Tokyo Steel's Views to Global Warming revised on June 25, 2010 with the latest data

1. Introduction

A worldwide movement to control global warming is under way. In 1997, the Kyoto Protocol became the world's first international agreement on the issue, producing commitments by principally European countries and Japan to reduce their CO_2 emissions in 2012 by about 5% compared with 1990. Further discussions have been continued at the summits and international conferences, trying to determine additional and stricter targets, and to fashion a system in which all nations can participate.

Taking action against global warming is the responsibility of current generations. We must act now to reduce CO_2 emissions and develop the alternatives for fossil fuels to preserve the Earth's environment.

In Japan, we hope that fair and proper action is taken to determine how to reduce CO_2 emissions and to cover the cost of developing alternative resources—and how to decide such issues as who should bear the costs.

According to Japan's Ministry of the Environment, Japan produced about 1.2 billion tons of CO_2 emissions from fuel combustion in 2007, equivalent to 4% of the world total. Of this amount, the CO_2 emissions of the Japanese steel industry, after emissions from the electric power companies having been allotted to each electricity user based on its electricity consumption, account for 14% of the total (FY2008[1]), the highest proportion among all the industries. Since steel is essential for the society to achieve industrial development, there is a clear need to find a way to reduce CO_2 emissions in manufacturing steel.

There is a big difference in CO_2 volume between two methods used to manufacture steel; making one ton of steel through a blast furnace method emits two tons of CO_2 compared with less than 0.5 tons by an electric furnace. For exactly the same type of steel, the CO_2 emissions from an electric furnace mill are one fourth that of a blast furnace mill.

As a supporter of industrial development, we have been recycling the valuable domestic resource of steel scrap into a wide range of steel products since Tokyo Steel's foundation in 1934, and as a company which plays an important role in establishing society where wastes are well managed through proper reusing or recycling, we have saved energy

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[1] Fiscal years are determined by the year in which they started, i.e. fiscal 2008 is the period from April 2008 to March 2009, the same holds hereafter.

and resources for the society. We have made uninterrupted efforts in our steel making processes as well to realize even more savings.

Our efforts to promote effective recycling of steel scrap will result more reduction of CO_2 and consequently contribute further prevention of global warming. And we agree to pay taxes based on emission volume of each tax payer, if it is necessary for the government to impose taxes for the purpose of researching and developing of the alternative energies, and realizing less carbon dioxide society.

In the following chapters, we report on our past contributions and further contributions we are going to make and our views on the aspect of how the society, industries and individuals approach to reduce CO_2 emissions.

2. A History of Our Contributions to Reducing Industry's Environmental Impact as a Scrap Recycler

Steel scrap recycling has always been our main business. In the beginning, we produced so-called electric furnace products—small size structural and reinforcing bars—and supplied Japanese society as the fundamental materials needed for reconstructing its infrastructure after WW II. When demand grew for higher value-added materials, we entered the H beam and large-size structural markets, which were dominated by blast furnace mills. As we competed with the blast furnace mills, we also became the No. 1 electric furnace steel maker in Japan. In 1990, the benchmark year of the Kyoto Protocol, we produced 3.58 million tons of steel. Of this total, the traditional electric furnace products of reinforcing bars and small size structural like steel angles accounted down to 39.4% and 2.4% respectively, while in contrast, the share of products that compete with those of blast furnaces had risen to over half of our production, at 58.2%. In other words, through our supply of a growing share of traditional blast furnace products to the market at a far lower energy cost, we could contribute to reducing the environmental impact of our society as a whole.

Since then, we have continued our active efforts to expand the variety of steel products that can be recycled from a valuable domestic resource, steel scrap, even to the area where had been thought difficult to be produced by electric furnace.

