mandatory accounting, reporting, and disclosure system

(1) Delete inappropriate clauses about “protection of rights”

Through the first reporting cycle conducted under Japan’s mandatory accounting, reporting and disclosure system for GHG emissions, under the Global Warming Law, the emissions data for nearly 15,000 of Japan’s major business facilities were disclosed and shared with the public in list form. This reporting process represents an important step forward in terms of establishing the invaluable informational basis for the development, implementation, evaluation and revision of policies to address climate change, which is caused by a broad range of human activities.

Nevertheless, as stated above, information was not disclosed for 36 facilities (including many extremely large emitters, including those in the steel industry) that requested an exemption based on an inappropriate protection-of-rights clause. When it comes to determining which companies are subject to (or exempt from) information disclosure requirements, this system is still influenced to some extent by the wishes of the businesses involved.

Moreover, non-disclosers such as those in the steel industry, include companies that are calling for the introduction of sectoral approaches and benchmark indicators to establish targets both domestically and internationally. Such initiatives, if they are to be introduced, must be based upon transparency of emission data. It is therefore necessary to delete any clauses that permit the protection of special rights.

(2) The need for reporting and disclosure of information from the annual reporting under the Law Concerning the Rational Use of Energy

Because the system under the Global Warming Law is a reporting and disclosure system only for total amounts of CO_2 from energy sources, (a) the potential for CO_2 emissions reductions through fuel switching is not verifiable, and (b) even if there is a considerable difference between facilities in a given industry in terms of CO_2 emissions intensity and energy consumption intensity, it is not possible to assess their levels properly, thus making it impossible to fairly evaluate the need for and appropriateness of strengthening emissions reduction and other measures.

Meanwhile, the Law Concerning the Rational Use of Energy totals use of fuel and electricity to determine the size of energy consumptions, and is applicable to Type 1 designated facilities being 3,000 kiloliters and Type 2 designated facilities being 1,500 kiloliters or greater (about 3,000 tons CO_2 equivalent, assuming fossil fuels), makes it mandatory for those facilities to submit annual reports to the government, including fuel use (by fuel type), electricity use (by type of use), and energy intensity, etc. These reports should be disclosed as essential information for the planning,

development, evaluation and review of policies to address climate change, and should be reflected in measures to address climate change.

(3) The need for accounting, reporting, and disclosure of direct emissions, on a facility-by-facility basis

Under the current system, not only is it impossible to obtain the statistics by fuel type for CO_2 from energy sources, there is also no distinction made between fuel and electricity consumption calculated on the end-user side. Thus, it is not possible to calculate direct emissions. It is necessary to modify the system into a reporting and disclosure system that treats fuel and electricity separately, in order to give separate treatment to actions in the electricity generation sector and actions in the electricity consumption sector, and to link them effectively.

IV. Analysis of emission reduction potentials in Japan

(1) Analysis of potential for fuel shifting by determining emissions on a fuel-by-fuel basis

Because coal emits twice the amount of CO_2 compared to natural gas for the same amount of energy (Figure 11), it is possible to reduce CO_2 emissions just by switching a fuel from coal to natural gas. However, because the price of coal is cheaper, the power generation and raw materials industries have been increasing the proportion of coal used, rather than preventing climate change. This dynamic has been a major factor in the increase of Japan's emissions. If we could ascertain the details on a fuel-by-fuel basis, it would be possible to examine the prospects for fuel shifting in each factory; the future reductions would become possible through fuel shifting, and this information would also serve as basic data for green procurement policies and the consideration of other policies.

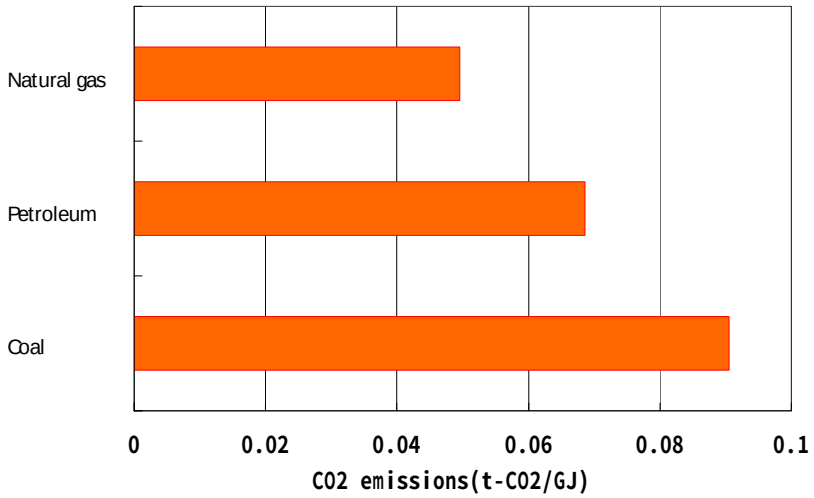

Figure 11. Differences in CO_2 emissions from different fuels

Source: Estimated from greenhouse gas emissions reports.

