Supplementary information

Energy Efficiency in the Japanese Steel Industry

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The Japan Iron and Steel Federation

1. Methods for properly determining steel industry energy efficiency

During the steelmaking process, energy is consumed for the production of steel while being simultaneously converted for the production of coke, recovery of byproduct gasses, recovery of exhaust heat, generation of electricity and other purposes. That means a unified evaluation covering energy consumption and conversion is needed in order to accurately determine the steel industry's energy efficiency. In addition, for international evaluations, it is vital to precisely match boundary terms such as the scope of the evaluation and the evaluation coefficients. If a steel industry energy efficiency evaluation were performed without using uniform rules for statistics, the evaluation would produce a conclusion that is completely different from the actual situation.

In "IEA Energy Statistics," which is produced by the International Energy Agency, the above "Energy Consumption (Final Consumption)" and "Energy Conversion" are presented separately. Furthermore, each country is allowed to use its own methods for dividing energy consumption and conversion, resulting in a large number of different approaches.

As a result, only the IEA's Final Energy Consumption can be used to compare the energy efficiencies of different countries. Even in the IEA report (Tracking Industrial Energy Efficiency and CO_2 Emissions, IEA 2007), there are separate sections in "IEA Statistics" for the steel industry for coke ovens, blast furnaces and other uses of energy. However, an analysis revealed the need to improve these statistics, which are based on information from individual countries. For example, in some cases, energy used for steel production is categorized as "other industries." This creates problems such as an underestimation of energy consumption or the conclusion that an inappropriate amount of byproduct energy for power generation is being used for the steel industry. Therefore, individuals must pay attention to these problems when making simple comparisons based on "Energy Final Consumption" of the IEA's energy statistics.

Currently, the "Asia Pacific Partnership (APP) Concerning Clean Development and Climate," an organization made up of public and private-sector individuals from seven countries, including the U.S., China, India and Japan, and International Iron and Steel Institute (IISI), which brings together the world's major steelmakers from the U.K., Germany, France and many other countries, are working on a set of unified rules for international benchmarking that can be the basis for approaches used for specific industries. However, this process is based on the major premise that final energy consumption and energy conversion will be evaluated together as a single unit. Unified evaluation scope and coefficients will be established based on this combination of consumption and conversion. If this evaluation system is used, the outstanding efficiency of Japan's steel industry will be obvious. This is because the combined consumption-conversion method will accurately reflect all of the hard work of Japanese steel

companies to devise ways to recover and effectively use exhaust heat and byproduct gases.

2. Energy efficiency in the Japanese steel industry

The Japanese steel industry has already made public a large volume of information about energy efficiency. The most recent document was announced in January 2008 by the Research Institute of Innovative Technology for the Earth (RITE). In this January 2008 report, 16 other reports along with IEA energy statistics are used to produce an international comparison of energy efficiency using a combined evaluation of energy consumption and conversion. The report gives Japan's steel industry an energy efficiency of 0.59 tons-oil/tons-crude steel. This is 15% to 20% better than the steel industry energy efficiency in Germany (0.69), France (0.71) and Britain (0.72), making Japan the world's most efficient steel industry.

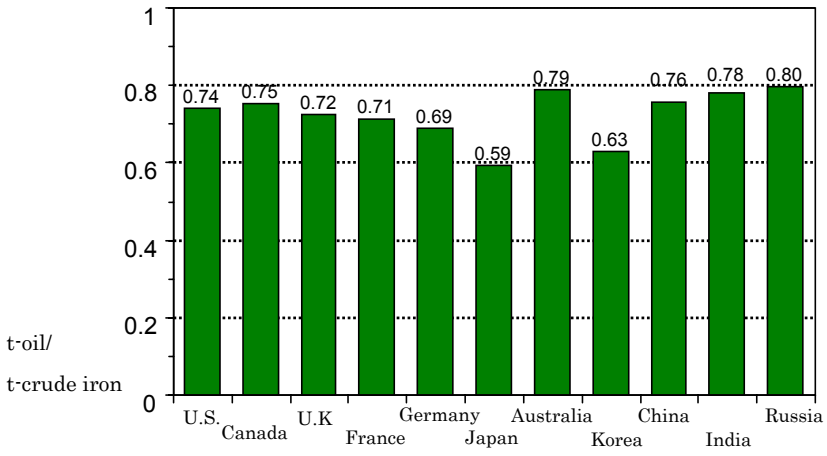
Furthermore, a 2007 international thesis collection called Energy Economics included a report on the results of a survey concerning the diffusion rate of energy conservation equipment at steel companies in different countries. Based on this survey, the diffusion rate of energy conservation equipment at Japanese steel companies is far higher than in any other country.

