Steel Industry Measures to Combat Global Warming

Voluntary Action Plan Progress Report

December 2010

The Japan Iron and Steel Federation

INDEX

1. FY2009 Report for Voluntary Action Program

Highlights of this year's report

- FY2009 energy consumption was down 17.2% from FY1990 due in part to a sharp drop in crude steel production. Although this decline was higher than the target for the FY2008-FY2012 five-year average, crude steel production is currently rebounding. As a result, the target of a 10% reduction vs. FY1990 energy consumption remains challenging.
- The steel industry will continue to focus on energy conservation (investments to conserve energy leading up to FY2012 (equivalent to -1.3%)) and use the Kyoto Mechanism as required (current contract volume is 53 million tons, equivalent to -5.3%) to increase the probability of reaching the target.

Voluntary Action Program of Steel Industry

1. Conserve energy with more efficient steel production processes

- Assuming annual crude steel production of about 100 million tons, the goal is to achieve a 10% reduction in energy consumption used by steel production processes by fiscal 2010 compared with fiscal 1990, the reference year.
- However, even if crude steel output exceeds 100 million tons, the steel industry is determined to do what is needed, including use of the Kyoto Protocol mechanisms, to reach this target.
- The 10% reduction is to be achieved based on average energy consumption for the five-year period ending in fiscal 2012

*A 10% cut in energy consumption is viewed as equivalent to a 9% cut in CO2 emissions.

2. Contribute to energy conservation outside the steel industry

(1) Reuse one million tons of waste plastics and other materials, assuming that the required collection system can be established.

(2) Use steel products and byproducts to contribute to energy conservation

(3) Use international technical cooperation to contribute to energy conservation

(4) Utilize unused energy at steel mills in neighboring areas

(5) Increase activities involving consumers, businesses and transportation

3. Development of revolutionary technologies

- Technology to separate CO_2 from blast furnace gas for recovery
- Iron ore reduction technology using modified hydrogen from coke oven gas

Voluntary Action Plan Progress Toward Reduction Targets (Fiscal 2009 Performance)

- FY2009 crude steel production of 93,717 thousand tons was 10.5% less than in fiscal 1990 (91 participating companies).
- Energy consumption was 17.2% less than in FY1990
- CO2 emissions were 17.5% less than in FY1990
- Unit energy consumption was down 7.5% from FY1990 and unit CO2 emissions were down 7.8%.

*CO2 emissions in this presentation are calculated by using electric power coefficients after reflecting emission credits.

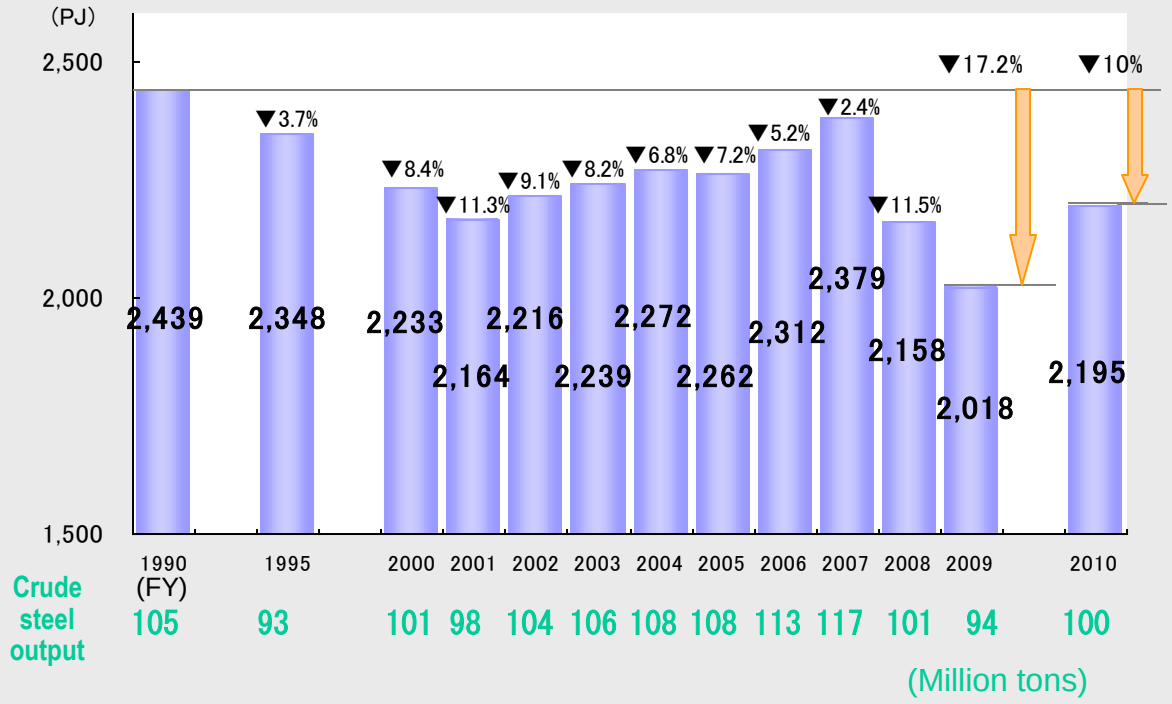
Reference: Data for entire Japanese steel industry

- FY2009 crude steel production was 96.449 million tons which is 13.7% less than in FY1990
- Energy consumption was 17.6% less than in FY1990
- CO2 emissions were 17.8% less than in FY1990

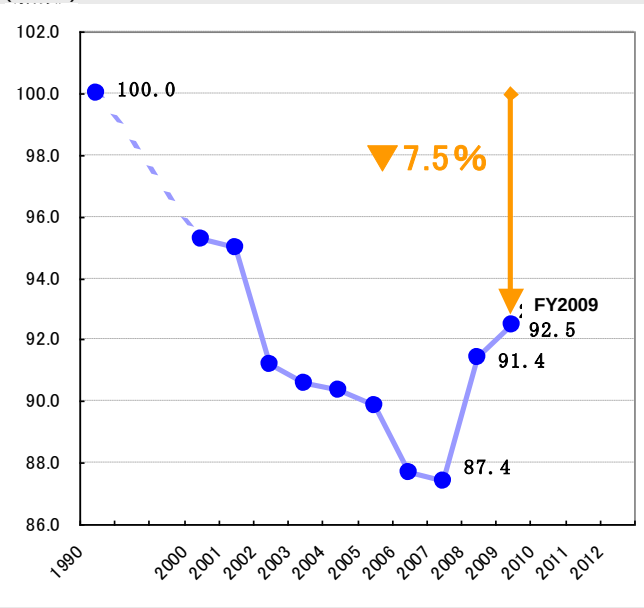
* Energy consumption is total of steel producers. CO2 emissions were estimated based on "Current Survey of Energy Consumption".

Energy Consumption

Total Energy Consumed



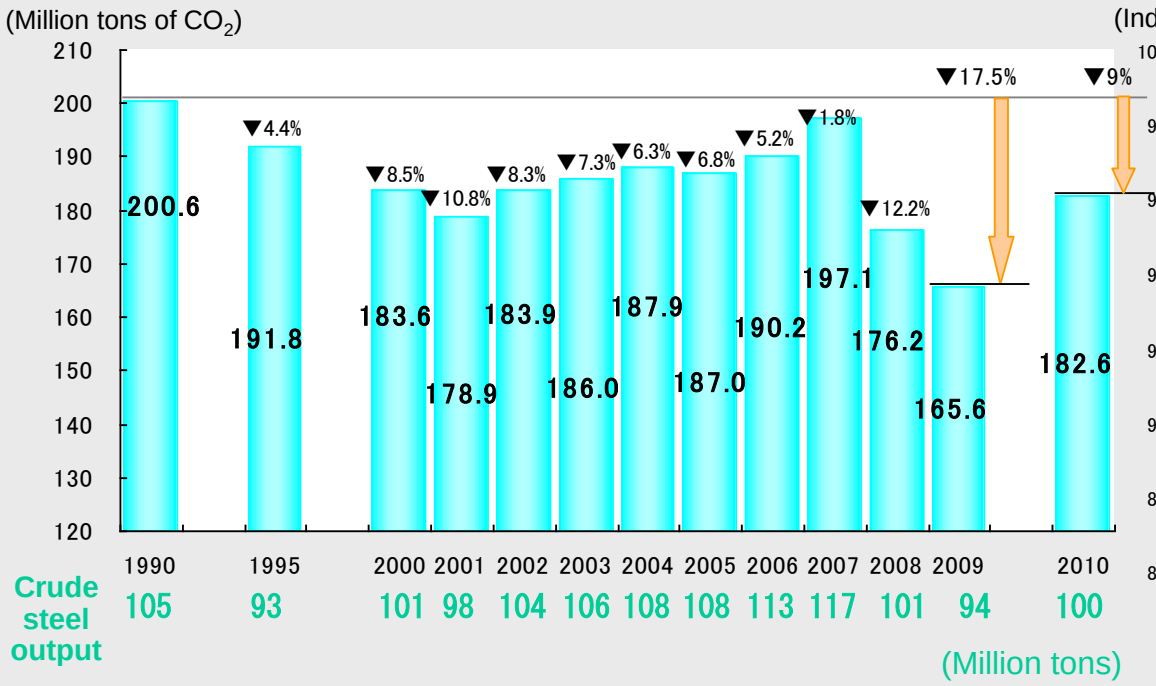
Unit Energy Consumption (Based on FY1990)



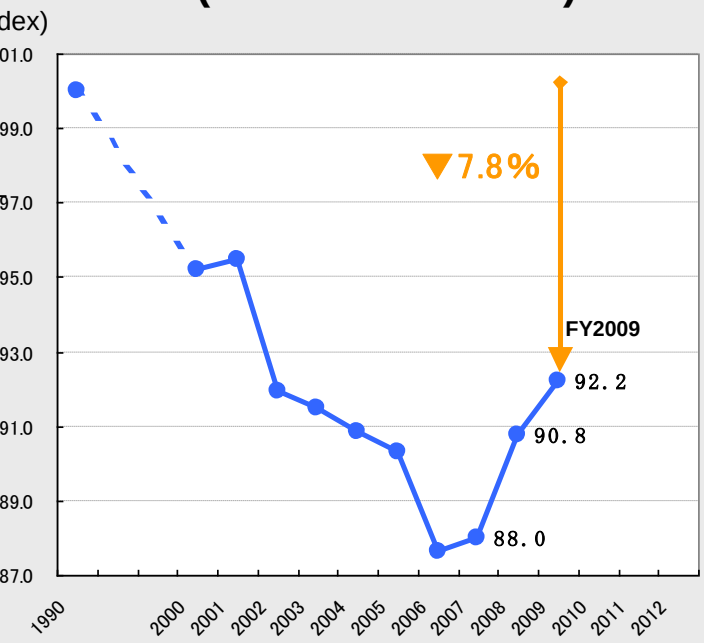
*PJ is a petajoule (10^{15} joules). One joule is 0.23889 calories. 1PJ is equivalent to about 2.58 million kiloliters of crude oil.