Based on information obtained by Kiko Network's requests for information, for example, we compare the fiscal 2005 results for the Hekinan Thermal Power Station (coal), and the Kawagoe Thermal Power Station (liquefied natural gas)—two major plants of Chubu Electric Power Co. To produce electricity, the Hekinan plant consumes 1.4 times the fuel of the Kawagoe plant but emits 2.5 times the CO_2 emissions.

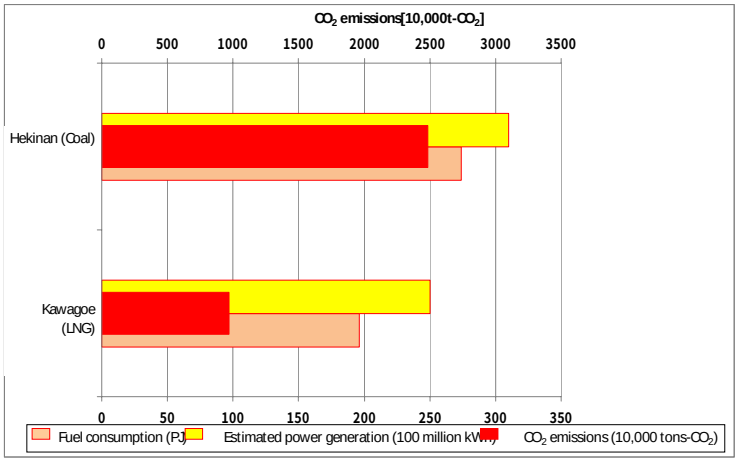

Figure 12. Example of differences in CO2 emissions from different fuels at electrical power plants

Source: Estimated from greenhouse gas emissions reports.

This is mainly because the Hekinan plant uses coal, which is high in CO_2 emissions, whereas the Kawagoe plant uses liquefied natural gas (LNG), which is comparatively low in CO_2 emissions. This example suggests that the potential exists to reduce emissions by more than 10 million tons by switching the Hekinan plant from coal to LNG.

Table 6. Major thermal power plants of Chubu Electric

Main fuel	Plant name	CO_2 emissions (1,000t-CO_2)	Fuel consumption (PJ)	Estimated power generated (billion kWh)	Electricity generation efficiency
Coal	Chubu Electric Power Co., Inc., Hekinan Thermal Power Plant	24,840	274	31	40%
LNG	Chubu Electric Power Co., Inc., Kawagoe Thermal Power Plant	9,710	196	25	45%

Source: Calculated by Kiko Network from annual reporting under the Law Concerning the Rational Use of Energy. Estimates of power generated were calculated by multiplying fiscal 2005 fuel consumption by fiscal 2003 actual power generation efficiency figures (Summary of electricity supply and demand, by Ministry of Economy, Trade and Industry).

(2) Analysis of facility-by-facility disparities in energy efficiency

The energy intensity of production for Japan's manufacturing industry has deteriorated since 1990.

Furthermore, large discrepancies exist in energy efficiency between different facilities even within the same industry. Figure 13 shows the distribution of power generation efficiencies of power plants for amounts generated in fiscal 2003, revealing a large discrepancy between the average and the "top runner" power plants. By modeling the current "top runner" level being achieved in other facilities using existing technologies, it is possible to calculate the medium-term reduction prospects possible from energy conservation—for an entire industry, and for each individual facility. This type of data is becoming increasingly compelling from Kiko Network's analysis of data obtained through information disclosure.

