

White Paper on Nuclear Energy 2006 (Summary)

March 2007

Japan Atomic Energy Commission

Chapter 1: Advent of a New Era for Nuclear Energy Worldwide

-- Toward Concurrent Achievement of Expansion of Nuclear Power Generation and Nuclear Nonproliferation --

Energy consumption is growing around the world, mainly in developing countries, making it a critical policy challenge for all countries in securing stable energy supplies.

On the other hand, the Intergovernmental Panel on Climate Change (IPCC) issued its fourth assessment report, which predicts that the global average temperature will rise by approximately 4.0 degrees centigrade by the end of the 21st century if mass consumption of fossil fuel energy continues in the pursuit of high economic growth. This has increased the need to further enhance efforts to tackle global warming and has prompted countries around the world to pay renewed attention to the fight against global warming as a critical policy challenge.

Against this background, an increasing number of developed countries are taking a new look at nuclear power generation as a key means to concurrently secure stable energy supply and cope with global warming. Also, there are more and more developing countries aiming to introduce nuclear power generation as a new energy source. Furthermore, there have also been new movements within the industry, such as increasing investments in uranium resource development in response to the recent uranium price surge and the ongoing realignment of the nuclear power industry across boundaries of national markets for nuclear facilities and equipment.

At the same time, the international community is requested to strengthen efforts to ensure nuclear nonproliferation and cope with the possibility of nuclear terrorism, as some countries have made efforts to acquire nuclear weapons and the threat of nuclear terrorism is increasing.

This chapter outlines the aforementioned recent activities prompted by the growing expectations for nuclear energy and challenges to be overcome, including a renewed interest in nuclear power generation as various countries seek to secure stable energy supplies while simultaneously coping with global warming, as well as new activities intended to strengthen efforts for nuclear nonproliferation. Moreover, this chapter points out challenges that Japan must tackle head-on as it faces a dynamic change in the international climate and explains the government's basic concept on how to address these challenges.

Paragraph 1: The Rapidly Changing Global Energy Situation and Global Warming

Key Points

- (1) Global energy demand in 2030 will exceed current levels by around 50%.
- (2) Fuel prices will rise sharply due to increasing energy demand, and international competition for energy resources will intensify.
- (3) The issue of global warming will grow more and more serious due to the mass consumption of fossil fuels.
- (4) Nuclear power generation could become a key means to help resolve the issues of a possible energy supply crunch and global warming. As a precondition for this, however, it is necessary to ensure sufficient nuclear nonproliferation measures, in addition to maintaining nuclear safety and security and ensuring appropriate management of radioactive waste.

1. Energy Demand Growth Worldwide

As global energy demands continue to grow, demands in 2030 are forecast to exceed current levels by 50%, with half of the projected increase expected to be attributable to Asia excluding Japan, with China alone accounting for approximately 30%.

Against this background, the prices of energy resources such as oil, coal, natural gas and uranium are starting to rise sharply and international competition to secure energy resources is starting to intensify.

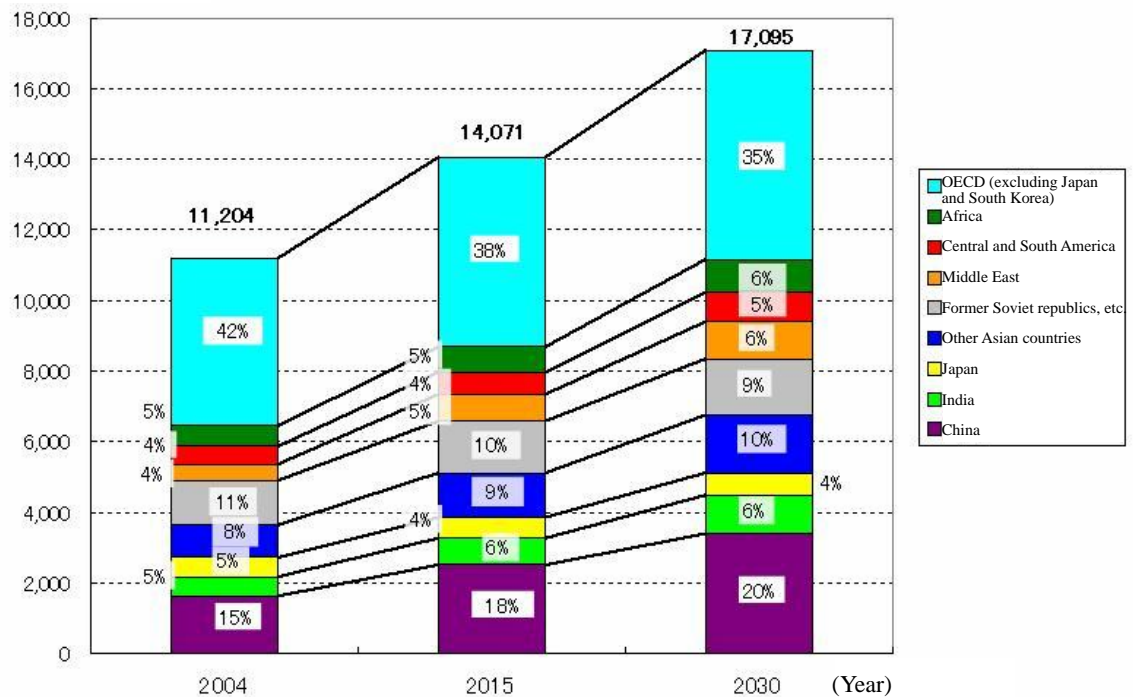


Figure 1: Outlook for Global Energy Demand (region-by-region breakdown)

Source: "World Energy Outlook 2006" compiled by the IEA

2. Approach to Refrain Global Warming

While energy demands continue to grow as mentioned above, global warming is progressing due to increases in the emissions of greenhouse gases, stemming from mass consumption of fossil fuels, and it has been pointed out that the impact thereof is becoming increasingly serious year-by-year. To be more specific, the IPCC's fourth assessment report predicts that the average surface temperature at the end of the 21st century will be approximately 4.0 degrees (within a range of between 2.4 and 6.4 degrees) centigrade higher than 1990 levels, and that sea levels will rise by between 18 and 59 centimeters if economic growth continues at such a rapid pace with heavy reliance on fossil fuel energy.