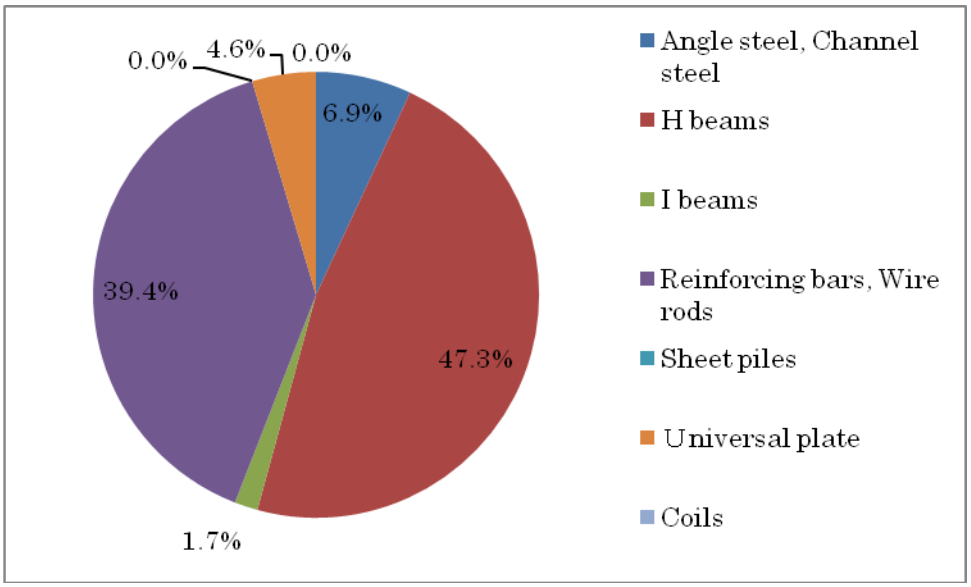
We started to produce hot rolled coil at our Okayama factory in October 1991. At the time, steel sheet product like hot rolled coil was in Japan regarded as a product that only blast furnaces could make, and its production was dominated by blast furnace mills. Steel sheets have broad application throughout industry, including automobiles, electric appliances, equipments and industrial machinery. According to a breakdown of steel production in Japan, steel sheets accounted for about 53.6% of total, or 40 million tons, in FY2008. Although the technical specifications required by major customers, such as automobile, home appliance, and machinery companies, were very demanding, we improved our technology to ensure stable product quality whatever the quality of steel scrap used. Working repeatedly with our customers on quality issues in the beginning, we have steadily built a base for electric-furnace-made steel sheet in the market. Redoubling our efforts, we stepped up to more products, including pickled and oiled (P & O) steel (1995) and galvanized steel (1997), expanding our presence in the steel sheet market.

We also commenced production of jumbo H beams (March 1992) and sheet piles

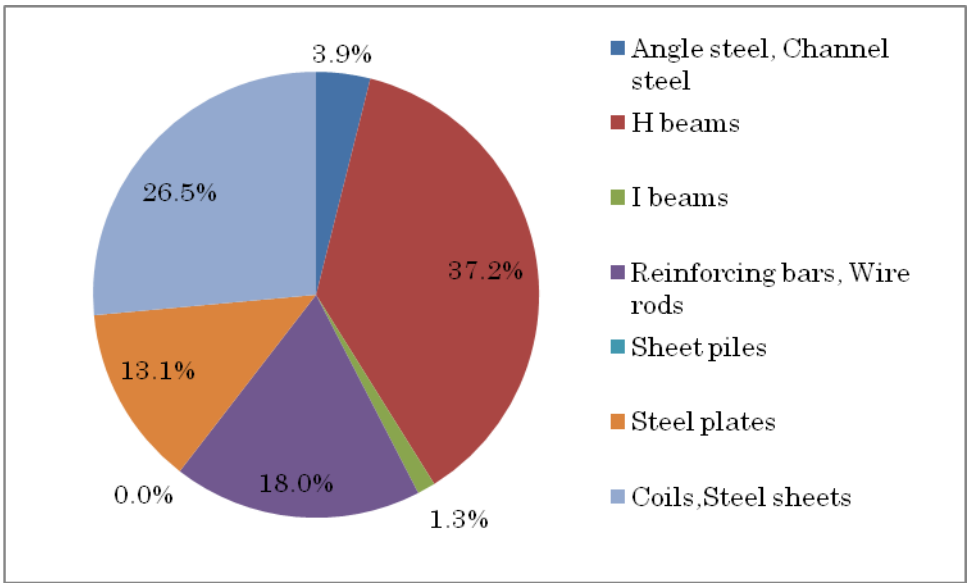
(February 1994), both at Kyushu factory, and aiming to boost sales of H beams, we built the Utsunomiya factory (1995) in the Kanto area, Japan's biggest market. Notably, the Utsunomiya factory was Japan's first new steel works in ten years. Among other new products, we began producing heavy plate in our Kyushu factory in February 2007. In fiscal 2008, total heavy plate production in Japan amounted to 13.6 million tons, or 18.1% of total steel production, and blast furnaces accounted for 89.5% of that total. Heavy plate has application in civil engineering and construction and machinery and equipment manufacturing as well as shipbuilding—which requires the same strict quality control as the automobile industry. As proof of that quality, Japanese shipyards started using our products in fiscal 2008.

The success of our efforts to enter new markets and sell products hardly ever produced by electric furnaces is apparent in the shift in our product composition. In FY2009, products competing with those of blast furnaces accounted for 80.9% of our total production.