CO_2 Emissions from Fuel Combustion

CO_2 Emissions from Fuel Combustion

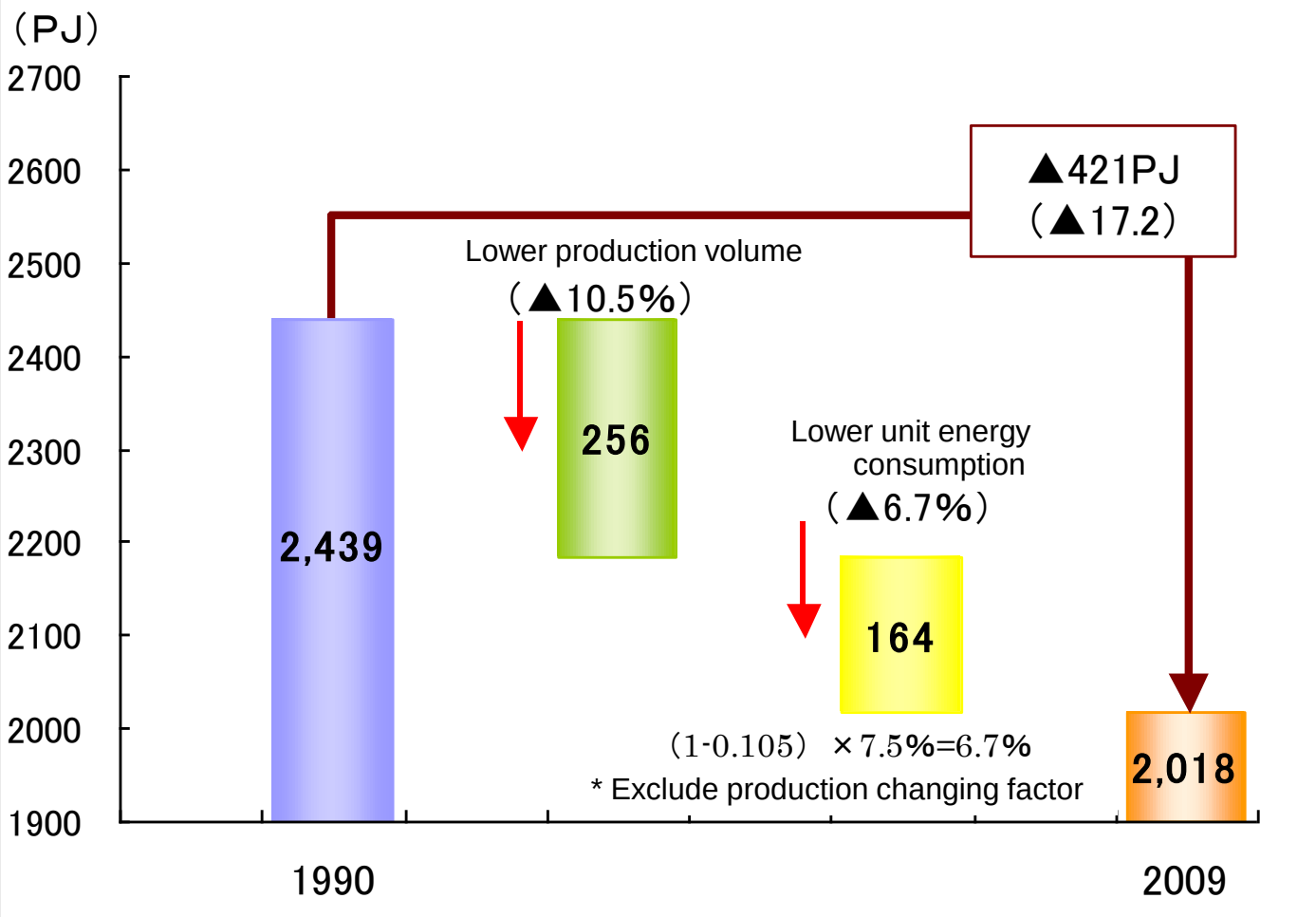


Unit CO2 Emissions (Based on FY1990)



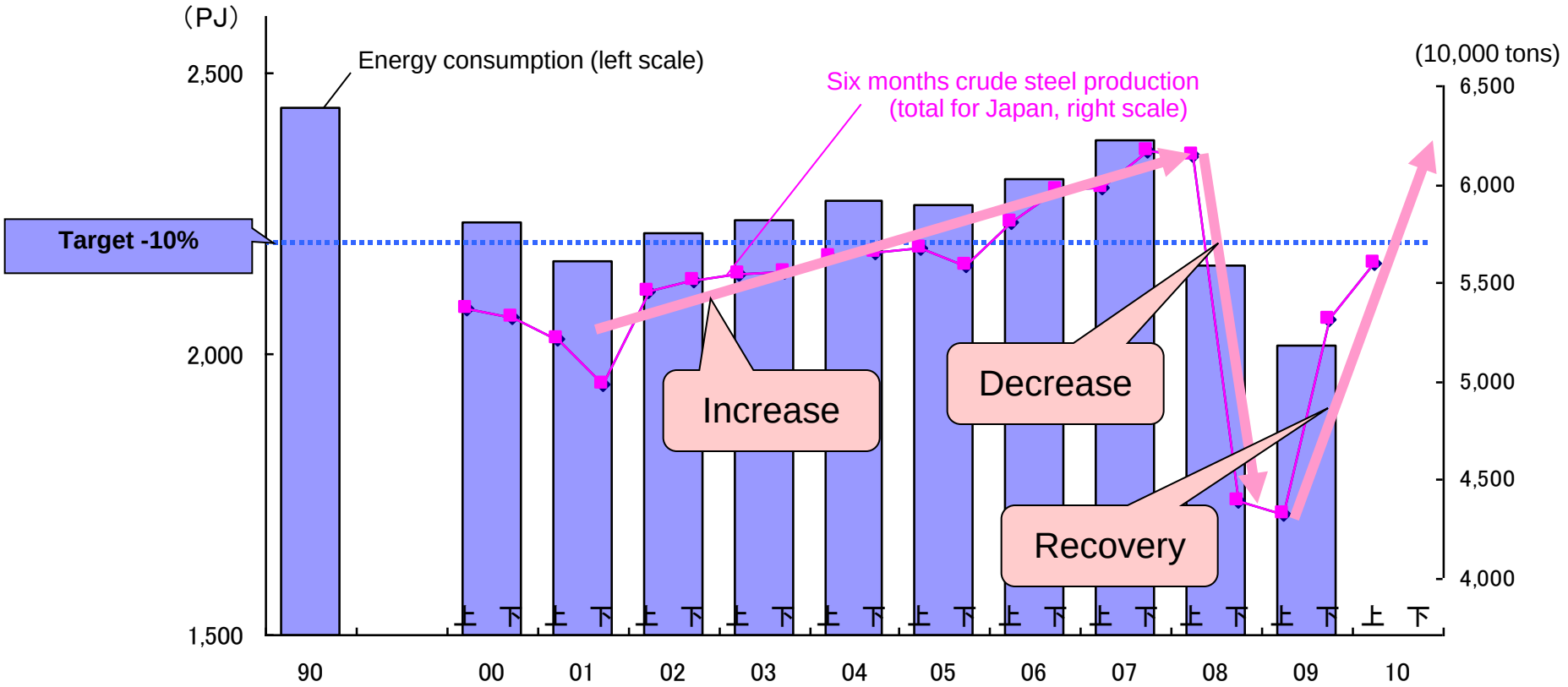
Causes of Change in FY09 Energy Consumption

FY2009 energy consumption was 17.2% less than in FY1990 because of a 10.5% decrease in crude steel production and a 7.5% improvement in unit energy consumption.



Probability of Reaching Targets

- **Japan's crude steel production increased steadily since FY2001 but dropped sharply in the second half of FY2008.**
- **The downturn ended in the second half of FY2009 and crude steel production has been recovering since then. In the first half of 2010, Japan's annualized crude steel output had recovered to over the 110 million ton level. Achieving a 10% reduction (five-year average) vs. FY1990 will be challenging. However, the Japanese steel industry is determined to do what is needed, including using the Kyoto Protocol mechanisms, to reach the target.**

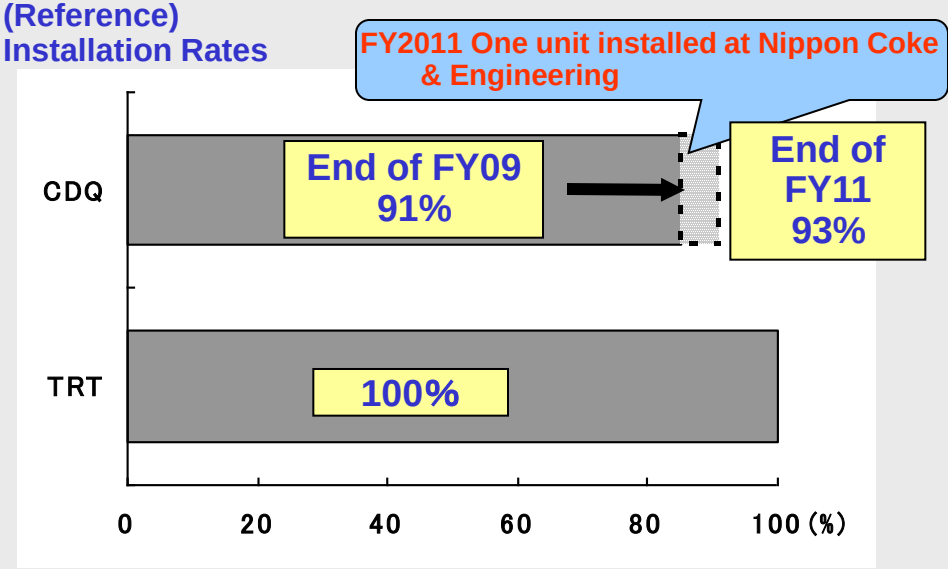


Source: METI

Outlook for Energy Conservation Measures

- Total energy to be conserved by projects now under consideration by Japanese steelmakers between now and 2012 will cut energy consumption by about 1.3% vs. FY1990.
  About 56% of these projects have been approved.
- Specific actions are listed below.

(Reference)
Installation Rates



(% share)

Exhaust heat recovery	Larger TRTs (top pressure recovery turbine), CDQ (coke dry quenching) installation, more gas recovery, recovery of LD converter gas, regenerative burners, others	59
More efficient equipment	High-efficiency oxygen equipment, improved power generation turbines, improved sintering, improved blast furnace, more efficient motors, more efficient power generation equipment, improved hot blast stove, others	26
Better operating methods	Smaller ratio of oxidizing agent, temperature management of steel materials, use of cold iron, others	6
Effective reuse of materials	Reuse of waste plastics, etc., more waste plastic treatment equipment, others	2
Others	Dust recycling, coal moisture control, preliminary iron ore processing, others	7

Use of Kyoto Protocol Mechanisms

Use these mechanisms as a supplementary means of achieving the goal.