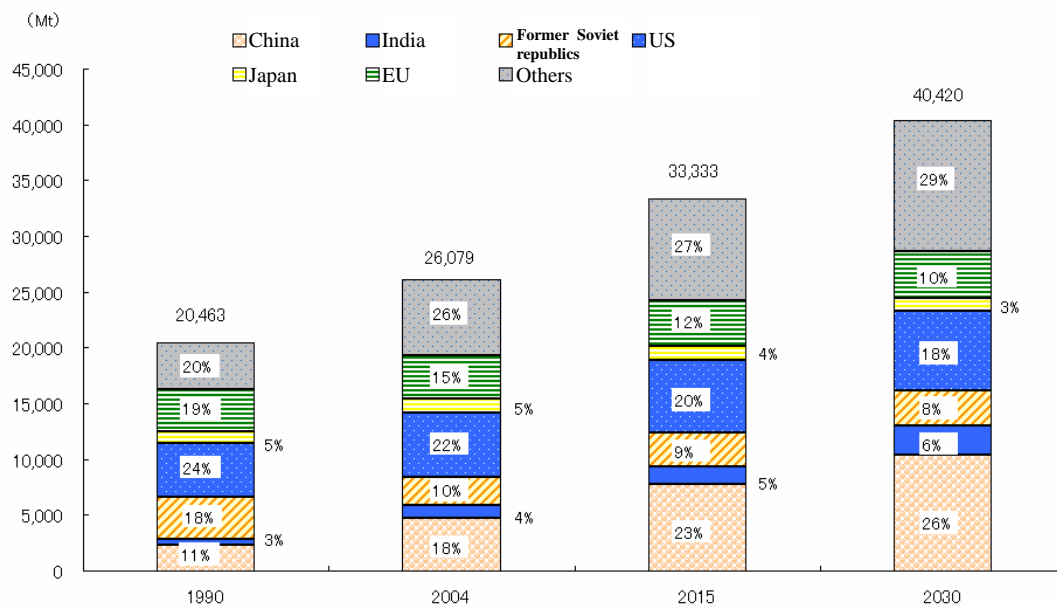


Figure 2: Outlook for Global CO₂ Emissions (region-by-region breakdown)

Source: "World Energy Outlook 2006" compiled by the IEA

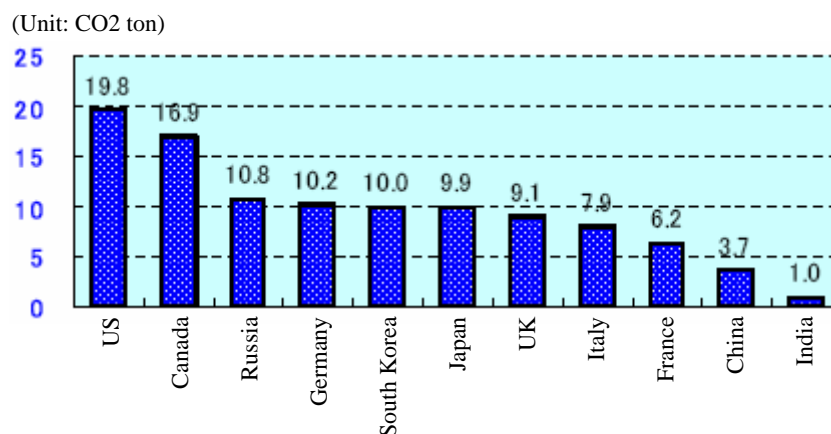


Figure 3: Per-Capita Emission of Energy-Derived CO₂

Source: "CO₂ Emissions from Fuel Combustion 2006" compiled by the IEA

3. Toward Resolving Energy and Global Warming Issues

Amid growing worries over issues of energy security and global warming, nuclear power generation, which involves little emissions of carbon dioxide, a major greenhouse gas, has respectable records in terms of safety and economy and enables a

stable energy supply, could become a key means to resolving these issues, although it is necessary, as a prerequisite, to ensure sufficient non-proliferation measures, maintain nuclear safety and security and ensure appropriate management of radioactive waste.

For example, when Tokyo Electric Power Co. halted operations at its nuclear power plants after the revelation of inappropriate plant operation management in 2002, alternative power generation to cover the ensuing supply gap led to the emission of an additional 42 million tons of carbon dioxide, underscoring the significant role of nuclear power generation. On the other hand, the incident highlighted the grave responsibility of electric power companies in ensuring safe and stable nuclear power plant operations so as to have the plants play the role in accordance with appropriate safety regulations while seeking to foster mutual understanding with local residents.

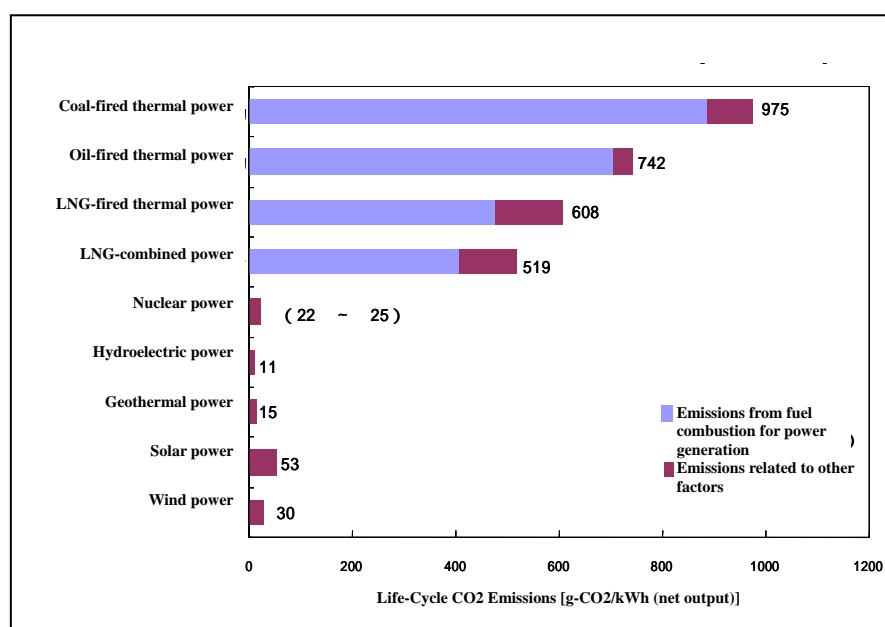
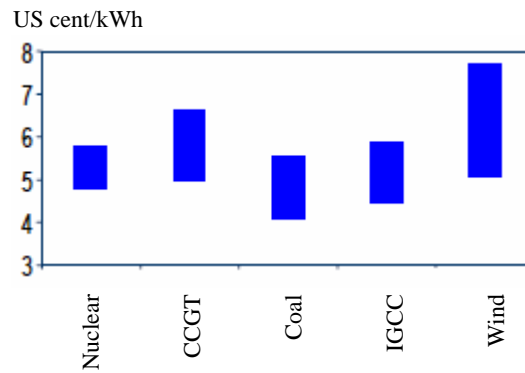


Figure 4: Life-Cycle CO₂ Emissions from Various Types of Power Generation Source:

Figures for emissions from nuclear power generation are taken from "Evaluation of Nuclear Power Generation Technologies Based on Life-Cycle CO₂ Emissions (August 2001)" compiled by the Central Research Institute of Electric Power Industry, and those for emissions from other types of power generation are taken from "Evaluation of Power Generation Technologies Based on Life-Cycle CO₂ (March 2000)" by the same institute.



