

August 2010
Atomic Energy Society of Japan
Social and Environmental Division

Development of Sustainable Energy

In view of the strong demand for diversifying energy supplies obtained from low carbon sources, the Atomic Energy Society of Japan suggests that, for the purpose of securing sustainable energy, now is the time to strengthen strategic approaches for increased use of nuclear power, which does not emit greenhouse gases during operation similarly to renewable energies such as solar power, wind power and biomass, and that is both technically and economically competitive as discussed below.

1. Nuclear power is one of the most effective means of addressing global warming.

Not only to meet the target agreed in the Kyoto Protocol by 2012, but to increase the ratio of zero emission power sources such as renewable energy sources and nuclear power to 50% or more by 2020, as determined by a cabinet meeting following the Hokkaido Toyako Summit in 2008, one of the most effective options is to enhance the use of nuclear power. It emits extremely low levels of greenhouse gases among large-scale power sources during operation, as well as during the phases of manufacturing necessary systems and constructing facilities, and also supplies large amounts of electricity stably (Fig. 1).

2. Increased use of nuclear power enhances energy security.

Japan's energy self-sufficiency rate is only 4%. Even if nuclear power is assumed to be a domestic energy, the rate will reach 20% at most, merely half the food self-sufficiency rate of 40%, which it is considered needs to be increased urgently. With fierce global competition for resources and energies, the increased use of nuclear power is the most effective means of enhancing the stability of energy supply (Fig. 2).

3. The spent fuel of LWRs contains abundant recyclable resources.

The spent fuel of LWRs currently in operation contains abundant recyclable resources, particularly uranium (U) and plutonium (Pu). The process of recovering them is called reprocessing. The spent fuel also contains other recyclable materials, and separating and recycling these materials reduces the radioactivity of the waste. Both public and private research institutes, led by the Japan Atomic Energy Agency, are developing the technology.

4. Uranium reserves can last several thousand years by commercializing fast breeder reactors.

If the spent fuel of LWRs is not recycled, uranium reserves will last no longer than 100 years, indicating that nuclear power is not sustainable. The fast breeder reactor produces more Pu than is consumed for power generation, which can then be reused as a fuel. This conserves the uranium resources that also serve as the source of Pu production, and so the uranium resources will last several thousand years, significantly enhancing the stability of energy supply. Therefore, the technological development of the fast breeder reactor, which is now being promoted by the Japan Atomic Energy Agency and other research institutes in both the public and private sectors, is one of the most important subjects for Japan which has few natural resources.

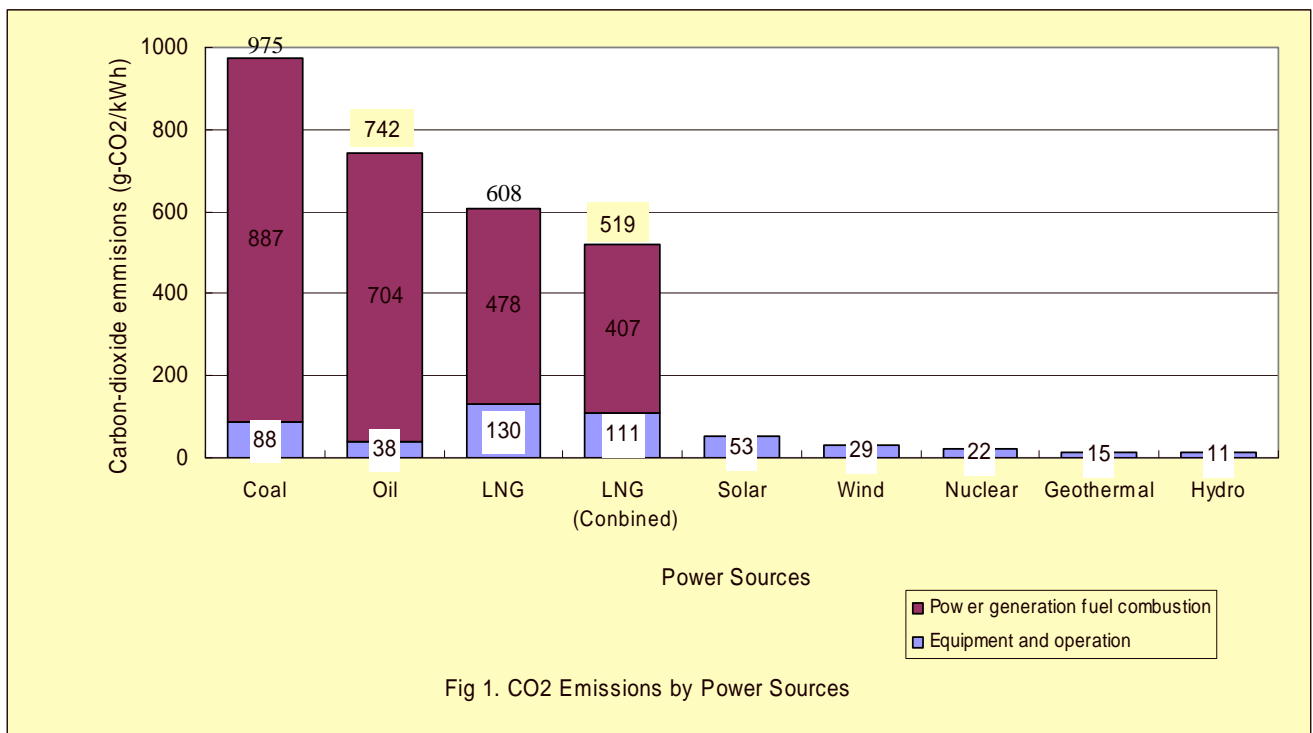
5. Safe disposal of radioactive waste makes nuclear power truly sustainable.

