

2. Promoting energy saving

In response to society's ener

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Steps toward Building an Environmentally Advanced Steel Works

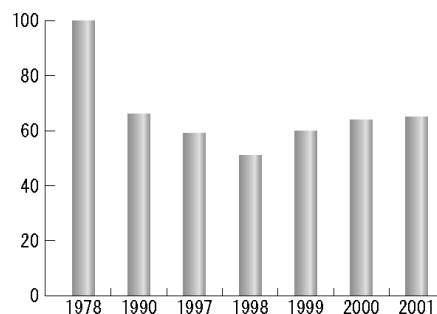
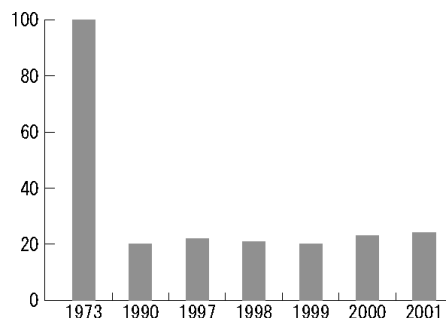
3. Promoting environmental conservation

3.1 Activities and results to date

3.1.1 Environmental measures and results at steel works

Associated with the rapid economic growth after World War II, environmental pollution became a serious social problem in Japan. This was particularly so after the period of high economic growth in the 1960's. In response, starting with the Basic Law for Pollution Control enacted in 1967, the Japanese government established a series of environmental laws, including the Air Pollution Control Law, and intensified measures associated with environmental conservation.

During the 1960's, local governments also started to implement environmental measures enacting ordinances that were sometimes more stringent than the national laws and regulations, such as the Pollution Control Ordinance enacted in 1951 by the government of Kana-



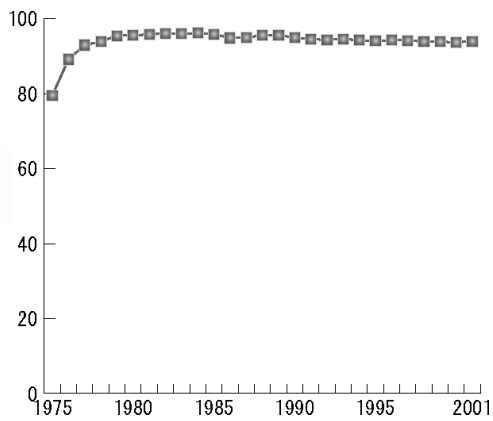
In response to social requirements, NKK has successively established new environmental goals, in consultation with local authorities, promoted technological development, and introduced new technologies.

NKK achieved the high by-product recycling rate of 98.7% as early as 1990. In the following year, 1991, the recycling rate reached 99%. Ever since then, the rate has been maintained at levels exceeding 99%. The recycling rates of major by-products in 2000 are shown in **Table 2**.

Table 2 Actual results of by-product recycling

4.1.2 Dealing with water recycling

Iron and steel production consumes huge amounts of water, and wastewater with varieties of properties is generated from each production process. The wastewater is properly treated in accordance with its properties, and re-circulated for use in permissible applications based on pu-

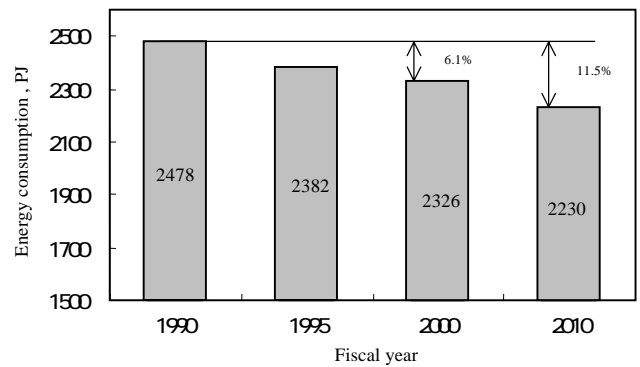


Heated debate has occurred on the Protocol at the United Nations Johannesburg Summit held in September 2002, and in the end, its enforcement was postponed due to the delay in Russian ratification and other reasons.