*The cost of nuclear power includes expenses related to treatment and disposal of radioactive wastes

Figure 5: Comparison of Cost per Unit Electricity Generated

Source: "World Energy Outlook 2006" compiled by the IEA

Paragraph 2: Global Trend of Expansion of Nuclear Power Generation

Key Points

- (1) Moves to expand nuclear power generation are gaining momentum in numerous countries around the world.
- (2) Various countries, mainly in the developed countries, are engaged in projects related to the nuclear fuel cycles, and efforts concerning the disposal of radioactive waste are underway in these countries.
- (3) The expansion of nuclear power generation has stimulated efforts in various countries to seek international cooperation in the area of nuclear energy, and has triggered a wave of moves to form partnerships in the nuclear industry sector.

1. Global Status of Nuclear Power Generation

There were a total of 435 nuclear power plants operating around the world as of the end of December 2006, with 28 others under construction. The number of plants constructed and expanded in the world has declined since the 1990s due to factors such as the impact of the accident at the Chernobyl nuclear plant, although many nuclear power plants were constructed and expanded in the 1970s to 80s.

In recent years, however, there have been growing moves to take a fresh look at the merits of nuclear power generation, reflecting the circumstances surrounding energy resources and the recognition of the significance of global warming. According to an estimate by the International Energy Agency (IEA), the combined capacity of nuclear power plants around the world will expand from 364GW in 2004 by about 13% to 416GW in 2030 under a scenario that presumes the continuation of the current energy policies of countries around the world, and by about 41% to 519GW under a scenario that presumes the adoption of their planned alternative policies that feature measures to curb emissions of greenhouse gases.

Among specific examples of recent efforts to increase the use of nuclear power generation are moves by countries such as the United States, China and India to construct and expand nuclear power plants, and reviews by the United Kingdom and Sweden, among other nations, of their policy of abandoning nuclear energy.

As of the end of December 2006

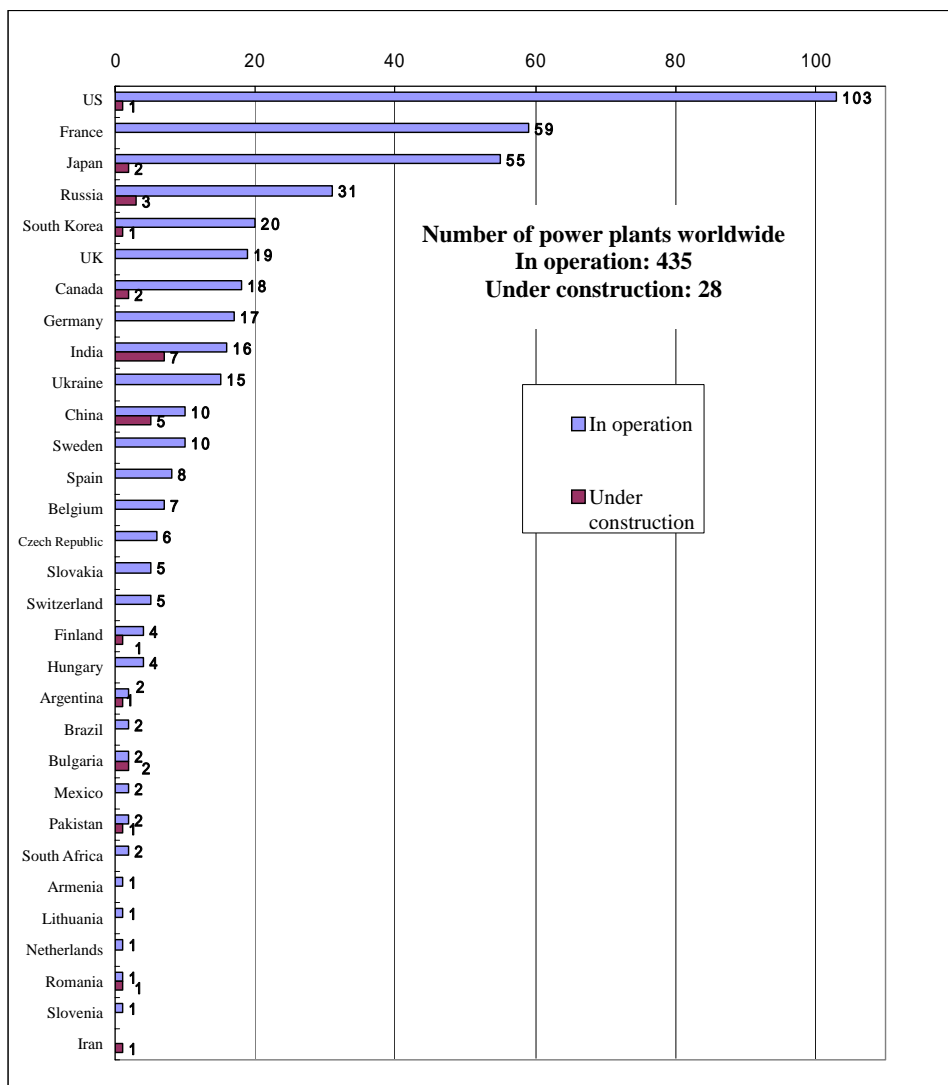


Figure 6: Number of Nuclear Power Plants Worldwide Including Those in Operation and Those Under Construction: Source: World Nuclear Association (WNA)