In addition, the January 2008 RITE report presents data concerning the potential CO_2 reduction if all countries in the world started using Japanese energy conservation technologies.

APP, IISI and other international organizations all recognize Japan's steel industry as the world leader in energy conservation.

International Comparison of Steel Industry Energy Efficiency

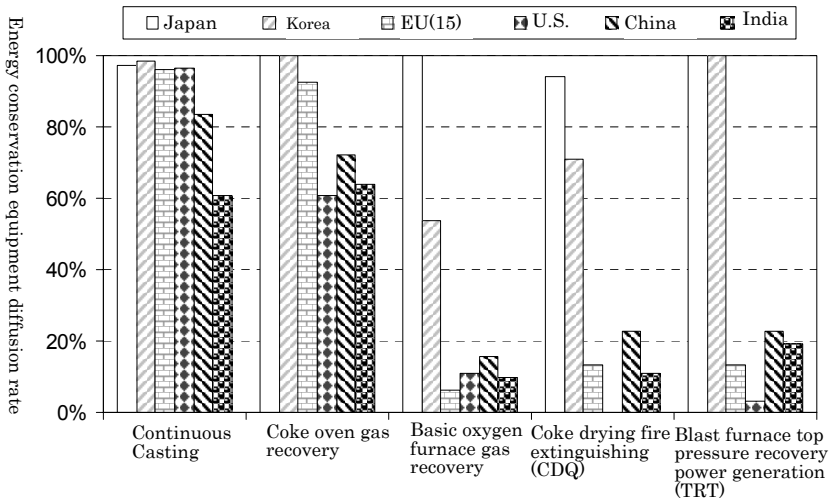
1) Unit Energy Consumption in Steel Industry



Japan ranks higher than the U.K., Germany, France and all other countries in terms of energy efficiency at integrated steel mills. Japan's leadership is due in large part to the extensive use of exhaust heat recovery equipment and the high utilization rate of byproduct gases.

Source: International Comparison of Energy Efficiency (Power Generation, Steelmaking and Cement), RITE, 2008 (Japanese translation and numbers by JISF)

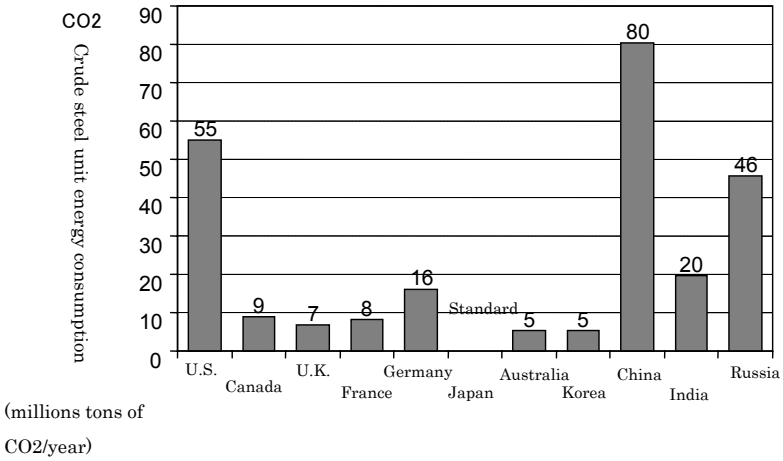
2) Diffusion Rate of Energy Conservation Equipment in Steel Industry



The diffusion rate of exhaust heat recovery equipment (CDQ, TRT) is much higher in Japan than in Europe and the U.S. Furthermore, Japan is clearly ahead of other countries in the recovery of byproduct gases (coke oven gases and basic oxygen furnace gases).

Source: Diffusion of energy efficient technologies and CO_2 emission reductions in iron and steel sector (ODA et al, Energy Economics, Vol. 29, No. 4, pp 868-888, 2007) (Japanese translation by JISF)

3) Potential CO_2 Emission Reduction in Global Steel Industry



There would be a large reduction in CO_2 emissions if all other countries could reach Japan's level of energy efficiency. Using Japanese energy conservation technology on a global scale would clearly make a big contribution to slowing global warming.

Source: International Comparison of Energy Efficiency (Power Generation, Steelmaking and Cement), RITE, 2008 (Japanese translation and numbers by JISF)