(2) Measures taken by Japan

Japan is developing domestic legal systems in preparation of the enforcement of the Kyoto Protocol. In March 2002, the Guideline for Measures to Prevent Global Warming was adopted by a cabinet meeting. Further, the Law for Promoting Measures to Prevent Global Warming and the Law for Ratifying the Kyoto Protocol were enacted in June 2002.

Table 4



Environmental Policy

- (a) Environmental Management Systems
- (b) Environmental Protection
- (c) Energy and Resource Conservation and Resource Recycling
- (d) Coexistence with Society
- (e) International Cooperation

In the 1970's, NKK established a system of mutual cooperation and information exchange between its individual works in order to facilitate quick responses to environmental issues across the company.

(2) Dealing with global warming

The majority of NKK's energy consumption is coal-based. Energy consumption needs to be curtailed in order to reduce GHG emissions. The most effective way is to reduce energy consumption in the production processes, and activities have been promoted toward this end.

The energy-saving measures implemented to date have brought about impressive results. It is expected that in the near future, revolutionary new iron and steel making processes will be developed such as the direct iron ore smelting reduction process, next-generation coke making process, massive scrap melting technology, and partial reduction sintering process. These new technologies, currently under development, are likely to make a substantial contribution to energy saving and thus to global warming prevention.

NKK's contributions to global warming prevention are not limited to these types of direct energy saving in the production processes. The company is also active in developing ecological steel products that save energy while used by customers, thus indirectly contributing to energy saving. Examples of these products are: high strength automotive steel sheets, coated automotive steel sheets; high-performance electrical steel sheets; high strength structural steel sections; and high strength shipbuilding steel plates.

In its recent follow-up report on the Voluntary Action Program by the Japanese steelmakers, the Japan Iron and Steel Federation announced the result of its trial calculation that the contributions to society made through these ecological steel products may possibly far exceed 5% of the energy consumption by the entire Japanese steel industry

Steel products are basic materials that must meet the needs of society and as such, it is our mission to continually undergo progress in order to contribute to the global environment.

Furthermore, the technologies and knowledge accumulated through iron and steel making will contribute to reduce GHG emissions across the entire society. Examples are: the environmentally-friendly regenerative burner system that can significantly improve heating furnace thermal efficiency; highly functional ecological steel products; waste plastics injection to blast furnace; DME as a new energy source; wind power generation systems, and fuel cell power generation systems. All of these developments can contribute to society in a variety of fields.

Also, the transfer to overseas countries of excellent technologies such as highly efficient iron and steel making equipment will contribute to international improvement in energy use efficiency.

As a company that possesses these leading-edge technologies, NKK believes that it is responsible to promulgate these worldwide in order to mitigate the global warming problems of concern to every country.

6. Future measures

6.1 Technology for preventing global warming

As indicated in the section on energy saving measures at steel works, it is necessary to identify new technological themes from viewpoints different from those used in the past and develop these new initiatives for furthering energy-saving measures. The development focus needs to shift from quantitative energy-saving to qualitative improvement of energy use efficiency. For example, technology that needs to be developed in the future includes a method of supplying energy that has the particular properties (calorific value or temperature) customized to specific energy use, as well as a method of recovering waste heat without degrading energy quality. Production processes need to be more compact, streamlined, and simpler. In some cases, a single process may need to be functionally separated; an upstream process may need to be added in order to perform thorough preliminary treatment, thus reducing the load on the subsequent process. These unique technological developments must be continually promoted and upgraded incrementally.

Some examples of the new technologies are introduced below in light of the points focused on in their developments, potential applications, and future expectations.

- (1) Environmentally-friendly regenerative burner system^{3),4)}

els and to use recovered heat directly in its own process. The environmentally-friendly regenerative burner system mentioned earlier has the potential of achieving these objectives. This system can recover heat as pre-heated air at a temperature of more than 1250°C from waste gas of

7. Conclusions

Japan made dramatic progress after World War II, and became one of the most highly industrialized countries in the world, completing the economic system that is based on mass production, mass consumption, and mass disposal. As a result, it has become a society that embraces various problems including those of an environmental nature. Many of these problems cannot be countered by the con-

Fig.6 Image of total energy & material control