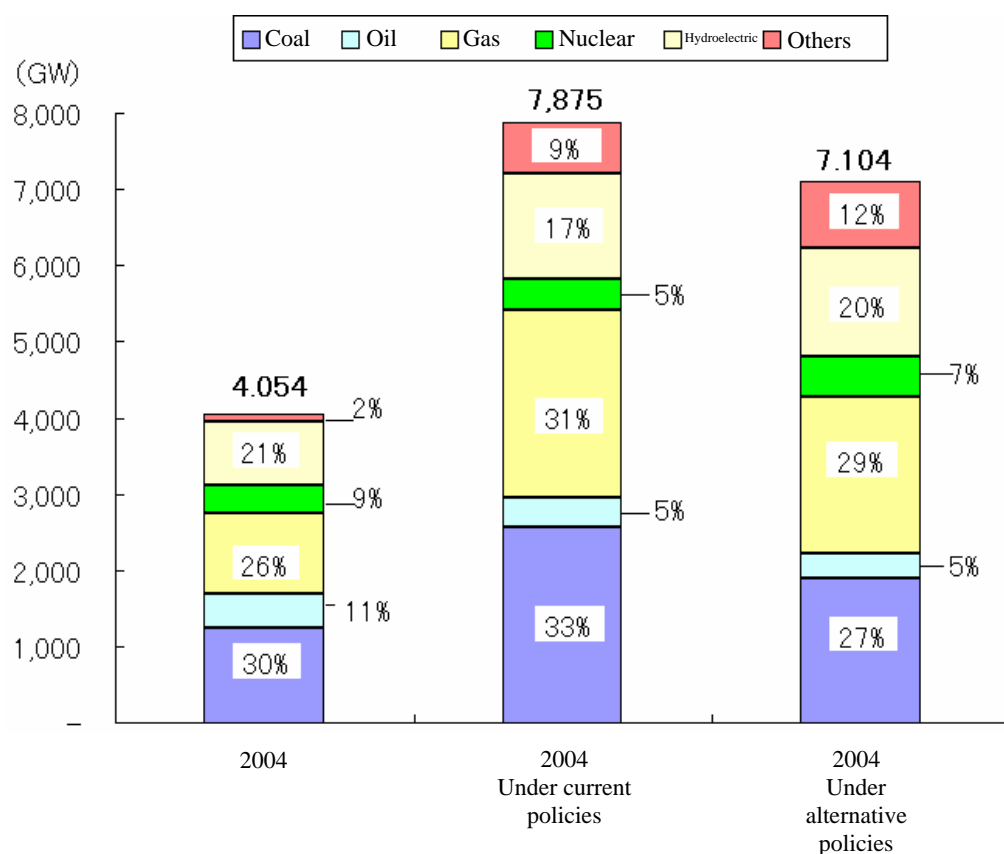


Figure 7: Prediction of Global Power Generation Capacity in Future and its Breakdown by Generating Methods

Source: "World Energy Outlook 2006" compiled by the IEA

2. Status of Japan's Nuclear Power Generation

Japan has adopted an energy policy that promotes the use of nuclear power generation while striving to save energy and introduce new energies from the viewpoint of securing a stable energy supply and coping with global warming. At the end of 2006, there were 55 nuclear power plants operating in Japan, with nuclear energy accounting for about a third of Japan's total electricity generation in fiscal 2005, providing a key electricity source for the country. Although the nuclear power facility utilization ratio stood at 71.9% in Japan in fiscal 2005, up three percentage points from the previous

year, this figure is relatively low given that the utilization ratio exceeds 80% in about half of the countries and regions that utilize nuclear power generation.

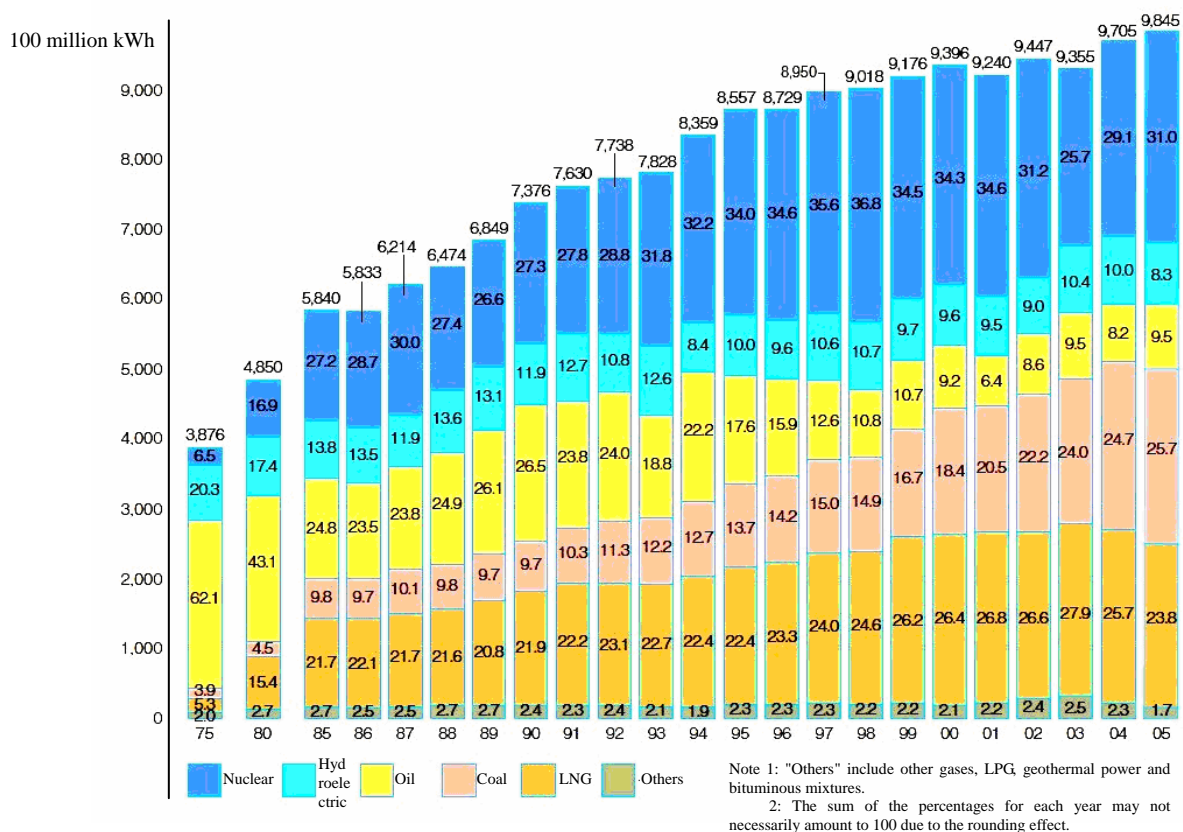


Figure 8: Change in Japan's Electricity Generation and its Breakdown by Generation methods

3. Status of Nuclear Fuel Cycle related projects Worldwide

With regard to the nuclear fuel cycle, efforts are underway mainly in developed countries to promote activities concerning uranium enrichment, reprocessing, fuel fabrication and MOX fuel utilization in LWRs. At the same time, various countries are engaged in activities to ensure appropriate management of radioactive waste, including the disposal of high-level radioactive waste.

