Feature Story

Nippon Steel’s Efforts to Hold Back Global Warming

Part 2
International Contribution to Environmental Conservation and the Generation of Electricity by Wind Power

Operating Roundup

Medium-Term Consolidated Business Plan (FY2003-2005)

Nippon Steel Group has formulated a medium-term consolidated business plan to be implemented during three-year period from fiscal 2003 to 2005.
Nippon Steel’s Efforts to Hold Back Global Warming

Part 2

International Contribution to Environmental Conservation and the Generation of Electricity by Wind Power

Including process concatenation and improvements in the efficiency of equipment operations and waste energy recovery, Nippon Steel took an array of energy-saving steps in the wake of the first oil crisis of 1973 that led to more than 20% in energy savings by 1990. Since the Voluntary Action Program for Environmental Protection by Steelmakers was worked out in 1996 by the steel industry as a whole, the company has also emphasized reductions in CO₂ emissions with rewarding results.

Also deserving special note are the international contributions of Nippon Steel’s world-class energy-saving technologies and the company’s recent advance into the field of wind-generated electricity as a clean energy resource for tomorrow.

This two-part series (Nos. 301 and 302) highlights these developments:

No. 301: Advance in the Voluntary Action Program
No. 302: International contribution to environmental conservation and the generation of electricity by wind power
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Global Contributions to Environmental Conservation and Energy Savings

The mechanisms for international cooperation delineated in the Kyoto Protocol of 1997 help to promote the diffusion of technologies associated with both energy savings and worldwide environmental conservation. In Japan, the New Energy and Industrial Technology Development Organization (NEDO) and other governmental organizations have initiated numerous activities to disseminate Japan’s energy-saving and environmental-protection technologies.

In the aftermath of the two oil crises, Nippon Steel amassed expertise in energy savings and environmental protection and related know-how that is unrivaled by other steelmakers. The company has been active in transferring these technologies to developing countries through model energy-saving projects of the NEDO. As of this date, five such projects have been implemented in China and another is underway in India.
**Feature Story**

**Case 1 | Shougang Corp. of China**

Nippon Steel's CDQ Technology Improves the Environment and Commands a 40% Share of the World Market

Overseas attention is now focusing on Nippon Steel's coke dry-quenching (CDQ) equipment. "CDQ is an innovative technology that not only reduces dust, soot and CO₂ emissions, thereby contributing to environmental protection, but also achieves great energy savings by recovering waste heat. As a result of consistent efforts by our company to disseminate this technology, Nippon Steel now commands a 40% (41 units) share of the world market in terms of the number of such units installed," says Manager Kiyoharu Itoh of China Projects Sales Div., Steel Plant Marketing Div., Plant & Machinery Division.

In December 1997, the installation of CDQ equipment (as a model energy-saving project of the NEDO) for Shougang Corporation, Beijing, China was entrusted to Nippon Steel's Plant & Machinery Division. "This model project attracted worldwide attention since it was the first such project that was internationally acknowledged as being an AIJ (Activities Implemented Jointly) undertaking between Japan and China," adds Manager Itoh.

The No. 1 CDQ equipment at Shougang Corp. was completed in March 2001 and now operates with a reduction in CO₂ emissions totaling approximately 110,000 tons/year (on a capacity basis).
Proprietary Technologies and Know-how Realize Higher Efficiency

The tenth of China's five-year programs stipulates the introduction of CDQ equipment into 60% of steelworks with an annual crude steel capacity of one million tons or more. This task has been positioned as a project of national importance.

"In China, twelve Nippon Steel-supplied CDQ units are already in operation. The CDQ equipment installed at Shougang Corp. is the most up-to-date type and features high energy savings. We received an order for a second unit of this type in February 2002. Another large cutting-edge CDQ unit was booked by Wuhan Steelworks of China in November 2001 and is now under construction," Manager Itoh says. "The energy savings and environmental improvements attainable by the introduction of CDQ equipment are truly substantial. We will continue our efforts to promote greater use of our technologies that are conducive to environmental conservation on a global scale."
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**Case 2  Tata Iron & Steel Co. of India**

**Nippon Steel Pioneers a CDM Project in the Steelmaking Field**

Nippon Steel's Plant & Machinery Division is currently proceeding with the construction of waste heat recovery equipment for the blast-furnace hot stoves at Tata Iron & Steel Co., Ltd. of India. This is NEDO-initiated model energy-saving project based on the CDM (Clean Development Mechanism) component of the mechanisms delineated in the Kyoto Protocol. As still another cooperative NEDO project premised on the potential of CDM, the Plant & Machinery Division is conducting a feasibility study regarding CDQ equipment at Tata Iron & Steel.

The key factors underlying Nippon Steel's commitment to the current CDM-based project are the company's proficiency at propelling overseas projects, as demonstrated by an extensive track record in overseas technical cooperation, and its world-class capabilities in energy-saving technologies.

"Nippon Steel has rich experience in the construction of large-scale CDQ equipment and operates numerous CDQ equipment at its own steelworks. As a result, it can provide host countries with extensive operational and maintenance know-how etc. Our thorough after-project services are another reason why our company's cooperative projects are highly rated abroad," says Manager Naohito Soma of Steel Plant Marketing Div., Plant & Machinery Division. "Upon completion of the current Indian project, we wish to accumulate precise know-how related to CDM for our company."