(1) JISF investments in Japan Greenhouse Gas Reduction Fund and Bio Carbon Fund: Total of 1 million tons

(2) Starting steel energy conservation technology (CDQ/China, Sintering exhaust heat recovery/Philippines) and steel engineering technology (CFC treatment, etc./China) CDMs and other projects: Total of 52 million tons

Signed contracts to purchase 53 million tons (10.6mn tons/year = -5.3%)

47mn tons of this amount has been registered with the UN (9.4mn tons/year = -4.7%)

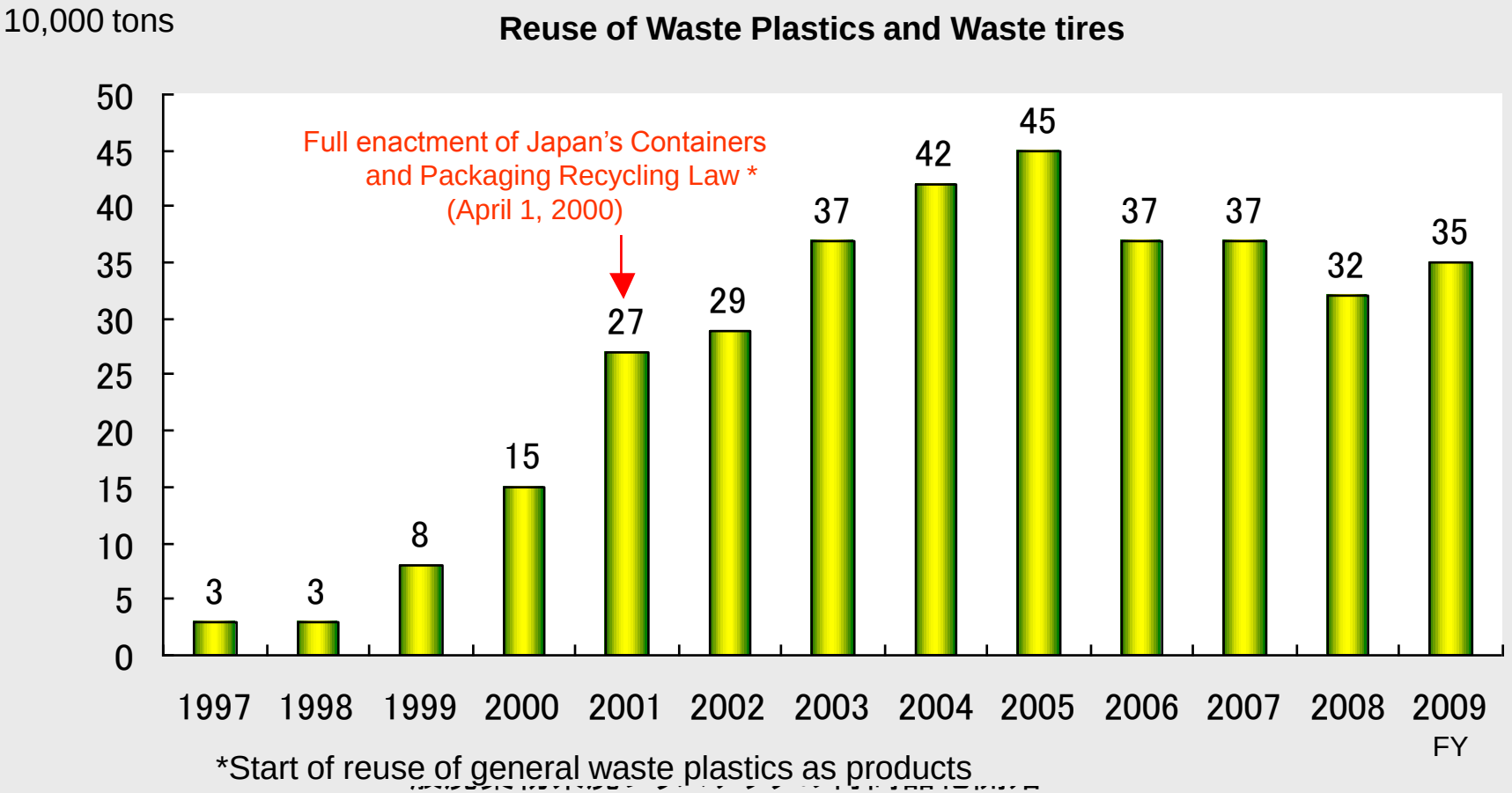
CDM Projects of Japanese Steelmakers (UN Registered)*1

Company	Country	Project	(10,000t CO_2 emission reduction CO_2/year)	Credit period	Amount for first commitment period (10,000t CO_2/year)
Nippon Steel Mitsubishi Corp	China	Shandong Dongyue HFC 23 destruction project	1,011	7 years starting in July '07	1,000 *2
Nippon Steel	China	Installation of heat recovery system for coke plant in Qian'an	21	10 years starting in Oct. '06	105
JFE Steel	Philippines	Power generation using exhaust heat from sinter cooling equipment	5.5	10 years starting in Jan. '08	27.5

Notes: *1.These materials are for projects conducted by steelmakers; total is 47mn tons of CO_2

*2. Only Nippon Steel's portion of contractual credits for this project

Reuse of Waste Plastics and Tires



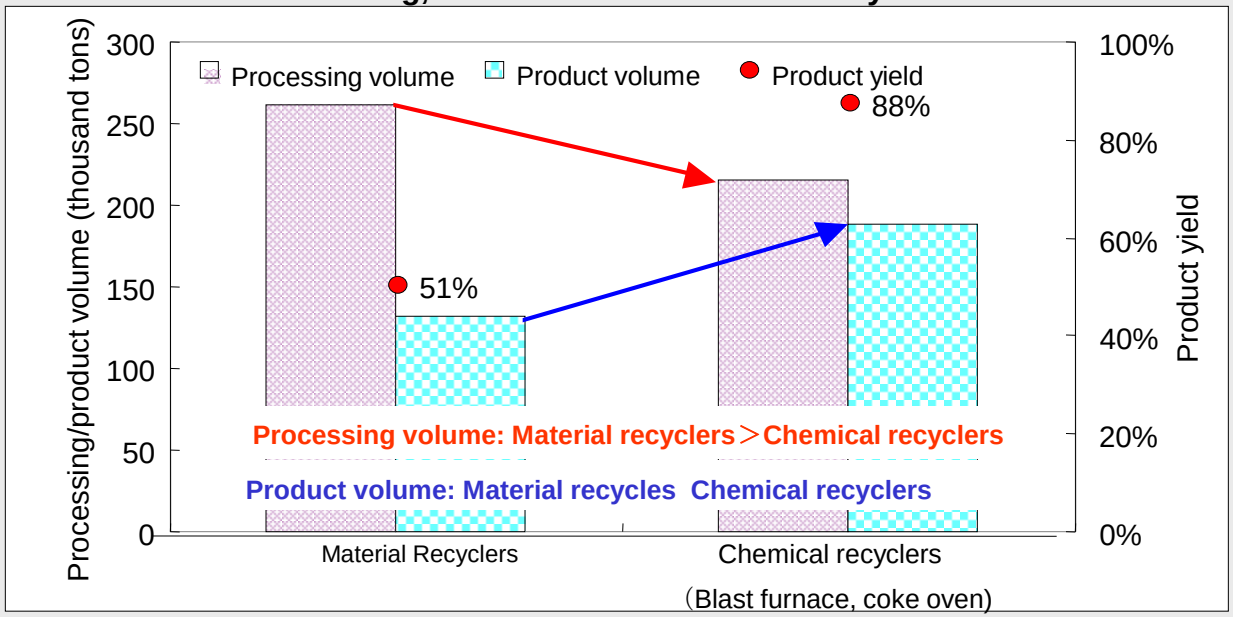
Effective Use of Waste Plastics and Other Waste Materials

- Current waste plastic processing capacity at Japanese steel companies is about 400,000 tons (FY09, tires not included). But actual recycling was only about 230,000 tons (60% capacity utilization) in FY09 since recycling of materials takes priority.
- A review of policies can produce a big drop in CO_2 emissions through the effective use of waste plastics, etc. We hope to see a quick reexamination of recycling systems from the following standpoints.

(1) From the standpoint of the effective use of waste material resources (recycling of materials highly effective at reducing CO_2 emissions), eliminate the system of prioritizing materials with a low CO_2 reduction benefit under the container and packaging recycling system.

(2) Ask for the participation in the container and packaging recycling system of municipalities that recycle trash (about 800). This participation would allow the resource recycling of about 300,000 tons of waste materials (equivalent to annual CO_2 emission reduction of about 1 million tons).

Processing, Product and Product Yield by Method



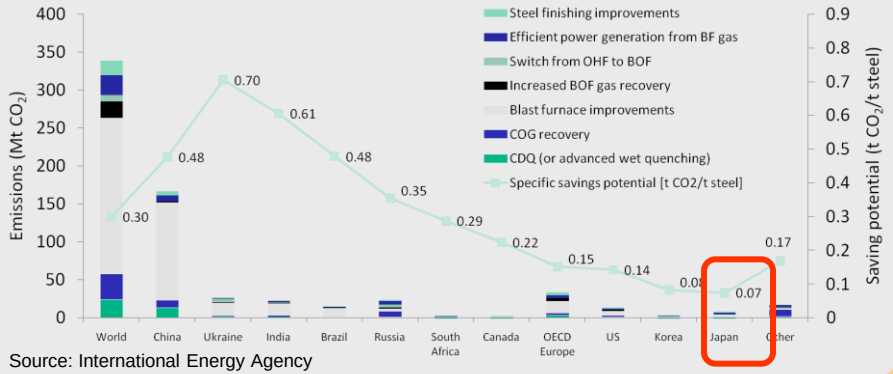
2. The Goals and Vision of Japan's Steel Industry

Global Contribution of the Japanese Steel Industry

Eco Process

- Production processes used by the Japanese steel industry have the world's highest energy efficiency. The potential for further emission reductions is thus the smallest in the world.
- The goal is to use the voluntary action program to cut CO2 emissions by about **18 million tons** vs. FY1990 during the first commitment period of the Kyoto Protocol.