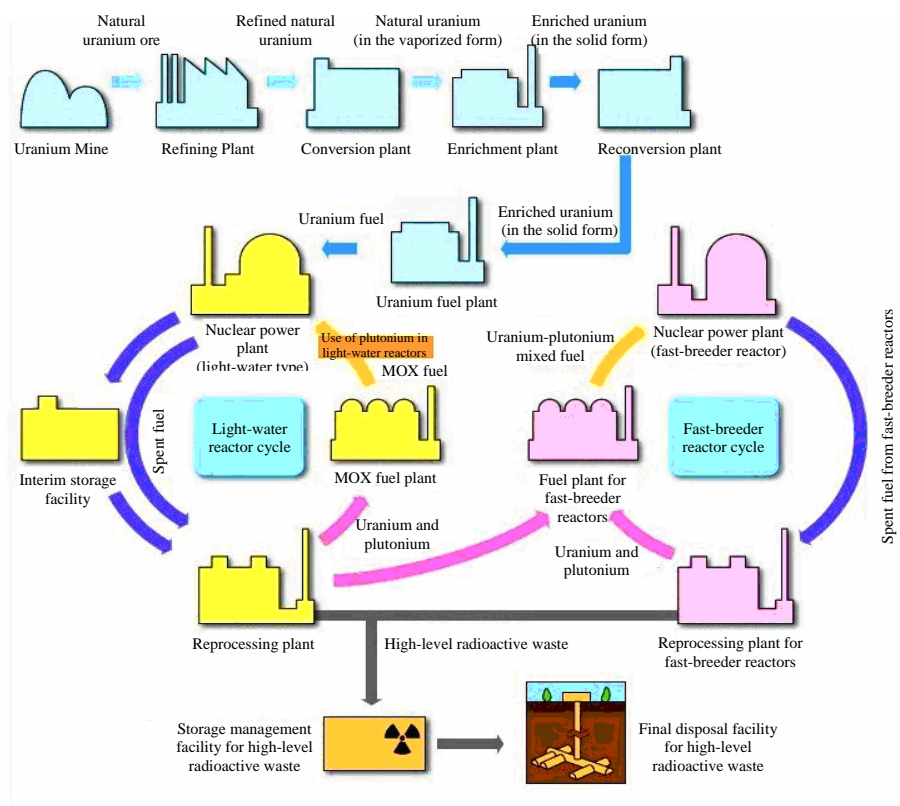


Figure 9: Concept of Nuclear Fuel Cycle:

Source: Materials compiled

by the Ministry of Economy, Trade and Industry

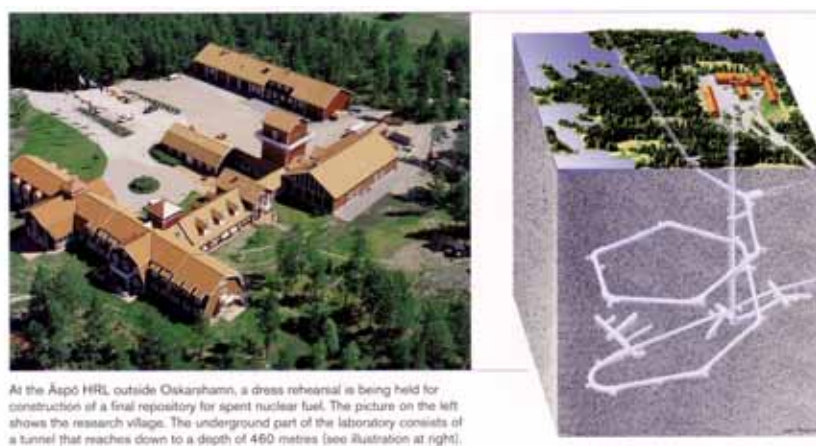


Figure 10: Oskarshamn Spent Fuel Repository Site in Sweden

4. Progress in International Cooperation in the Area of Nuclear Energy

In recent years, there have been new moves towards international cooperation concerning nuclear energy in line with the expansion of nuclear power generation. Specific examples include moves by developed countries and other nations such as China and India to seek bilateral cooperation concerning nuclear energy and uranium resource supply. Furthermore, multilateral cooperation schemes such as the Generation IV International Forum, the Forum for Nuclear Cooperation in Asia and the ITER project are underway.

Table 1: Movements concerning bilateral cooperation on nuclear energy in and around 2006

Countries	Movements
U.S.-Russia	*Agreement to initiate talks on a U.S.-Russia agreement on nuclear cooperation in July 2006.
U.S.-India	*Agreement to an initiative for cooperation in the civilian nuclear energy sector in top-level talks in July 2005. *Agreement on specific matters concerning the above initiative in March 2006. *A U.S. law allowing for nuclear cooperation with India was enacted in December 2006.
France-India	*Issuance of a Franco-Indian declaration concerning nuclear development for peaceful purposes in February 2006.
China-India	*China's president and India's prime minister, at a meeting in November 2006, issued a joint declaration concerning 10 items including science and technology cooperation in civilian nuclear energy and other areas.
China-Russia	* Issuance by Chinese and Russian leaders of a joint declaration in March 2006 that included a reference to nuclear cooperation.
China-Australia	*Conclusion of an agreement in January 2007 on the transfer of nuclear materials between China and Australia, and cooperation for peaceful use of nuclear energy.
China-Egypt	*Conclusion of an agreement concerning peaceful use of nuclear energy in 2003.
Russia-Kazakhstan	*Signing of a memorandum of understanding on the establishment of three joint ventures in the nuclear energy sector in July 2006.
Japan-Kazakhstan	*Signing of a memorandum of understanding on cooperation on peaceful use of nuclear energy in August 2006.
Japan-Euratom	*Provisional signing of an agreement in November 2006 concerning broad-approach activities to be conducted in conjunction with the ITER project. *Conclusion of an agreement on cooperation in the peaceful use of nuclear energy in December 2006.
Japan-U.S.	*Agreement between Japanese and U.S. energy ministers over a document concerning U.S.-Japan cooperation in energy security in January 2007.