**CDM (Clean Development Mechanism)**

A system to implement projects leading to reduced greenhouse gas emissions in developing countries through financial and technical support provided by advanced countries. All or part of the greenhouse gas emissions thus reduced can be acquired by such advanced countries and used to meet their own emissions reduction commitments.
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Opening New Possibilities for Highly Promising Wind Power

Wind power, together with solar energy, is one of our most promising renewable energy resources. In ways designed to meet the geographic features of Japan, wind power development is now actively underway. In June 2001, the Ministry of Economy, Trade and Industry (Research Committee on General Resources and Energy) revealed its "Targets for New Energy Introduction," in which the targeted amount of wind-generated power for fiscal 2010 was revised upward, from 300,000 kW to 3 million kW—a level over 30 times greater than in 1999.

Capitalizing on Its Track Record, Nippon Steel Advances into Wind Energy

In March 2003, Nippon Steel started the commercial production of wind-generated power in the Hibikinada district of Wakamatsu in Kitakyushu City. This wind farm, consisting of ten 150,000 kW-capacity generators, will generate 35 million kWh of electricity which will be sufficient to supply the annual electrical needs of about 10,000 households. Nippon Steel intends to sell this electricity at retail to Kyushu Electric Power Co., Ltd. for the next fifteen years.

The Civil Engineering & Marine Construction Division of Nippon Steel received an order about three years ago for the manufacture of towers from NEG MICON, a Danish wind blade maker. This initiated Nippon Steel's involvement with wind power. "Because it is proficient in the manufacture of steel-tube structures such as offshore berths for receiving crude oil and LNG, Nippon Steel has already become a leading maker of wind turbine towers in Japan," says Group Leader Masayoshi Watanabe of Sales Div., Civil Engineering & Marine Construction Division.

Nippon Steel has a track record in power generation through in-plant power generation at its steelworks and IPP (independent power producer) power supply business. In addition, the company recently joined with Japan Wind Development Co., Ltd., a venture wind energy enterprise, to
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Offshore Wind Power Is Soon to Be Commercially Practical in Japan

"Offshore winds are stronger and steadier than on-shore winds. Offshore wind-generated power systems are virtually free of such concerns as the huge scale of these systems in terms of size and noise. Systems with greater capacity can also be built offshore. In light of these benefits, Japan will see rapid progress in offshore wind power in the future," says Manager Atsushi Yamashita of Marine Engineering & Construction Div., Civil Engineering & Marine Construction Division. Pilot projects of large offshore wind farms are already operating in four countries of the EU, though Japan has no such system yet. In the North Sea, an offshore wind system is being planned and the construction of a wind farm comparable in scale to a medium-class thermal power station is in progress.

For offshore wind power generation in Japan, the strengths of Nippon Steel's Civil Engineering & Marine Construction Division will be brought into full play. "Nippon Steel boasts an extensive track record and broad know-how in offshore construction. Because larger wind farms are possible offshore, Nippon Steel's technological capabilities will come into the picture," Manager Yamashita says.

Nippon Steel is already moving forward with the technological development required to cope with the challenging requirements presented by offshore locations and bigger wind turbines. To create larger blades, a combination of conventional fiber-reinforced plastics and carbon fibers are being used to develop higher-strength, lightweight composite materials. Since offshore wind systems must be capable of resisting the oscillation and corrosion endemic to harsh environmental conditions, a variety of elementary technologies must be developed to accommodate the demands placed on the structures and materials used. While these will, indeed, pose formidable challenges for Nippon Steel to meet head-on, they will also open the possibility of exciting new technical advances.

establish NS Wind Power Hibiki Co., Ltd. Nippon Steel assumed responsibility for construction of the wind power systems. In May 2003, NS Wind began commercial production of electricity for retail sale.

Wind Power Generation: A Promising New Energy Source

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<th>1999 results</th>
<th>2010 revision/target</th>
<th>2010/1999 (times)</th>
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<tr>
<td></td>
<td>Crude oil equivalent (1,000 kl)</td>
<td>Equipment capacity (1,000 kW)</td>
<td>Crude oil equivalent (1,000 kl)</td>
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<td>Wind power</td>
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<td>Utilization of solar heat</td>
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<td>Unused energy</td>
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<td>5,750</td>
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<tr>
<td>Scrap wood and others</td>
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<td>Total new energy supply</td>
<td>5.93 million kl (1.2%)</td>
<td>19.1 million kl (about 3.0%)</td>
<td>About 14</td>
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<tr>
<td>Total primary energy supply</td>
<td>About 580 million kl</td>
<td>About 600 million kl</td>
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Source: Reports from the Advisory Committees for Natural Resources and Energy and others
Offshore Wind Power Makes the Most of Plentiful Unused Energy

"It is said that the power-generating efficiency of offshore wind power systems is about 20% higher than that of onshore systems. Henceforth, we will make an exact assessment of offshore wind conditions and examine an array of related factors in order to determine the optimum angle and direction of blades. Accordingly, we hope that in a few years offshore wind farms can be established in Japan," Manager Mochizuki says, revealing his vision for offshore wind power.

"I think that wind power generation is one of the most advanced recycling systems in the world," Group Leader Watanabe says in conclusion. "For the maritime nation of Japan, wind energy is a very familiar natural energy that has enormous potential. We cannot sit idle without harnessing it. Eyeing an age of offshore wind power generation, we intend to steadily accumulate experience in wind power and to aggressively promote related business developments in preparation for 2010 when offshore wind power will account for one-third of all targeted wind power generation."

breakthroughs. "It is feasible that in the future, with the keyword being 'offshore,' environmentally-friendly power generation systems will be developed that harness natural energy sources, including tidal currents and ocean temperature differentials," says Manager Takashi Mochizuki of Technical Research and Development Group, Civil Engineering & Marine Construction Division.