Estimates of potential reductions resulting from use of the major technologies



Source: International Energy Agency

Eco Solution

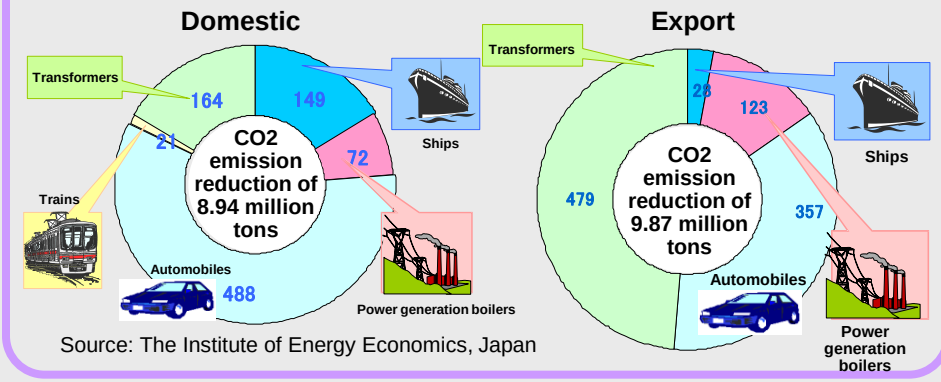
- Major energy-conserving equipment with Japanese steel industry technology in use in other countries (China, Korea, India, Russia and others) currently cuts annual CO2 emissions by about **33 million tons**.
- Potential CO2 emission reduction is estimated at **340 million tons/year** (equivalent to about 25% of Japan's total CO2 emissions) if these energy-conserving technologies are transferred and used worldwide.

Emission Reductions in Other Countries from Japanese Energy-conserving Equipment

	No. of units	Reduction (1,000 tons/year)
Coke dry quenching (CDQ)	55	8,620
Top-pressure recovery turbines (TRT)	47	7,897
Byproduct gas combustion (GTCC)	24	11,858
Basic oxygen furnace OG gas recovery	17	3,481
Basic oxygen furnace sensible heat recovery	7	848
Sintering exhaust heat recovery	5	725
	Total emission reduction	33,429

Eco Product

- High-performance steel developed with manufacturers and sold in Japan and other countries contributes to CO2 emission reductions when finished products made of this steel are used.
- For the five products for which quantitative data are available (FY2009 production 8.3 million tons, 8.6% of all crude steel production), the use of high-performance steel cut CO2 emissions by **18.81 million tons** in FY2009.



Source: The Institute of Energy Economics, Japan

Three "eco" contributions cut CO2 emissions by 70 million tons

Eco Process
Reduction of about **18 million tons of CO2/year** during Kyoto Protocol first commitment period (Goal is 9% reduction vs. FY1990)

Total contribution of eco processes, products and solutions is a CO2 reduction of about 70 million tons/year
About 6% of Japan's total CO2 emissions (FY1990)
About 35% of Japanese steel industry CO2 emissions (FY1990)

Eco Product
Reduction of about **19 million tons of CO2/year** from use of finished products made of high-performance steel
*Contribution for five steel products for which quantitative data are available (8.3 million tons)

Eco Solution
Reduction of about **33 million tons of CO2/year** due to global contribution to cutting CO2 emissions from overseas use of energy-conserving technologies and equipment

The Goals and Vision of Japan's Steel Industry

(1) 2020

Eco process⇒ **Goal is reduction of 5 million tons**

- Aiming for a further improvement in energy efficiency of steel production processes, which are already the highest in the world

The 2020 goal is to aim for a reduction of about 5 million tons of CO2 emissions (emission reduction vs. business as usual in 2020, excluding reduction from improvement in electric power emission coefficient), which is based on the maximum use of the latest technological advances and 2020 crude steel output of 119.66 million tons. This is the long-term energy supply-demand outlook (recalculated) of the Advisory Committee on Energy and Natural Resources. (Cost of this reduction is about ¥1 trillion.)

Eco product⇒ **Estimated contribution of 30 mil. tons**

← **18.81 million ton contribution in FY2009** (Products included: Production of 8.3mn tons, 8.6% of total crude steel output)

- By supplying high-performance steel, which is vital to creating a low-carbon society, Japanese steelmakers contribute to cutting CO2 emissions when finished products made of this steel are used.

Eco solution⇒ **Estimated contribution of 70 mil. tons**

← **FY2009 contribution was 33 million tons**

- Contribute worldwide by transferring the world's most advanced energy-conserving technologies to other countries (mainly developing countries) and increasing the use of these technologies.

(2) Long term

Development of revolutionary steelmaking processes (COURSE50)

Cut CO2 emissions from production processes about 30% by using hydrogen for iron ore reduction and collecting CO2 from blast furnace gas. The first production unit is to begin operations by about 2030*. Goal is widespread use of these processes by about 2050 in line with timing of updates of existing blast furnace facilities. *Assumes establishment of economic basis for CO2 storage infrastructure and creation of a practical unit using these processes.

Eco Process

- The 2020 goal is a reduction of 5 million tons of CO2 emissions, which is based on the maximum use of the latest technological advances and the steel production volumes envisioned in the report of the Advisory Committee on Energy and Natural Resources. The Japanese steel industry is thus aiming for further improvements in energy efficiency, which is already the world's highest.
- Specifically, the goal is to cut emissions by 5 million tons by using advanced technologies that have reached the stage of practical use when current facilities are updated or replaced. Examples include the use of next-generation coke production technology, higher efficiency for joint thermal and internal power generation, more energy-conserving equipment like TRT, CDQ and facilities to recover heat emissions and sensible heat, higher efficiency for equipment powered by electricity, and more chemical recycling of waste plastics and other materials at steel mills.
- Emission reduction targets are calculated using the maximum potential for reductions. Technical and physical limitations when starting to use new technologies are not taken into consideration.
- When starting to use new technologies, in addition to initiatives of the steel industry itself, specific emission-reduction measures (promotion of widespread use, actions to recover and utilize waste plastics and other materials, and other measures) using the cooperation of the public sector and others will be vital as well.

Emission Reduction Targets for 2020

(Million tons, Million tons of CO2)

	For lower production (10 million tons less than standard case)	Standard case	For higher production (10 million tons above standard case)
Total crude steel production in Japan	109.66	119.66	129.66
Production at participating companies	105.16	114.75	124.34
BAU emissions at participating companies	183.31	195.40	207.51
Reduction from new technologies	5		
Total reduction at participating companies	178.31	190.40	202.51

*Production volume at participating companies is calculated by using the ratio of FY2005 crude steel production at companies participating in the voluntary action program (91 companies) to total crude steel production in Japan (95.9%).

*A significant change in production volume may cause these figures to become greater or less than the anticipated range. If this happens, the suitability of the BAU and emission reduction volumes will have to be reexamined based on actual production volume.

Eco Process (Revolutionary steelmaking technologies)
(Reference: Advisory Committee on Energy and Natural Resources report)

Premise for long-term energy supply-demand outlook (recalculated) (proposal)

About 5 million tons of CO2
About ¥1 trillion

Maximum use of advanced technologies at practical stages when facilities are updated or replaced

In Japan's steel industry, which is already the world's most efficient, cut CO2 emissions by using the following types of advanced technologies.

Ironmaking Major technologies envisioned

- **Higher efficiency for internal and joint thermal power generation equipment** — 420,000kL
  Replace internal and joint thermal power generation facilities with more efficient equipment → Install more efficient equipment when existing facilities are due for replacement to create the optimum composition of equipment in the future
- **Increase chemical recycling using waste plastics at steel mills** — 470,000kL
  Use less coal by utilizing waste plastics and other materials collected in accordance with Japan's container recycling law. → Collect and use 1 million tons of waste plastics and other materials
- **Improve efficiency of equipment powered by electricity** — 120,000kL
  Replace electrically powered equipment at steel mills with more efficient facilities.
- **Increase the use of energy-conservation equipment** — 510,000kL
  Install more facilities for utilizing waste heat, such as blast furnace top equivalent pressure gas recovery and coke oven sensible heat recovery. → When updating or replacing equipment, raise efficiency to the highest possible level.
- **SCOPE21 coke oven** — 310,000kL
  Conserve energy when producing coke by using preliminary coal processing and other measures. → Start using new technologies at all coke ovens as they are updated or replaced (six ovens by 2020).

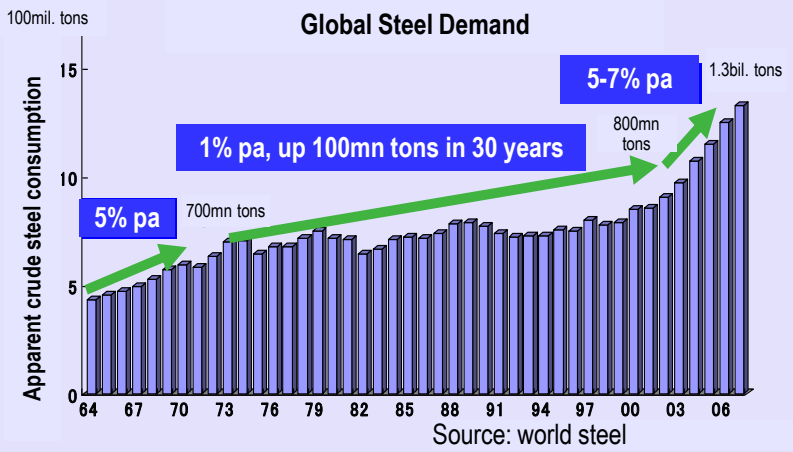
Major associated initiatives thus far
Development of a revolutionary coke production technology (SCOPE21) that conserves energy and produces coke very efficiently
(FY1994-FY2003: ¥8.2 billion)

Issues

- **Issues involving users of advanced technologies**
  - Limited space for new equipment
  - Compatibility with current infrastructure (energy supplies, etc.)
  - Restrictions on timing of installation work (need to reflect production plans, limitations on lost output during installation)
- **Issues involving providers of advanced technologies**
  - Ability of manufacturers to supply technologies (technology development, design and production capabilities)
  - Engineering capabilities
- **Other restrictions**
  - Limitations on the ability to collect and supply waste plastics and other materials

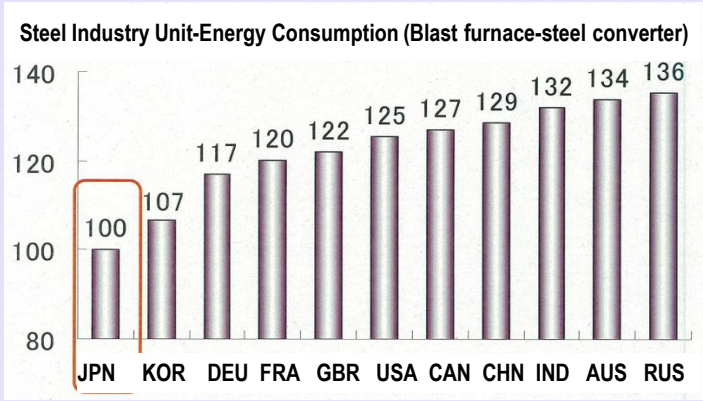
*These materials are based on assumptions that use model calculations.