5. Global Situation Surrounding Nuclear Industry

Since the 1990s, the global nuclear industry has seen a series of cross-border mergers and alliances as power plant manufacturers tried to adapt to a shrinking market and maintain the scale and competitiveness necessary for an integrated industry. Last year, the trend of international mergers and alliances spread in Japan, as Toshiba Corp. acquired Westinghouse Electric Co. of the United States, Mitsubishi Heavy Industries Ltd. formed a business tie-up with the AREVA Group in France and Hitachi Ltd. agreed with General Electric Co. of the United States to set up a joint company for manufacturing nuclear power reactor components. In Russia, too, there have been moves to integrate companies related to nuclear energy following the divergence thereof into separate military and civilian categories.

Henceforth, international competition for orders for nuclear reactor equipment, maintenance services, uranium enrichment and fuel production is likely to intensify, primarily among the three giants represented by the Toshiba-Westinghouse group, the Mitsubishi Heavy-AREVA alliance and the Hitachi-GE partnership, with manufacturers in countries such as China, South Korea, Canada and India also vying for pieces of the pie in the outside of their respective traditional market.

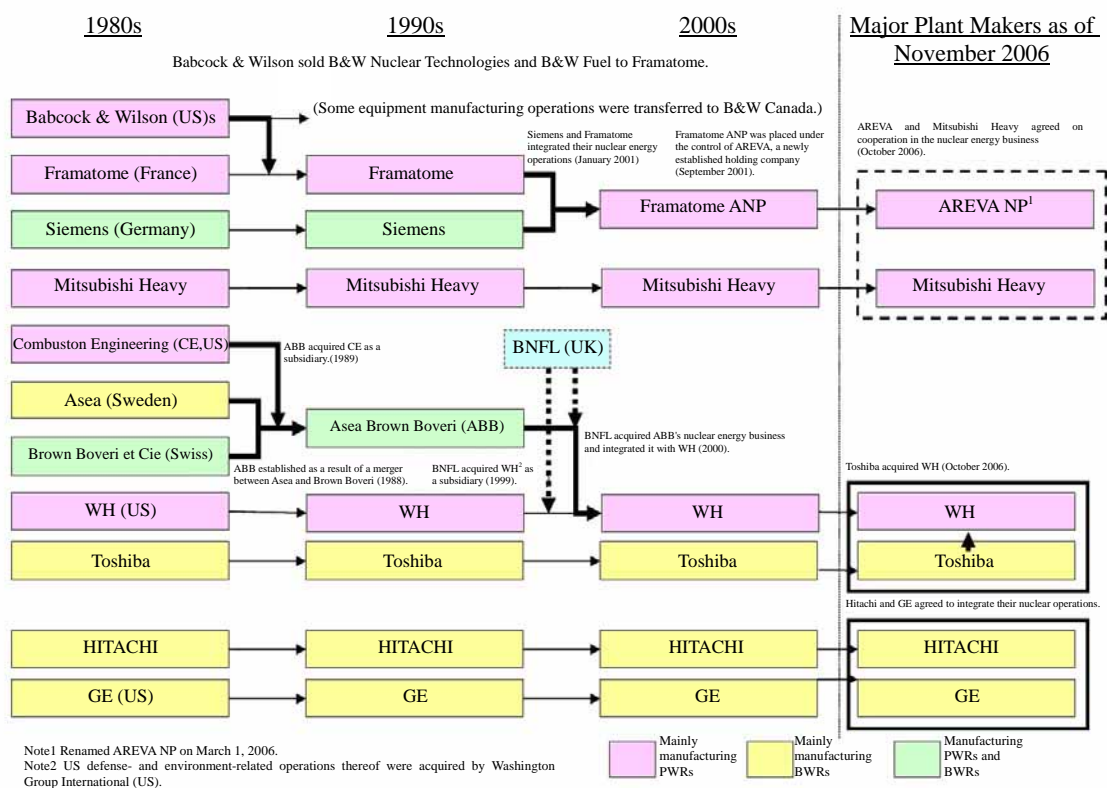


Figure 11: Realignment of World's Major Nuclear Plant Manufacturing Groups

Paragraph 3: New Movement Worldwide Towards Enhancing Efforts for Nuclear Nonproliferation

Key Points

- (1) Efforts are underway to ensure nuclear nonproliferation regime and secure nuclear safety under various international frameworks.
- (2) Japan strictly limits the use of nuclear energy for peaceful purposes.
- (3) Nuclear issues concerning North Korea and Iran have fueled concern over nuclear proliferation.
- (4) New movements are underway toward strengthening the nuclear nonproliferation regime in order to enable the concurrent achievement of expanding the use of nuclear energy and ensuring nuclear nonproliferation. Japan is actively participating in such movements.

1. Existing International Frameworks for Nuclear Nonproliferation

As shown in Figure 12, there are various international frameworks and arrangements for nuclear disarmament and nonproliferation, such as the Treaty on Non-Proliferation