FY1990 Product Composition



FY2009 Product Composition



As shown above, we decreased the proportion of so-called electric furnace products, replacing them with products that had been dominated by blast furnace mills and other electric furnace mills found difficult to make. Throughout this process, we concentrated on achieving higher applications for Japan's valuable steel scrap resources. Since our CO_2 emissions are one fourth that of blast furnaces that use iron ore and coal, it can be said that Tokyo Steel has a history of reducing the environmental impact of our industry.

3. CO_2 Emissions of Electric Furnaces Compared with Blast Furnaces

There are two main methods of producing crude steel on an industrial basis.
In the blast furnace method, iron ore and coke (carbonized coal used as a reduction agent) are fed into a furnace, producing pig iron. The pig iron is then refined into crude steel. Located in a natural resource-poor country, Japanese blast furnace mills import almost all of their iron ore and coal. In contrast, the electric furnace method produces crude steel by using electricity and oxygen to melt and refine steel scrap. In contrast to the raw materials used in the blast furnace method, steel scrap is plentiful in Japan, being basically generated in all regions.
Furnace size is another of the distinctive characteristics of Japanese blast furnace mills. All of them use huge furnaces to maximize productivity. Because it is both difficult and costly to stop operations and reheat a furnace, these mills only halt production for major maintenance and repair. Naturally, this means they are continuously emitting CO_2. According to the steel handbook, the energy consumed in the process of smelting pig iron using a blast furnace accounts for over 70% of the energy used by the entire integrated steel works. This points out another strong disparity between blast furnaces and electric furnaces: there is a big difference in the CO_2 emissions of the methods they use to melt their sources of iron.
According to industry CO_2 emissions statistics by company disclosed by the Ministry of the Environment and the Ministry of Economy, Trade and Industry on June 18, 2010, the CO_2 emissions of blast furnaces amounted to 160 million tons, about 13% of the total for Japan in FY2008. Since crude steel production by blast furnace mills was about 79 million tons in FY2008, blast furnaces emit approximately 2 tons of CO_2 per ton of steel. In contrast, Tokyo Steel's CO_2 emissions amounted to 1.40 million tons in FY2008 while crude steel production was 2.99 million tons, equivalent to CO_2 emissions of under 0.5 ton per ton of steel.

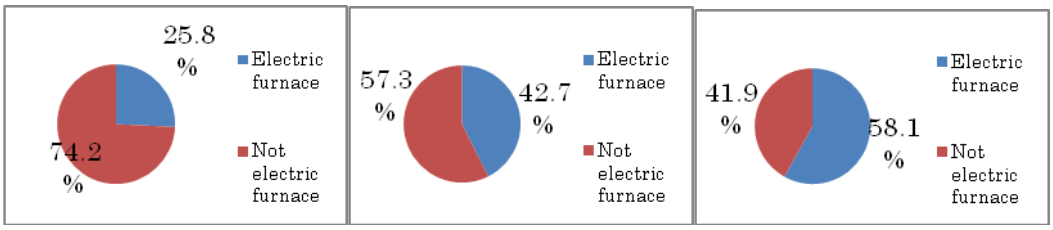
FY	COMPANY NAME	CO2 emissions (mt)	crude steel production (1,000m t)	CO2 /mt of crude steel
2008	TOKYO STEEL	1,399,724	2,988	0.47
2008	JFE STEEL	54,863,060		
2008	SUMITOMO METALS(KOKURA)	2,889,000		
2008	KOBE STEEL	17,217,566		
2008	SUMITOMO METALS	22,790,080		
2008	NIPPON STEEL	57,204,000		
2008	NISSHIN STEEL	7,699,630		
blast furnace mill total		162,663,336	78,951	2.06

(Source: FY2008 survey by the Ministry of the Environment)

The FY2008 statistics reaffirmed what had become apparent with the FY2007 survey—our CO_2 emissions are only one fourth that of blast furnaces.

There are 5 blast furnace companies and 50 electric furnace companies in Japan. In FY2008, the proportion of Japan's crude steel produced by electric furnaces was 23.6% (25 million tons) compared with 74.8% (79 million tons) by blast furnaces. Electric furnaces' share of the market in Japan was far less than in other industrialized countries. For example, in 2007, electric furnaces were with a 58.1% share in the United States. Similarly, in the EU and South Korea, electric furnaces produced 42.7% and 46.5% of their country's total steel production. In comparison, the ratio in China was relatively low (9.1%). In general, the more industrialization progresses, the larger the proportion of steel produced by electric furnaces. This trend can be explained as being the result of the steady growth of the steel scrap market as steel production and consumption expands during industrialization until electric furnaces become able to source all of their steel scrap needs in their own country. Japan, however, is an exception. Since the late 1990s, Japan has been East Asia's only exporter of steel scrap. Despite Japan's self-sufficient ratio for steel scrap clearly being beyond 100%, the ratio of steel production by electric furnaces is below 30%—a peculiar phenomenon. Taking CO_2 emissions into consideration, we feel that recycling of steel scrap should be further promoted in Japan.