Rapid increase in global steel demand due mainly to higher demand in developing countries



Source: world steel

Japan's steel industry has the world's highest energy efficiency. As global steel demand rises, lowering Japan's production while raising production in other countries would thus cause worldwide CO2 emissions to increase.



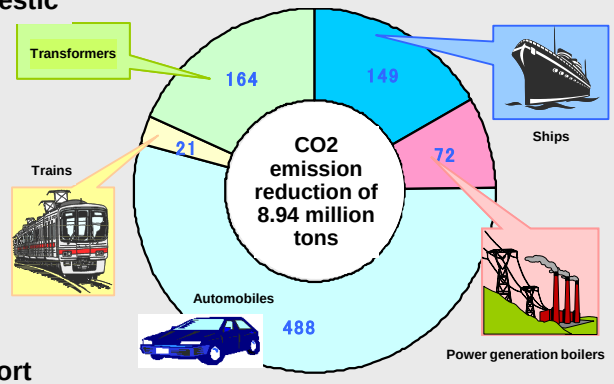
Source: RITE "International Comparison of Energy Efficiency (Electric Power, Steel and Cement)"

CO2 Emission Reductions from Use of Eco Product

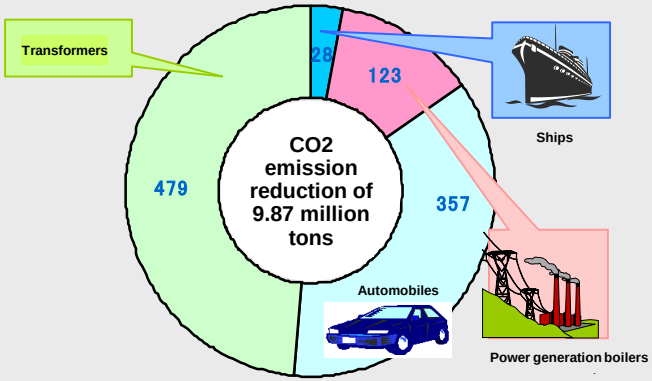
- To determine the contribution of high-performance steel products, the JISF established the LCA Energy Assessment Committee (Chairman: Professor Kanji Yoshioka, Keio University) in FY2001. This committee has been monitoring this contribution every year since then by performing assessments and analyses from a life cycle assessment (LCA) perspective with user industry associations and The Institute of Energy Economics, Japan.
- For the five steel products for which quantitative data are available (FY2009 production 8.3 million tons, 8.6% of Japan's total crude steel output), the use of finished products made of high-performance steel cut FY2009 CO2 emissions by 8.94 million tons for steel used in Japan and 9.87 million tons for exports, a total of 18.81 million tons of CO2.
- If demand for these five high-performance steel products remains at the FY2009 level until FY20, the CO2 reduction from the use of finished products made of these steel products in FY20 will be an estimated 10.77 million tons for steel used in Japan and 18.85 million tons for exports, a total of about 30 million tons of CO2.

CO2 Emission Reductions FY09

1. Domestic



2. Export

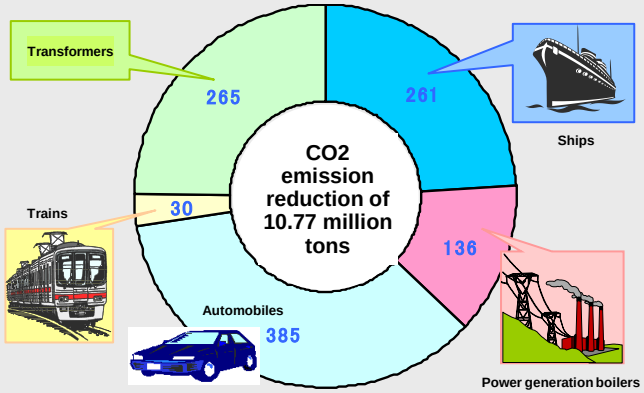


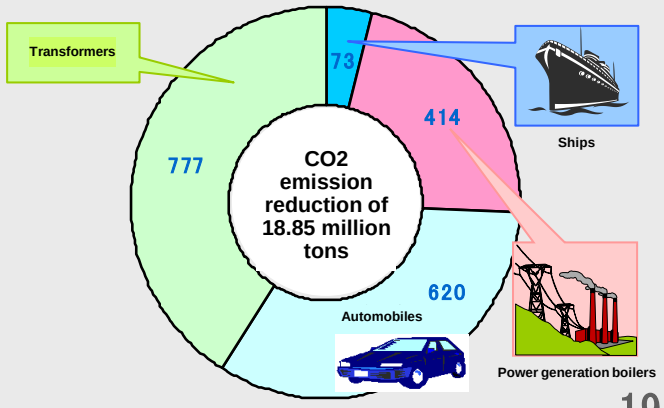
19 million tons

If FY2009 demand level remains until FY20

30 million tons

CO2 Emission Reductions FY20 (E)





Source: The Institute of Energy Economics, Japan

*The five categories are automotive sheets, oriented electrical sheets, heavy plates for shipbuilding, boiler tubes and stainless steel sheets

*Assessments in Japan started in FY1990 and for exports assessments started in FY2003 for automobiles and shipbuilding, in FY1998 for boiler tubes and in FY1996 for electrical sheets.

*In FY2009, use of the five categories of steel products in Japan was 4.58 million tons and exports were 3.72 million tons for a total of 8.30 million tons.

Examples of Eco Product

High-performance steel, much of which is made by Japanese steelmakers, will be vital to making the broad range of products that will be needed to create a low-carbon society. Examples include high-tensile strength steel sheets and electrical steel sheets for hybrid and electric vehicles; pipes with outstanding strength and corrosion resistance for ultra-super-critical boilers for coil-fired power plants; and forged steel parts and steel sheets for reactor pressure vessels and steel pipes for steam generators in nuclear power stations. Demand is certain to increase significantly in all these areas.

How high-performance steel helps fight global warming

Hybrid vehicles and electric vehicles

High-efficiency grain-oriented electrical steel sheets for hybrid and electric vehicle motors cut fuel consumption, boost power and reduce size and weight.

Cumulative global sales of hybrid vehicles, a market sector where Japanese automakers have a dominant position, are more than 1.7 million vehicles. These vehicles have cut CO2 emissions by an estimated 9 million tons (compared with gasoline-powered vehicles). Source: Toyota website

Ultra-super-critical boilers

Ultra-super-critical boilers, which raise power generation efficiency, require steel pipes that are very strong at high temperatures and able to resist oxidation and high-temperature corrosion caused by exposure to steam.

Steel pipes made in Japan have been used at 191 ultra-super-critical boilers worldwide between 1993 and 2008. The higher power generating efficiency of these boilers lowered the amount of coal used, resulting in an estimated annual CO2 emission reduction of 66 million tons (compared with subcritical pressure boilers and super-critical boilers).

Nuclear power

Larger number of nuclear power stations due to forged steel parts for power generation

All nuclear power stations in Japan use large forged components. The 53 reactors operating at nuclear power stations in Japan in FY2008 are estimated to have cut annual CO2 emissions by 228.93 million tons (compared with coal-fired power stations)

Eco Solution

Major energy-conserving technologies developed and applied by the Japanese steel industry have been transferred to other countries by Japanese companies. Looking only at coke dry quenching (CDQ), top pressure recovery turbines (TRT) and other major facilities, these technologies have cut annual CO2 emissions by about 33 million tons collectively in China, Korea, India, Russia, Ukraine, Brazil and other countries.

Based on the potential for lowering global CO2 emissions through major energy-conserving technologies, the current share (of CO2 emissions) of Japanese companies, their supply capacities and other factors, Japan's contribution for lowering annual CO2 emissions globally in 2020 is estimated at 70mn tons .

If energy-conserving technologies (including high-efficiency blast furnaces, etc.) are transferred and utilized worldwide, the potential for lowering annual CO2 emissions is estimated at 130 million tons in the seven APP countries and 340 million tons worldwide (equivalent to about 25% of Japan's total CO2 emissions).

Emission Reductions in Other Countries from Japanese Energy-conserving Equipment

	No. of units	Reduction (1,000 tons/year)
Coke dry quenching (CDQ)	55	8,620
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Byproduct gas combustion (GTCC)	24	11,858
Basic oxygen furnace OG gas recovery	17	3,481
Basic oxygen furnace sensible heat recovery	7	848
Sintering exhaust heat recovery	5	725
	Total emission reduction	33,429

* GTOC: Gas Turbine Combined Cycle system

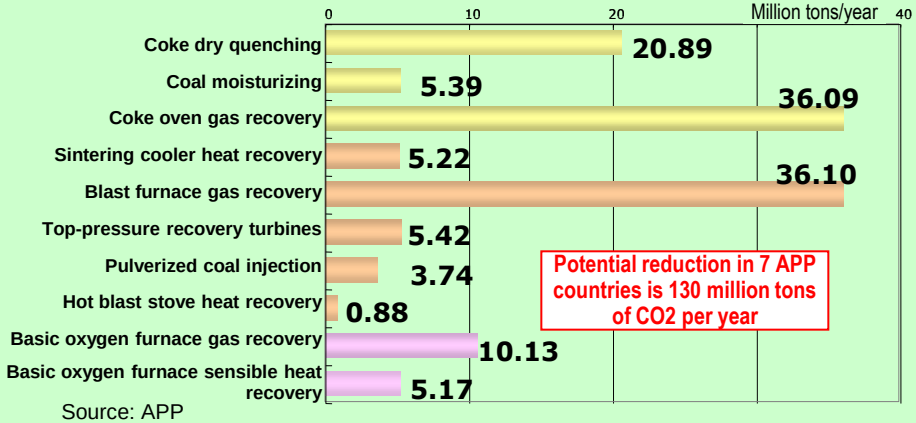
Potential CO2 emission reduction 340 million tons/year world wide

Japan's contribution by transferring major energy-conserving technologies

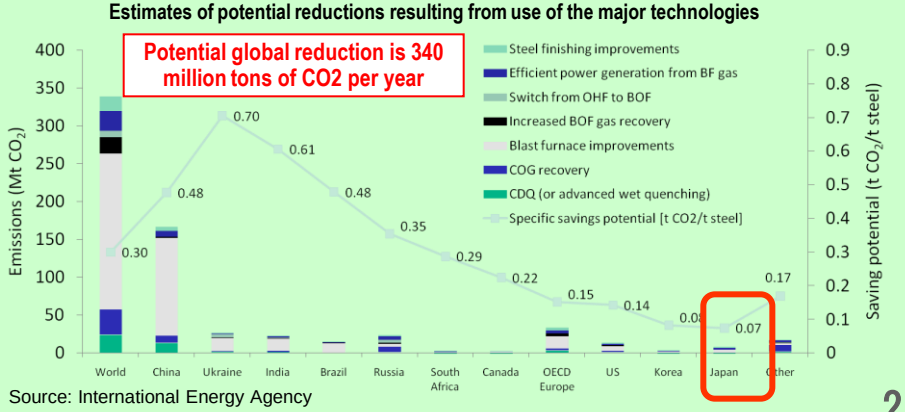
FY2009: 33million tons

FY2020: 70million tons

Potential Emission Reductions from Use of Major Energy Conservation Technologies in APP and world



Source: APP



Source: International Energy Agency

International Alliances of the Japanese Steel Industry

The Japanese steel industry has achieved concrete results by using the Japan-China Steel Industries Conference on Exchange of Advanced Technologies on Environmental Preservation and Energy-Saving, Asia-Pacific Partnership (seven countries), World Steel Association (60 countries) and other forums to encourage adoption of the global sectoral approach.
With these activities, the Japanese steel industry is making a significant contribution to the "Hatoyama initiative" by transferring the industry's outstanding energy-conserving technologies and equipment to other countries and increasing their use in these countries.