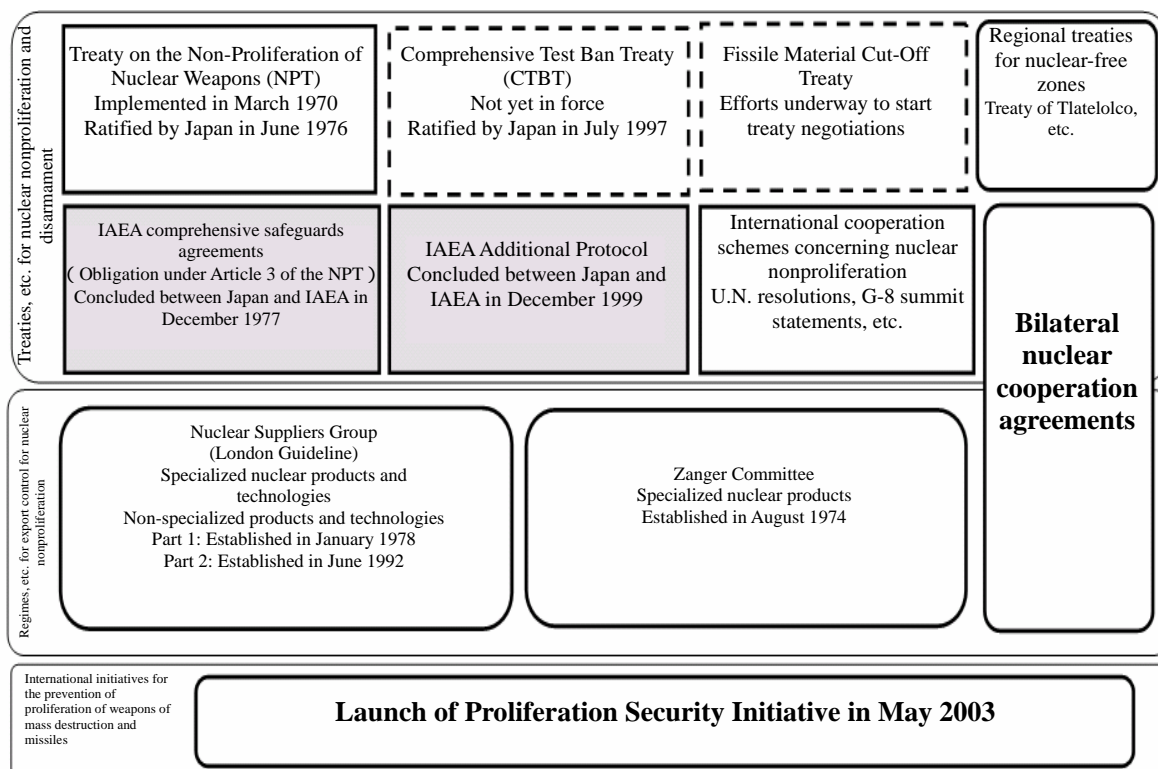


Figure 12: Existing International Frameworks for Nuclear Nonproliferation

of Nuclear Weapons (NPT) and the safeguard agreements with the International Atomic Energy Agency (IAEA) that underpin the NPT, as well as the guidelines on export control under the Nuclear Suppliers Group (NSG).

2. International Frameworks for Security Related to Nuclear and Radioactive Materials, i.e. Nuclear Security

Should nuclear and radioactive materials be acquired and exploited by terrorists, or nuclear facilities be attacked in the event of war or other crises, considerable damage would likely be done to human life, health and property. In order to prevent such occurrences, governments around the world are engaged in efforts to ensure nuclear security.

Prompted by the multiple terrorist attacks in the United States in September 2001, efforts have intensified worldwide to safeguard nuclear materials, with various initiatives underway under the leadership of the IAEA and the United Nations.

3. Japan's Consistent Advocacy of Peaceful Use of Nuclear Energy

Stating the "three non-nuclear principles", Japan has limited research, development and utilization of nuclear energy to peaceful purposes since the Atomic Energy Basic Law was put into effect in 1956. In 2004, the IAEA determined that all nuclear materials belonging to Japan were being used exclusively for peaceful purposes under the auspices of the IAEA safeguards. As a result of this verdict, the IAEA has gradually been implementing integrated safeguards for nuclear facilities in Japan.

In addition, aiming for the total worldwide abolition of nuclear weapons, Japan has been submitting draft resolutions for nuclear disarmament to the U.N. General Assembly on a yearly basis and has strenuously urged countries that have not joined international frameworks such as the NPT and its additional protocols or the CTBT (Comprehensive Nuclear-Test-Ban Treaty) to participate therein.

Furthermore, the Japanese government is actively engaged in domestic and overseas public relations activities with a view to fostering understanding both at home and abroad of Japan's efforts concerning the utilization of nuclear energy for peaceful purposes. For example, at an IAEA general meeting in September 2006, then-State Minister for Science and Technology Policy Iwao Matsuda made a speech in his capacity as a government representative, in which he called for abolition of nuclear weapons, stressing the importance of strengthening the nuclear nonproliferation regime and promoting the peaceful use of nuclear energy and international cooperation in such activities, and also explained Japan's approach to nuclear issues related to North Korea

and Iran.

In addition, the Japanese government produces an annual report on the status of management of plutonium in light of Japan's policy of promoting the utilization of plutonium under the principle of not maintaining ownership of surplus plutonium for which there is no use. Meanwhile, electric power companies are required to annually publish plans for using plutonium separated and recovered from spent fuel at domestic reprocessing plants. Such plans were made public for the first time in January 2006, when the separation of plutonium was due to start on a trial basis, and submitted to the Japan Atomic Energy Commission.



**Figure 13 Then State Minister for Science and Technology Policy Matsuda
Delivering Speech at IAEA General Meeting**

4. Growing Concerns over Nuclear Proliferation

Despite international efforts for nuclear nonproliferation, India and Pakistan, both of which are non-members of the NPT, have conducted nuclear weapons testing. North Korea also conducted nuclear weapons testing in October 2006, and Iran has been engaged in nuclear activities in recent years, fueling concern over the proliferation of nuclear weapons. Japan must strenuously work with the international community to restrain nuclear proliferation-related activities. Currently, the international community is putting pressure on North Korea and Iran through such forums as the U.N. Security Council and six-party talks involving Japan, the United States, China, Russia and North and South Korea.

With regard to North Korea's nuclear development, Japan has expressed its intention

of patiently seeking to induce the country to fully implement the provisions of a joint statement issued in the six-party talks, in which North Korea committed itself to "abandoning all nuclear weapons and existing nuclear programs," by cooperating with the United States, China – the current chair of the six-party talks, and other countries involved. Concerning Iran's nuclear development, Japan strongly hopes that Iran will return to the negotiating table following a complete and permanent halt of its uranium enriching and reprocessing activities, and it has made various appeals to Iran through diplomatic channels.

5. Toward Concurrently Expanding Utilization of Nuclear Energy and Ensuring Nuclear Nonproliferation

Although international frameworks for nuclear nonproliferation such as the NPT have contributed to nonproliferation, they have failed to prevent India, Pakistan and North Korea from conducting nuclear weapons testing. In addition, the risk of nuclear proliferation will grow if various countries build uranium enrichment and reprocessing plants from the viewpoint of energy security in line with expanding their use of nuclear energy. Therefore, vigorous deliberations have been conducted in recent years on international efforts to minimize the risk of nuclear proliferation, and Japan has actively participated in such deliberations.

For example, various initiatives have been proposed for the purpose of preventing the proliferation of nuclear-related materials, equipment and technologies, particularly those related to uranium enrichment and reprocessing, while simultaneously promoting the peaceful use of nuclear energy, ever since IAEA Director-General Mohamed ElBaradei stressed the need for a new approach to the concurrent achievement of nuclear nonproliferation and peaceful use of nuclear energy in October 2003.