Japan EU15 U.S.A



(Steel production ratio of electric furnaces, 2007, from World Steel Association)

4. Our Contribution to Reduction of CO_2 Emissions

In this section, we are going to outline our contributions to reducing CO_2 emissions by further elaborating on the previously mentioned points.

Let's start with the contribution to Japan's efforts under the internationally agreed Kyoto Protocol, which requires that the countries that ratified the agreement reduce their CO_2 emissions by an average of about 5% compared with 1990 levels.

In 1995, we brought the Utsunomiya works on stream, establishing basically almost the same product lineup and capacity that Tokyo Steel has today. As shown in the table on the next page, our yearly average $CO0_2$ emissions volume during the 15 years since 1995 (FY1995 to FY2009; hereafter referred to as the "15-year average") increased by 360 thousand tons compared with FY1990. However, this increased CO_2 emissions can be attributed to our greater production of products that competed with blast furnace products which requires more energies in order to achieve higher quality and value-added content, and wider product lineups. Although our consumption of energy increased as a result, it was more than offset by the lower CO_2 emissions to the society as a whole because of the replacement of blast-furnace-made products with our lower-emissions products.

During the 15 years since FY1995, we have yearly produced on average 3.35 million tons of steel, of which 2.76 million tons was products that competed with blast furnaces, such as H beams, large-size structural, steel sheets and coils, sheet piles and heavy plates. Consequently, compared with FY1990, we can say that Tokyo Steel replaced an additional 530 thousand tons of blast furnace steel products with electric furnace steel products.

As previously mentioned, based on the results of the surveys done by the two ministries, we calculated that Tokyo Steel's CO_2 emissions are only 0.5 tons per ton of steel compared to an average of 2.0 tons per ton of steel by blast furnaces. In other words, given that the type of steel produced is the same, the CO_2 emissions of an electric furnace are one fourth those of a blast furnace. If the additional 530 thousand tons of replacement products made by Tokyo Steel had actually been made by blast furnaces, CO_2 emissions would have increased by the following figures: 530 thousand tons x (2 tons – 0.5 tons) = 800 thousand tons—equivalent to our contribution to reducing total CO_2 emissions from the society. This is a very large figure for a single company's reduction; 800 thousand tons is equivalent to 0.4% of the total emissions of the Japanese steel industry in FY2008.

To reiterate, although expanding our production of products that competed with those

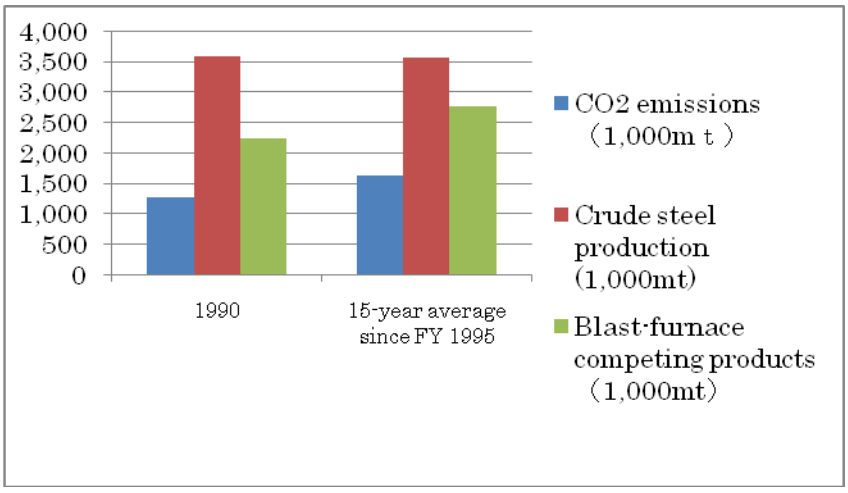
of blast furnace increased our CO_2 emissions by about 360 million tons compared with FY1990, we contributed an 800-thousand-ton reduction in CO_2 emissions toward achieving a low-carbon society as the result of fulfilling the demands of customers by supplying products that competed with those of blast furnaces.