1. Japan-China Steel Industries Conference on Exchange of Advanced Technologies on Environmental Preservation and Energy-Saving

(Japan and China account for about half of the world's crude steel production)

- Japanese and Chinese executives signed a memorandum of understanding at the first meeting that was held in July 2005 in Beijing. Since then, technology exchange conferences attended by experts from the two countries have been held every year.
- The foundation for international cooperation in the steel industry

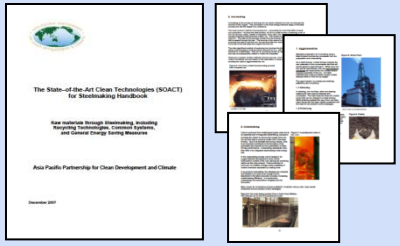
2. APP Steel Task Force

(The 7 APP countries account for 64% of the world's crude steel production)

- This task force was started in April 2006 by the ministers of six countries: Japan, Australia, China, India, Korea and the U.S. Canada joined in 2007, raising participation to the current seven countries. Meetings are held twice each year and are consistently producing benefits.
- There are eight task forces, including for steel and cement, and Japan chairs the steel task force.
- Member countries have given the steel task force high marks for facilitating the sharing of energy-conservation technologies, establishing a uniform system for measuring efficiency, performing energy-conservation diagnoses using specialists, and performing other activities.

SOACT Handbook

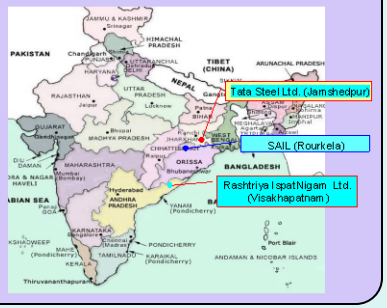
- The State-of-the-Art Clean Technologies (SOACT) for Steelmaking Handbook contains 22 environmental-protection technologies and 42 energy-conservation technologies. Of these technologies, 27 are provided by Japan.
- All technologies are posted on a website and are available to the public.



Steel Mill Diagnostic Surveys

- Engineers performed energy-conservation diagnostic surveys at three steel mills in China and three steel mills in India between fiscal 2007 and 2009.
- These surveys showed that the potential CO_2 emission reductions at the six steel mills total about 6 million tons.

China/APP/Three Steel Mills
(1) Taiyuan: JFE
(2) Jinan: Nippon Steel, Kobe Steel
(3) Jiangyin: Sumitomo Metal
Time: December 2007
Survey teams: 3 to 4 individuals



3. International cooperation using the World Steel Association

- The decision was made in October 2007 to use the sectoral approach on a global scale. Uniform worldwide assessment methods were established and CO_2 emission data at the world's major steel mills are being gathered and reported.
- The CO_2 Breakthrough Programme was started in 2003 with the goal of developing breakthrough technologies for CO_2 emission reductions. Japan is participating in this initiative through COURSE50, an initiative to develop innovative technologies for steelmaking processes that lower CO_2 emissions.

Development of Revolutionary Technology for Steelmaking Process (COURSE50)

(COURSE50 : *CO2 Ultimate Reduction in Steelmaking process by Innovative technology for cool Earth 50*)

CO2 emissions are unavoidable when coal is used for the reduction of iron ore.

The goal is to cut total CO2 emissions by about 30% by using hydrogen to reduce iron ore and collecting CO2 from blast furnace gas.

The first practical system is to start operating by about 2030*. All blast furnaces are to be switched to this technology by 2050 as blast furnace facilities are updated and replaced.

*Assumes establishment of economic basis for CO2 storage infrastructure and creation of a practical unit using these processes.

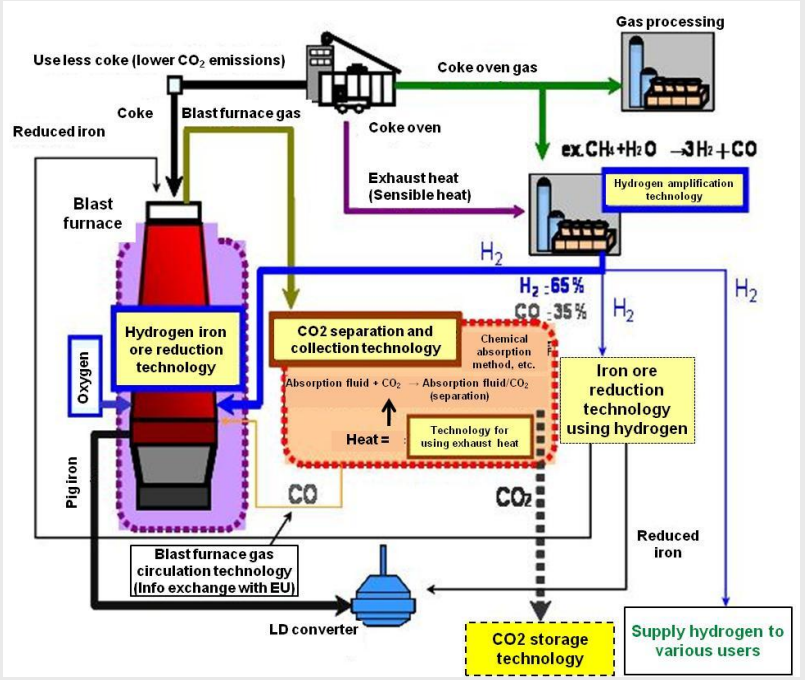
Project summary

1. Total cost (Phase1, Step 1): About ¥10 billion (tentative)
2. R&D activities (technology development)

a) Development of hydrogen amplification technology using unused coke oven gas sensible heat (800ºC)

b) Development of iron ore reduction technology using hydrogen

c) Collection of CO2 from blast furnace gas by using unused exhaust heat at steel mills



NEDO Project (Phase1 Step1 2008～12)

2008	09	10	11	12
About 6	20～30	20～30	20～30	20～30 (100 mn yen)

Medium/long-term timeline

2010 2020 2030 2040 2050

Phase1 Step1 (2008～12) Phase1 Step2 (2013～17) Phase2 Practical applications, more widespread use

3. Requests Concerning Initiatives in Japan

Role of Japanese Steel Industry in Fighting Global Warming

The Japanese steel industry can help fight global warming by using three "eco" methods: eco processes, eco products and eco solutions.

Eco process:
The Japanese steel industry has achieved the world's highest energy efficiency by developing and using major energy-conserving technologies. Since there is little potential for more emission reductions by using existing technologies, further cuts in emissions will require the greatest possible use of advanced technologies and the development of revolutionary technologies.

Eco product:
High-performance steel developed with manufacturers and sold in Japan and other countries cuts CO2 emissions when finished products made of this steel are used. High-performance steel made in Japan will be vital to the production of many types of eco products in fields where Japan is highly competitive, such as next-generation automobiles and nuclear power.

Eco solution:
The Japanese steel industry helps lower global CO2 emissions by sharing its outstanding energy-conserving technologies with the steel industries of other countries and assisting in the widespread use of these technologies. Potential CO2 emission reductions from the international transfer and use of advanced Japanese energy-conserving technologies total 340 million tons worldwide (equivalent to about 25% of Japan's total CO2 emissions).

This global technology sharing and utilization will be impossible without making a broad range of industries more globally competitive and increasing cooperation among different industries in Japan.

Effect of Initiatives in Japan on the Steel Industry

- The steel industry and other major industries in Japan are the most energy-efficient in the world. There is little potential for further emission reductions. Therefore, the adoption of an emissions trading system and environmental taxes would not only prevent progress with environmental measures but also reduce the availability of funds for necessary capital expenditures and technology development programs due to the resulting higher expenses.
- In particular, since steel is a carbon-intensive industry, an emissions trading system or other environmental program in Japan would have a severe impact on steel companies. The result would be an enormous impact on the ability of Japanese steel companies to compete in global markets. (Among the world's major steel producers, Japanese steelmakers alone are subject to the effective emission restrictions of the Kyoto Protocol framework.
- This situation would make it difficult for Japanese steel companies to continue operating in Japan. Moreover, there would be an enormous impact on the global competitiveness and workforces of companies in industries that use steel and jointly develop high-performance steel with steelmakers. In addition, these measures would be detrimental to the fight against global warming because of carbon leakage.

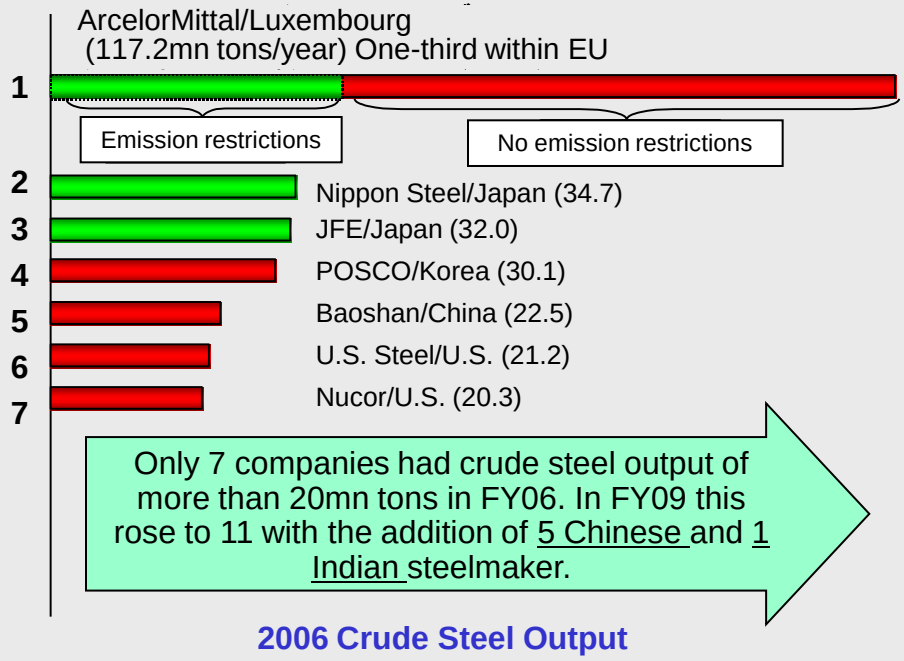
*Ordinary income per ton of crude steel produced by blast furnace and EAF steelmakers was an average of ¥4,500 between FY1990 and FY2009. Compared with this profit, there would be huge additional burdens resulting from the **cost of ¥3,500 to ¥7,000 per ton (80% to 160%) for emission rights associated with higher output under an emission trading system and from the cost of ¥243 to ¥654 per ton (6% to 15% of the above ordinary profit) resulting from a tax to combat global warming and a program to purchase all energy from renewable sources**.