The major premise in using nuclear power is to safely isolate from places where people live the radioactivity of radioactive waste generated during the operation of nuclear power plants or by

reprocessing spent fuel until it causes no harm to the human body. Only when this is achieved, nuclear power will become a truly sustainable energy. This has already been achieved for some of the low-level radioactive waste generated during the operation of nuclear power plants. In addition, the technology for disposing of high-level radioactive waste and others generated by spent fuel reprocessing has already been developed, and some countries are now preparing to construct disposal facilities. The Nuclear Waste Management Organization of Japan is proceeding with the siting of disposal facilities for high level waste.

6. Nuclear power generation is a crucial and invaluable area in which Japan can demonstrate world leadership.

It is critical to ensure safety and establish a nonproliferation system in using nuclear power. Japan’s nuclear technology leads the world in terms of safety and quality, and is used in the construction of nuclear power plants that have been increasing worldwide and the development of advanced reactors. Japan also has state-of-the-art technology for safeguards, which are important for preventing nuclear proliferation. Nuclear safety and nonproliferation are key areas in which Japan can demonstrate world leadership.

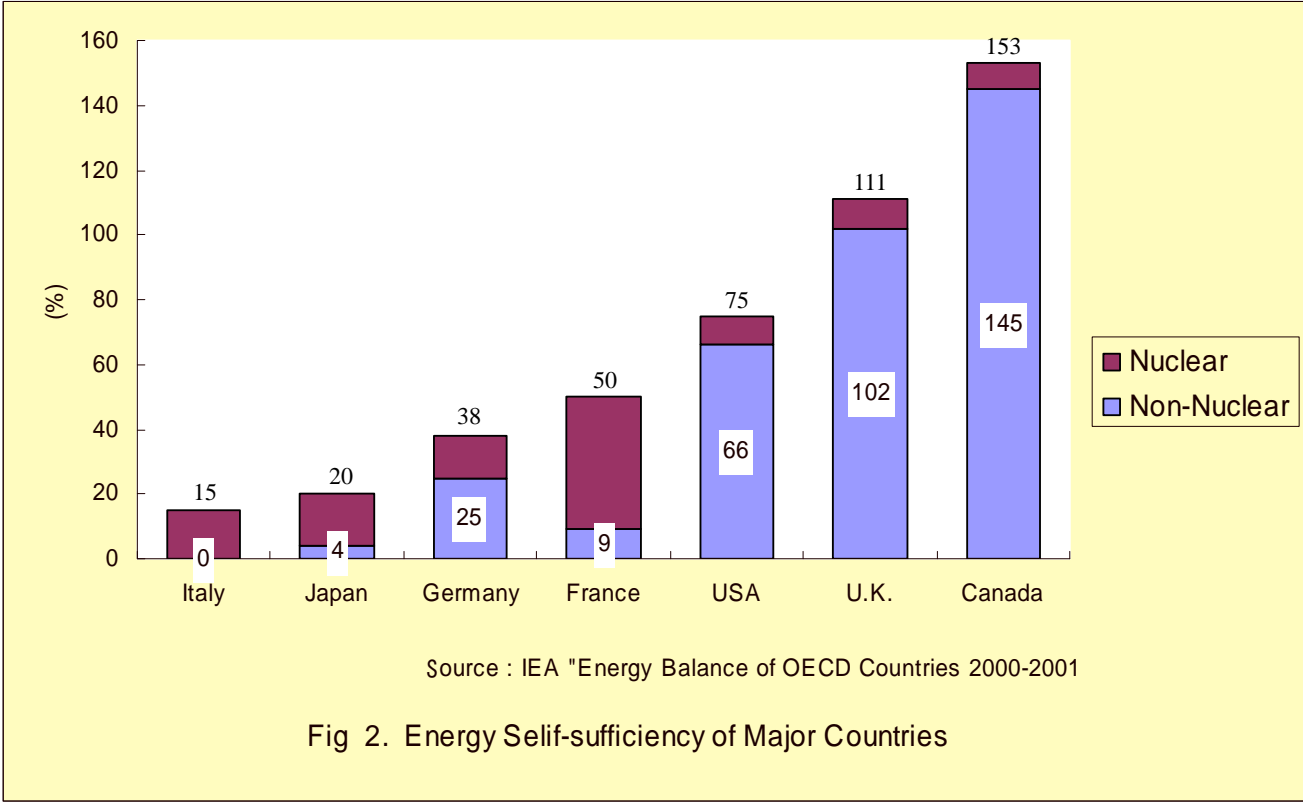


Source: Central Research Institute of Electric Power Industry

* CO₂ emissions were calculated for all the energies generated by combustion of power generation fuel, as well as those consumed by mining of raw materials, construction of buildings including power generation facilities, fuel transport, refining, operation, maintenance and other activities.

* The emissions from nuclear power were obtained by combining the emissions from domestic reprocessing of spent fuel, application of Plu-thermal (assuming recycling one time), disposal of high level waste and others.

Note: Totals may not match the sum of individual values due to rounding.



Note: The imports and exports of electricity were reported as primary energy.