

# ENERGY AND RESOURCES

Energy saving and new energy sources within the context of global environmental concerns



A petrochemical complex  
(Photo courtesy of AFLO)

## Japan's Current Energy Profile

Japan's limited domestic energy resources combined with its huge energy demand mean that it must depend on foreign sources for approximately 96% of its energy supply. Imports of crude oil account for the largest portion.

Except for the periods after the oil crises of 1973 and 1979, energy consumption in Japan has steadily increased. In the decades since the oil crises, consumption of energy by industry has remained fairly steady while consumption for

residential and commercial use and passenger and freight transportation has tended to increase, regardless of economic trends.

Since the end of the 1980s, as oil imports from such Asian countries as Indonesia and China have decreased, Japan has been relying to an ever greater degree on oil from the Middle East, which now provides around 83% of Japan's oil imports. Global energy demand, especially that in Asia, is expected to continue to increase, and oil is likely to remain the world's principal source of energy. With oil reserves declining in some producing regions, the world is likely to become even more dependent on the huge oil production

capacity that still exists in the Middle East.

Given that Japan already relies on the Middle East for around 86.6% of its oil and also depends on imports for most of its non-oil energy resources, it is clear that the country's energy supply structure is even more fragile than that of other industrial nations. Under these conditions, reducing energy risk by securing stable supplies will continue to be a critical issue for Japan's energy policy. To reduce energy risks and to prepare for emergency situations, Japan is pursuing measures for stockpiling oil, encouraging independent development of resources, and promoting cooperation with oil producing countries.

In 2002 the government passed the Basic Law on Energy Policy in order to promote comprehensive and integrated energy policies. This law sets forth the basic energy policy principles of "ensuring a stable energy supply," "harmonization with the environment," and "utilization of market mechanisms," and it also mandates the preparation of a "Basic Energy Plan"

that promotes a systematic, long-term, comprehensive approach to policies concerning energy supply and demand.

## The Prevention of Global Warming and New Energy

The greenhouse effect, which is mainly the result of carbon dioxide emissions created when fossil fuels such as petroleum and coal are burned, has become a matter of serious global concern. At the end of 1997, the Third Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP3) was held in Kyoto.

In the quest for technologies and facilities that lessen greenhouse gas emissions, attention is naturally given to the potential of both nuclear power and natural energy sources. While nuclear power generation does not produce carbon dioxide, the nuclear power industry is encountering increasing difficulty in securing sites for the construction of new power plants and facilities for the storage of spent nuclear fuel. Thus, the active development of natural energy sources is highly desirable, even though the diffusion and popularization of these new energy technologies still pose many problems.

Already in 1974, the Ministry of International Trade and Industry (now the Ministry of Economy, Trade and Industry) announced its Sunshine Project for developing new energy technologies aimed at coping with the energy crisis and building a society free of environmental pollution. In 1993, this project underwent fundamental revisions that gave birth to the New Sunshine Program, the objective of which is to develop innovative technology to create sustainable growth while solving energy and environmental issues.

In the new energy sector, solar power generation has been making steady strides forward. Japan is one of the leaders in this area, and until the end of 2004 it was the first

### A vehicle using alternative fuel

Rechargeable electric cars are expected to reduce air pollution and mitigate the effects of global warming. (Photo courtesy of NISSAN MOTOR CO., LTD.)



place in the world for introducing solar energy. As of 2009, Japan was ranked third in the world with regard to solar electric capacity. In January 2009, the government reintroduced a system of subsidies for solar power generation, and that same year the volume of solar cell shipments within Japan began to increase.

Another strategic technology in the development of new energy sources is hydrogen fuel cells. These fuel cells have a wide range of applications, the most conspicuous being use as an automobile power source. Several Japanese companies are already producing fuel-cell-powered automobiles. However, many issues surrounding hydrogen-fueled vehicles remain to be resolved, such as the high manufacturing costs and the release of carbon dioxide during the process for the production of hydrogen. In 2004, Japanese companies developed a new electric motor known as the “in wheel motor” which brought the electric vehicle much closer to realization. As electric vehicles themselves have the capacity to store energy, they are a promising technology for solving energy issues and preserving the environment. In 2009, the government started a program of subsidies for consumers who purchase an environmentally friendly vehicle, which added momentum to the popularization of electric vehicles. Since then, about 140,000 electric vehicles have been sold in five years.

## Nuclear Energy

Given the present-day difficulties involved in ensuring the reliability and large-scale supply of new energy, nuclear energy cannot help but have an important role as a type of energy that does not produce carbon dioxide. Nuclear power is a key source of energy for Japan, a country with few natural underground resources, since the technology

enables the country to produce electricity domestically. This was the stance of the Japanese government as it took measures to improve self sufficiency and diversify the types of energy and supply sources in order to bolster energy safety and security. Nuclear power was promoted as a way of reducing reliance on oil, and the Japanese government worked to assure the safety of atomic energy.

However, the Great East Japan Earthquake and the tsunami in March 2011 caused an accident at Tokyo Electric Power Company's Fukushima Dai-ichi (Number 1) Nuclear Power Plant. Several explosions thought to be hydrogen explosions occurred, damaging the plant facility, resulting in a leak of radioactive substances into the atmosphere and an accumulation and leak of contaminated water. The accident at the Fukushima Daiichi Nuclear Power Plant, as well as the stoppage at the thermal power stations, decimated the power supply to east Japan in one stroke.

These events once again brought to the fore the issues of the vulnerability of the domestic energy supply system against natural disasters and the safety of atomic power. The government set out to reconsider its Basic Energy Plan to create a more robust energy supply and demand structure. Five months after the disaster in August 2011, a law was passed to promote the introduction of renewable energy sources such as solar, wind and geo-thermal energy.

## Deregulation in the Energy Industry

In recent years, there has been a steady easing of regulations in Japan's energy industry. In the case of oil-related businesses, the importation of crude oil to be refined into gasoline, light oil, and fuel oil had earlier been almost wholly monopolized by the oil refineries. Since April 1996, however, such imports have been possible by any enterprise

**Solar energy in use**

A row of houses equipped with solar panels. (Photo courtesy of Getty Images)



so long as it meets certain standards of safe storage and quality control. In April 1998 the prohibition of self-service pumps at gasoline stations was lifted. As part of a series of deregulation measures, in January 2002 regulations controlling the supply-demand balance were eliminated and a new system was implemented for ongoing collection of information to be used in the event of an emergency. Such deregulation measures are helping to spur the reorganization of Japan's domestic oil industry through corporate mergers and alliances.

Deregulation is also taking place in the electricity sector. In accordance with a revision to the Electricity Utilities Industry Law, since December 1995 competition has been introduced into the market for the generation and supply of electricity. The introduction of a wholesale electric power bidding system in 1996 made it possible for companies other than electric power companies to sell the electricity that they generate to the electric power companies. In March 2000 the sale of electricity was deregulated, with an aim to ensure stable supply and help counter global warming. Subsequently systematic reforms of the electric power industry were also implemented, which has contributed to a steady increase in the amount of electricity sold by providers other than electric power companies.

To address the accident at the Tokyo Electric Power Company's Fukushima Daiichi Nuclear Power Plant, which was caused by the Great East Japan Earthquake in March 2011, the government began reviewing its basic energy plan, which was approved in a Cabinet meeting in 2014.