Impact of Kyoto Protocol on Japanese Steel Industry

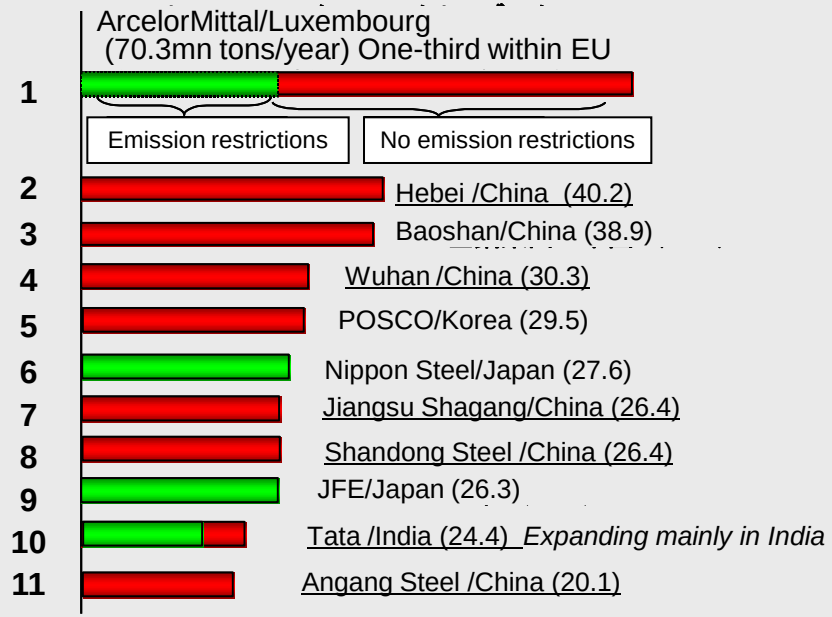
Among the world's major steelmakers, only Japanese steelmakers are effectively required to meet CO_2 emission restrictions.

The steel industry would bear an extremely large burden for carbon offsets because steel is a carbon-intensive industry. Imposing emission restrictions with no scientific justification would be an effective restriction on production.

- An emission rights price of 15 to 30 euros (¥2,000-¥4,000) per ton of CO2 would result in total expenses of about ¥100 billion to ¥200 billion.
- The cost of emission rights for higher production would be ¥3,500-¥7,000*, an extremely high cost in relation to the ordinary income per ton of crude steel (average of about ¥4,500 for FY1990-FY2009) at blast furnace and EAF steelmakers.
  * Unit CO2 emissions per ton of crude steel: 1.77. Cost of emission rights: 15-30 euros (1 euro = About ¥130)



2006 Crude Steel Output



2009 Crude Steel Output

JISF

Source: JISF from Metal Bulletin

(Reference) Estimated Impact of Initiatives on the Steel Industry

- The combined impact of a global warming tax and system for purchasing all energy from renewable sources would be about ¥36 billion to ¥97 billion for the steel industry (based on FY2007 consumption). (Cost of global warming tax: About ¥10 billion; Cost of renewable energy purchases: About ¥26 billion to ¥87 billion)
- Compared with ordinary income per ton of crude steel produced by blast furnace and EAF steelmakers, the impact is 6% to 15% of the total ordinary income of these steelmakers. The impact rises to 16% to 45% for the EAF steel industry.

(yen/ton of crude steel)

	Blast furnace/EAF Total		(EAF sector only)	
	Cost	Pct. of ordinary income	Cost	Pct. of ordinary income
Global warming tax (1) *1	70	2%	112	3%
Renewable energy purchases (2) *2	173 - 584	4 - 13%	470 - 1,584	13 - 42%
Renewable energy purchases (2)' *3	124 -168	3 - 4%	336 - 456	9 - 12%
(1) + (2)	243 - 654	6 -15%	582 - 1,696	16 - 45%
Ordinary income	4,500		3,800	

*1 The global warming tax is calculated by using the additional tax rate for fuel categories that are included in the FY2011 Tax Reform Plan Outline approved by the Japanese Cabinet on December 16.

*2 Renewable energy purchasing program (2) (option 4) includes the cost of power system stabilization measures. (Based on intermediate summary announced July 23, 2010 by Ministry of Economy, Trade and Industry.) (Amounts are per ton of crude steel. Cost is based on FY2007 energy consumption. Ordinary income is average for FY1990-FY2009.)

*3 Renewable energy purchasing program (2) (option 4) does not include the cost of power system stabilization measures. (1) + (2): Cost of ¥194-¥238 for blast furnace and EAF combined vs. ordinary income 5%-6%; EAF sector only: Cost of ¥448-¥568 vs. ordinary income 12%-15%

Requests Concerning Initiatives in Japan

Achieve "equal footing" on a global scale

- A shrinking domestic market due to an aging population, regulatory and tax systems that increase expenses more than in other countries, the yen's current strength and other factors will make it difficult for Japan's industries to retain their competitive edge in global markets.
- Industries in Japan have the world's highest energy efficiency. As a result, restricting industrial activity in Japan and forcing unfair expenses on Japanese companies would be harmful to Japan as well as the entire world. This is why Japan must achieve an international "equal footing" that eliminates differences in corporate tax rates and ensures that Japan is not at a disadvantage regarding measures to fight global warming.

The need for initiatives that support Japan's position as a leader in manufacturing and technology

- Industries in Japan have three roles regarding global warming: (1) Use advanced technologies to the fullest extent to achieve more improvements in efficiency; (2) Transfer outstanding products and technologies to other countries and take steps to increase their use; and (3) Develop revolutionary technologies.
- Emission trading systems do not contribute to the improvement or development of technologies. Furthermore, the purchase of emission rights is treated as a reduction in emissions. This is why emission trading makes no contribution to cutting actual emissions and is also an impediment to making improvements to technologies. For these reasons, as a country that is dependent on manufacturing and advanced technologies, Japan should not start using an emission trading system.
- The Japanese government must not impose unfair expenses and regulations on companies. Instead, the government should enact policies that help companies develop outstanding products and technologies to fight global warming. Enacting such policies is the only way to create a driving force for economic growth and jobs while at the same time contributing to the worldwide fight against global warming.

Reference Materials

CO2 Emission Reduction from Blast Furnace Slag Used in Cement

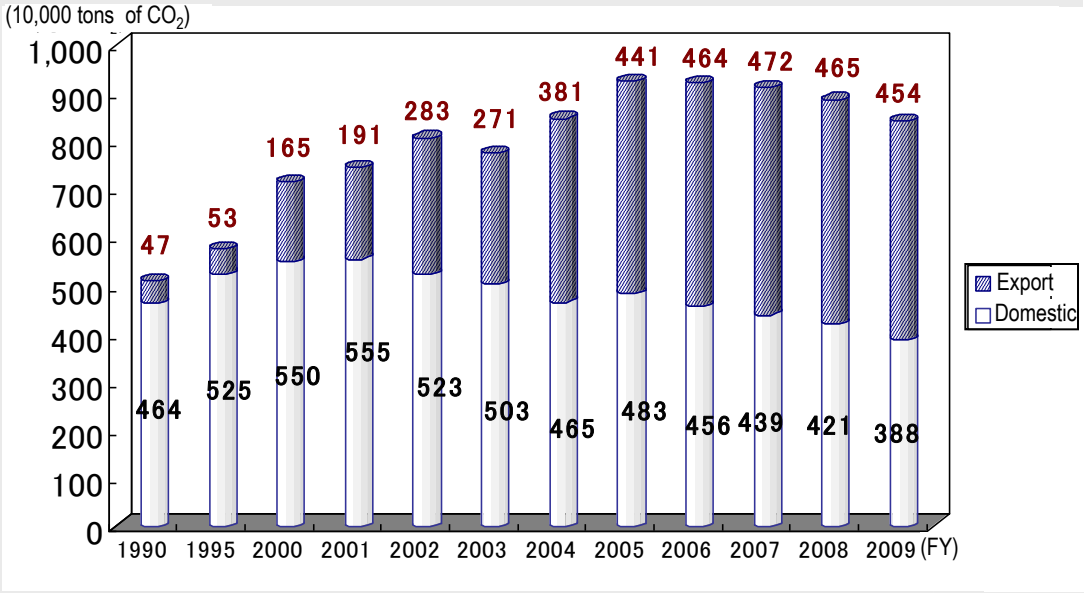
Initiatives - Households, Offices, Transportations

CO2 Emission Reduction from Blast Furnace Slag Used in Cement

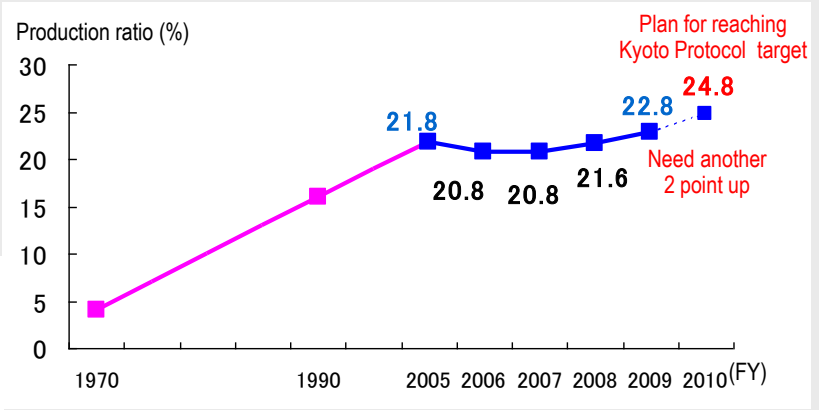
- Plan for reaching Kyoto Protocol targets assumes a higher pct. of mixed cement (mainly blast furnace cement) = From 22.8% in '09 to 24.8% in '10
- Higher pct. of mixed cement production can significantly cut CO_2 emissions

- Blast furnace cement was designated in 2001 as a specified procurement item under Japan's Green Procurement Law.
- National and other green procurement programs along with green procurement efforts of local governments and agencies can significantly cut CO_2 emissions by further increasing use of blast furnace cement.