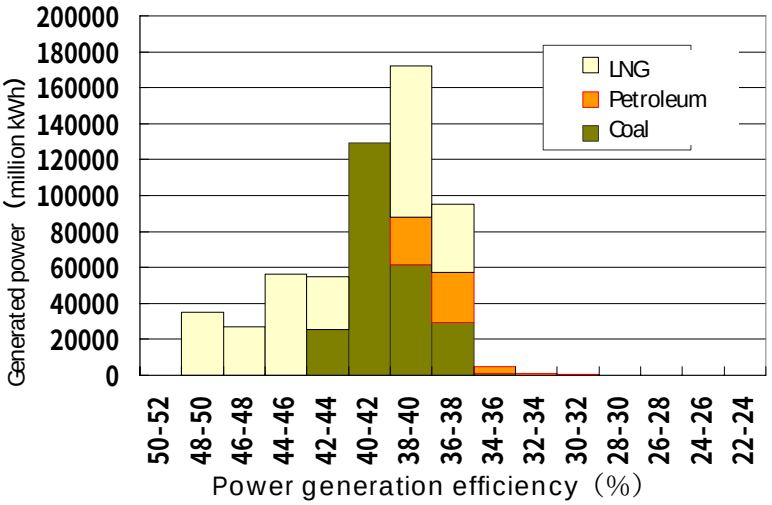

Figure 13. Power generation efficiency of thermal power plants of typical power companies

Source: Prepared from "Summary of Electricity Supply and Demand 2003" from Resources and Energy Agency (figures not release for 2004 onward).

The Tokyo Metropolitan Government has already provided an example of this approach in the commercial sector. Figure 14 presents information from the TMG to which we have added some details.

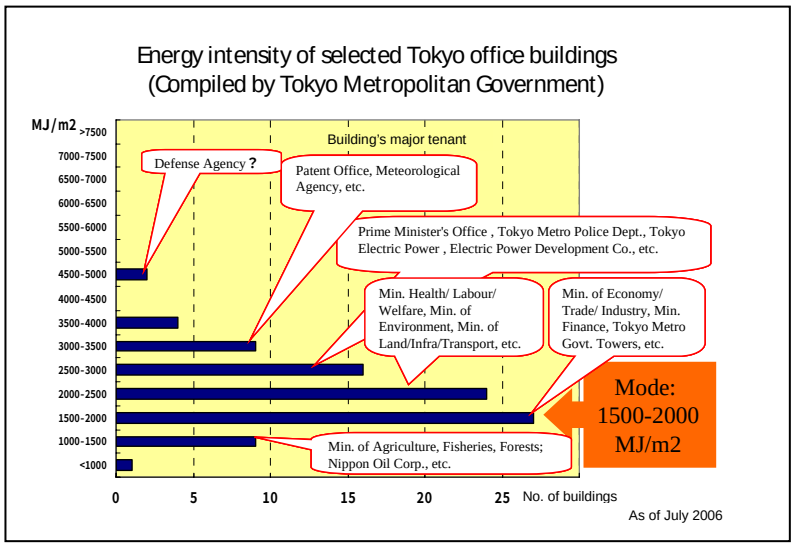

Figure 14. Energy intensity of major office buildings in Tokyo

Prepared from materials on Global Warming Prevention Plan, Bureau of Environment, and Tokyo Metropolitan Government.

If emissions disclosure systems incorporate efforts to visually express the results of efforts at facilities—for example, by including information such as energy intensity (or efficiency) and per-unit CO_2 emissions —allowing users to make facility-by-facility comparisons, they will be able to understand the

current state of energy conservation in each facility as well as the future potential to reduce emissions. Furthermore, citizens and local governments could support those businesses that are making good efforts, by buying their products and services through “green purchasing.” This type of information could also serve as basic data when the national government and local governments consider their policies.

(3) The significance of this data as basic information for introduction of an emissions trading system and carbon tax

The fact that different facilities within each industry have different levels of energy efficiency means that in each industry, the potential exists to achieve reductions in the medium term through energy conservation by making inefficient facilities improve to the level of the “top runner.” There is still considerable potential for Japan to reduce emissions in each industry, and this realization suggests that the effort is in no way like trying to “wring water from a dry towel”, which industry claims constantly, —much remains to be achieved. The problem is that analysis and measurement of the real potential to reduce emissions is not being done in a transparent manner.

In the future, if we can properly ascertain data on a facility-by-facility basis and if this data is released widely, it will become possible to properly assess the potential for Japanese businesses to achieve further emissions reductions. Such a system would also play a beneficial role in the design of Japan’s domestic emissions trading system and carbon tax. Having availability of reliable data and immediate introduction of effective policies and measures based on the data, it is certain to say that Japan can meet 6% Kyoto target in 1st commitment period mainly through domestic action, Furthermore, it is not at all impossible to set deeper reduction target in the range of 25-40% by 2020 compared to 1990 level.

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