If we subtract the 360 thousand tons of CO_2 emissions by which our CO_2 emissions actually increased compared with FY1990 from the 800-thousand-ton reduction achieved by replacing blast furnace products, we get a balance of about a 440-thousand-ton yearly average reduction in CO_2 emissions over the 15 years. Therefore, we consider that Tokyo Steel has actually achieved a reduction in CO_2 emissions equivalent to 35% of its FY1990 CO_2 emissions compared with the 5% target set for Japan as a whole under the Kyoto Protocol.

(Our 15-year average CO_2 emissions since FY 1995 compared with FY 1990)

FY	CO_2 emissions (1,000mt)	Crude steel production (1,000mt)	Blast-furnace competing products (1,000mt)	Ratio of blast furnace products	CO_2 emissions reductions achieved by replacement (1,000mt)	Total CO_2 emissions reductions compared to FY 1990 (1,000mt)
1990	1,267	3,583	2,225	58.2%	—	—
15-year average since FY 1995	1,627	3,553	2,759	82.4%	801	442

CO_2 emissions from transportion are not included above.



5. Conclusion

These days, blast furnace steel companies in Japan are proposing a global sectoral approach to emission trading that differs from the cap and trade approach begun in Europe. This approach sets quotas for emissions based on unit-energy consumption by the industry on a global basis. The Japanese blast furnace mills point out that they have the most efficient figures in the global steel industry in regard to saving energy. According to them, if CO_2 emissions by Japanese blast furnace mills were set at 100, the U.S. mills would be 120, European mills 110, and Chinese mills 120. Based on these comparisons, Japanese blast furnace mills say that if the world's steel mills could reduce their CO_2 emissions to the level of the Japanese blast furnace mills, it would reduce the world's total CO_2 emissions by 160 million tons annually. The sectoral approach is recognized as being better able to prevent carbon-leakage to developing countries in which steel production is increasing than the cap and trade approach, which does not reflect the efforts of individual companies. However, for Japan's drive as a nation to achieve a low-carbon society, we believe that action to reduce CO_2 emissions should be taken not based on unit-energy consumption per product, but based on the total amount of CO_2 emissions per emitter—for example, by paying a certain tax per CO_2 or by an auction approach. If we set a goal of pursuing lower CO_2 emissions in steel production not only in each corporation but also society as a whole, making steel using electric furnace becomes an important solution. As previously stated, our company's emission per unit of production is one fourth that of Japanese blast furnace mills. We are convinced that increasing steel production by electric furnaces will be the key factor in the steel sector's support of Japan's low carbon society action.

Accordingly, we have started operation of our newest and biggest factory at Tahara in Aichi Prefecture from November 2009. The Tahara plant is the first green-field steel mill built in Japan this century. Because this area has plentiful scrap resources and actually exports lots of steel scrap, we have built this factory to greatly promote recycling of this precious resource domestically into value-added steel products. The plant has a production capacity of 2.5 million tons per year. If operations reach maximum capacity, we will be able to reduce CO_2 emissions by another 3.75 million tons through increasing production of steel products competing with those of blast furnace, equivalent to 0.3% of Japan's total emissions.

We also have taken action to reduce CO_2 emissions in our own steel making processes. By converting heavy oil to LNG in our Utsunomiya and Kyushu plant, we have cut CO_2 emissions per ton of steel. We also have implemented measures to save energy through

various improvements in operating processes through enhancing productivity, heating efficiency and energy efficiency at such many areas in our plants as the melt shops and the rolling mills. In addition to our efforts in contributing to reductions of CO_2 of the society, by expanding production of products competed with those of blast furnace, we will also continue our endeavors to reduce CO_2 emissions in our own production process as much as possible.

In conclusion, we would like to propose the following policies and approaches for reducing CO_2 emissions.

We recognize that taking action against global warming is the responsibility of everyone in the world and that it is urgently necessary to develop alternative resources and technologies to replace fossil fuels. In this sense, we believe that it is important that corporations and individuals alike share the burden fairly to achieve success. Under the Kyoto Protocol, countries promised to make reductions, but set no compulsory targets for companies or individuals. Since the Kyoto Protocol, however, nations have set stricter emission reduction targets, which will require both companies and individuals to take on the burden of achieving those targets in proportion to their CO_2 emissions. Therefore, we suggest that companies and individuals should share the cost burden, with companies paying a certain tax based on their CO_2 emission amounts while individuals pay tax based on a fossil-fuel consumption. We believe the Japanese Government should take action on this issue.

While some are discussing the concept of emission trading with foreign companies in exchange for the transfer of energy-saving technology, we think it essential to first try and achieve our domestic targets, as agreed internationally. Only if a country may not fulfill the target should country pursue international emissions trading using funds from the collected taxes related to CO_2 emissions.