Estimate of CO_2 Emission Reduction from Use of Blast Furnace Cement (Domestic + Exports)



Production ratio of mixed cement



Replacing conventional cement (Portland cement), which generates CO2 during the firing of raw materials, with slag cement, which does not generate CO2 during production, reduced CO2 emissions by 842tons/year (FY2009).

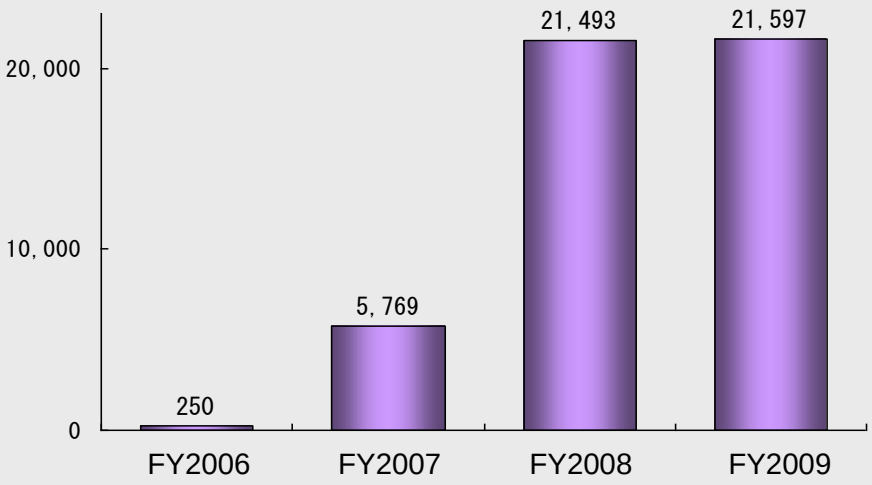
- Japan: Annual reduction of 3.88mn tons of CO_2
- Exports: Annual reduction of 4.54mn tons of CO_2

Assumptions for emission reduction contribution
Conversion to volume of cement: 450kg of slag/ Ton of cement
CO_2 emission reduction: 312kg of CO_2/Ton of cement

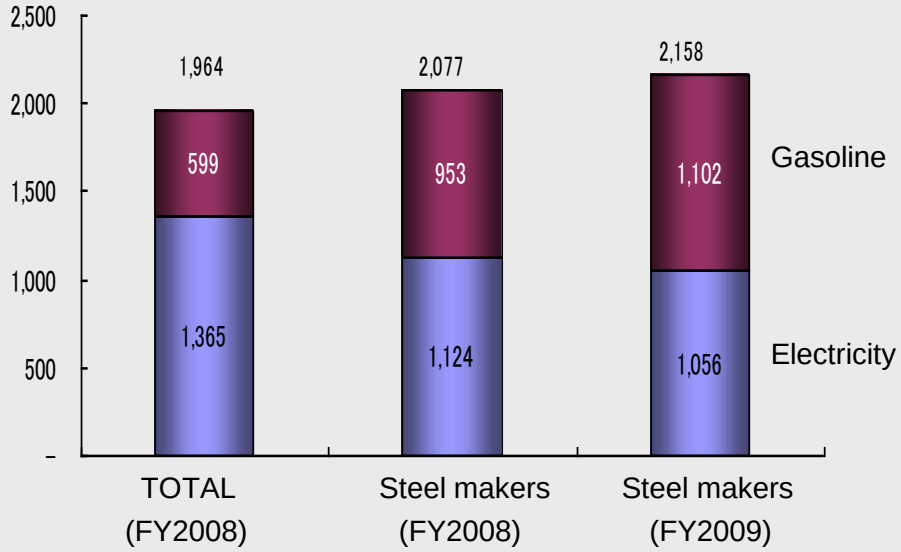
Initiatives by Households

- In FY2005, Japan's steelmakers started energy conservation programs using environmental ledgers for households.
- Steelmakers started education programs that included all employees, including at group companies, promotion of use of household environmental ledgers, and other actions. There were 20,000 households participating in this program in FY2008.

Households Using Environmental Ledgers



Household CO_2 Emissions
(CO2 emissions per individual: kg of CO_2/person-year)



Source: Estimates based on Greenhouse Gas Inventory Office materials

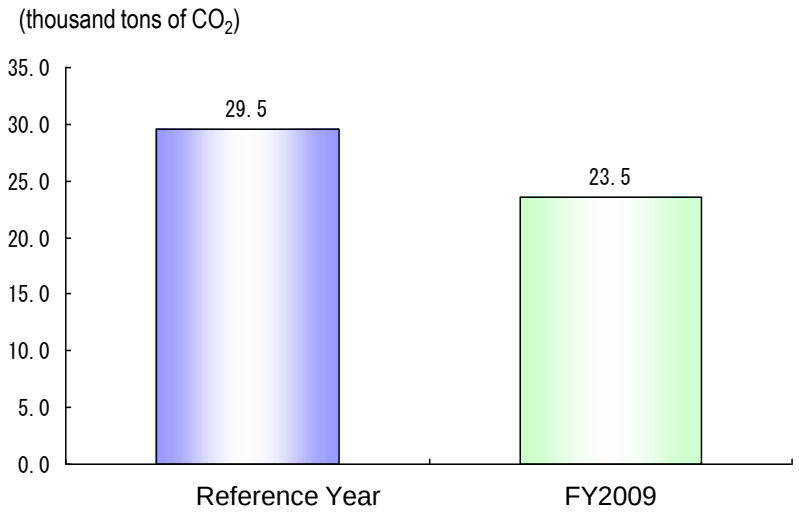
Notes:
1.Total for Japanese households includes households and household use of automobiles.
2. Total for steel industry households is an estimate by JISF based on the inventory in Japan

Initiatives for Office Buildings

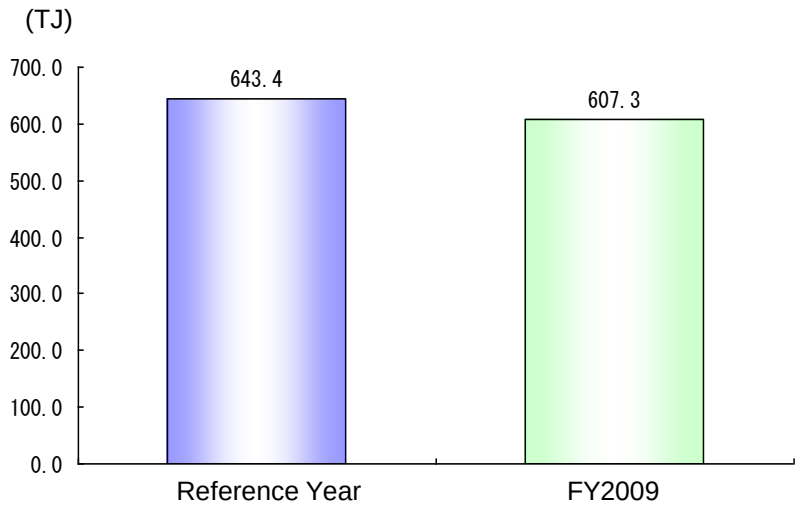
- The Japanese steel industry announced a target for office buildings: reducing average CO2 emissions by 5% based on the average for FY03-FY05 and for FY08-FY12. All steelmakers are taking actions aimed at achieving this goal.

Office CO2 emissions and energy consumption in FY2009 were both below the reference year.

CO2 Emissions



Energy Consumption

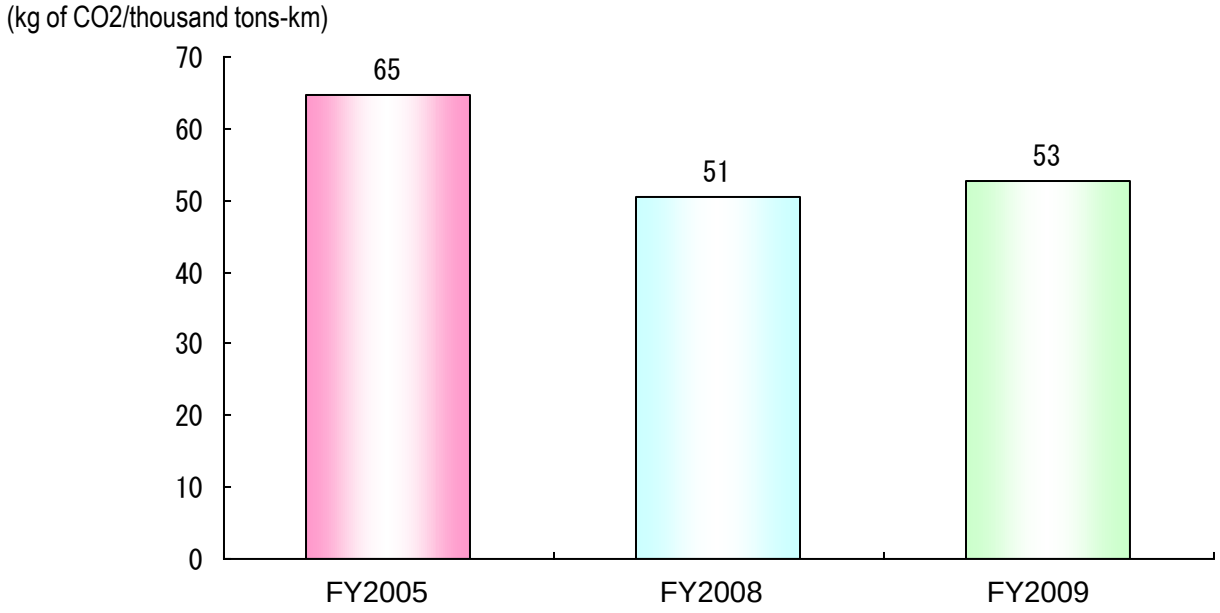


Note: Data for 297 business sites of 73 companies. In principle, FY03-FY05 average is used, but FY04-FY05 average is used in cases where office data was difficult to obtain

Initiatives for Transportation

- CO_2 emissions per unit of cargo transport increased marginally in FY2009 compared with FY2008 reflecting lower cargo volume amid economic sluggishness. However the figure is lower than FY2005 the year government started record keeping.
- In FY2009, the steel industry modal shift (ships + rail) was 80% for primary transportation and 97% for cargo transported more than 500km. This is far higher than the average modal shift rate of 38.1% for all industries in Japan (Ministry of Land, Infrastructure and Transport FY05 data for more than 500km).
- Steelmakers are taking other actions too, such as improving cargo transport efficiency by using a higher pct. of cargo space on ships, using eco-tires on trucks and using eco-friendly driving methods.

CO_2 Emissions per Unit of Cargo Transport



Note: Total CO_2 emissions from use of gasoline, light oil and heavy oil at the 43 companies surveyed divided by total ton-kilometers of cargo transported

JISF