At a special event concerning the guaranteeing of nuclear fuel supply that was held by the IAEA in September 2006, participants discussed various proposals* including the concept of "IAEA Standby Arrangement system for nuclear fuel supply" proposed by the Japanese government, and shared the view that they will be useful for concurrently ensuring nuclear non-proliferation and the peaceful use of nuclear energy and should henceforth be studied as possible options. At the end of this event, it became clear that these matters require detailed examination, and an agreement was reached that the IAEA's secretariat would present relevant proposals to pave the way for deliberations at a meeting of the IAEA Board of Governors in 2007.

***Proposals from Countries and Other Parties Concerned for Concurrent Achievement of Nuclear Nonproliferation and Peaceful Use of Nuclear Energy**

- 1) Multilateral Approaches to the nuclear fuel cycle (MNA) proposed by the IAEA
- 2) International center for nuclear fuel cycle services proposed by Russia
- 3) Global Nuclear Energy Partnership (GNEP) initiative proposed by the United States
- 4) Six-country proposal for reliable access to nuclear fuel (RANF), presented by the United States, France, the United Kingdom, Russia, Germany and the Netherlands
- 5) IAEA Standby Arrangements System for Nuclear Fuel Supply proposed by Japan
- 6) Proposal for multilateral use of the nuclear fuel cycle presented by the German foreign minister
- 7) "Enrichment bond" proposed by the United Kingdom
- 8) Stockpile of low-enriched uranium proposed by the Nuclear Threat Initiative, that is a U.S. non-governmental organization.

Paragraph 4: Challenges Facing Japan in Forging New Era of Nuclear Energy

Key Points

<Challenges to be tackled directly by Japan>

- (1) Establishing and enhancing a framework for fostering research and development in- and use of nuclear energy
- (2) Active involvement in efforts to encourage the international community to strengthen the nuclear nonproliferation regime and step up measures to safeguard radioactive materials
- (3) Supporting Asian countries aiming to introduce or expand the nuclear power generation.
- (4) Promoting research and development of technologies that contribute to the development of the human society, such as those for securing long-term, stable energy supplies and for managing radioactive waste in ways that reduce harm to the environment.

The world is expected soon to see the arrival of what can be described as a “new era of nuclear energy,” in which research, development and utilization of nuclear energy will become more active and broad-based in both developed and developing countries. The international community must work harder to strengthen the nuclear non-proliferation regime, ensure nuclear security and secure the safety of nuclear energy so as to contain the problems involved in the use of nuclear energy and also must steadily conduct relevant research and development activities.

Japan, as the only country ever to incur an atomic bomb attack, has promoted research, development and utilization of nuclear energy exclusively for peaceful purposes in accordance with the Atomic Energy Basic Law in order to enhance human welfare and national standards of living. As a result, Japan has become No. 3 in the world in terms of the scale of its nuclear power facilities and nuclear fuel cycle system.

As it awaits the arrival of a new era of nuclear energy, Japan should strive to further advance the use of nuclear energy and promote the research and development thereof based on its past achievements. At the same time, Japan should cooperate with other countries to lead efforts to overcome challenges and make contributions to the achievement of goals set by the international community.

Specifically, Japan should tackle the challenges listed in (1) to (4) below:

overcoming these challenges will not only contribute to the development of Japan's nuclear industry but also help to enhance the country's status in the international community and foster closer relations with other countries.

(1) Establishment and Enhancement of Framework for Advancing Research Development and Utilization of Nuclear Energy

Although Japan has already established a framework for research, development and utilization of nuclear energy, which features high levels of technology, human resources and knowledge, it still needs to continue efforts to improve the framework by way of carrying out the following tasks:

- 1) Promoting hearings and public relations activities to foster a social consensus on the construction of disposal facilities for high-level radioactive waste, and undertaking constant efforts to improve disposal technology so as to adapt it to the geological characteristics and other features of Japan and of the local communities that host the repository, in particular.
- 2) Improving the framework for research, development, and utilization of nuclear energy while enhancing hearings and public relations activities with a view to using nuclear energy in ways that respond to public needs.
- 3) Developing and securing human resources capable of assuming leadership roles on the international stage or making international contributions of assisting with the development of nuclear energy. To this end, an attractive working environment must be created.
- 4) Providing people with opportunities for learning about nuclear energy and establishing a framework for lifelong learning so as to help people inform themselves on nuclear energy.
- 5) Ensuring that electric utilities improve technological standards by reflecting up-to-date knowledge and expertise upon them and promote P-D-C-A cycle of quality management system so as to assure their accountability to the public with respect to their responsibility for ensuring safety.
- 6) Strengthening nuclear security measures, including measures to protect radioactive materials in accordance with relevant treaties and other international agreements.
- 7) Establishing and strengthening a scientifically rational nuclear safety regulation system for the purpose of maintaining high levels of safety with effective and efficient inspection of the site with respect to the status of regulatory

compliance.

- 8) Active promotion of international collaborative work while heeding the distinction between cooperation and competition in the international community. To this end, it is important to establish and strengthen a network of competent human resources, knowledge and technologies.

Recognition of Japan's efforts concerning the above-mentioned activities as an excellent model by the international community would be advantageous in this new era of nuclear energy, as the recognition makes Japan as a suitable partner for international cooperation from the point of view of progress, development, universality and approachability. Japan should constantly evaluate its own efforts based on these criteria and make necessary improvements while engaging in international communications on these efforts and promoting dialogue with other countries.

(2) Active Efforts to Encourage International Community to Strengthen Nuclear Nonproliferation Regime and Measures to Protect Radioactive Materials

In order to enable people around the world to safely enjoy the benefits of nuclear energy, it is important to apply the principle of defense-in-depth not only to the assurance of safety but also to the prevent of the proliferation of nuclear weapons and the misuse of radioactive materials. Deliberations on such measures have been underway in the international community.

Specific examples include deliberations by the IAEA on new international schemes for the prevention of nuclear proliferation such as nuclear fuel supply assurance system, debate within the NSG on the enhancement of standards for the export control on nuclear materials and technologies and discussions at G-8 summits on anti-terrorism measures.

While envisioning how nuclear energy should be exploited in the future in Japan and abroad, Japan should strengthen its involvement in these issues with an increased emphasis on efforts concerning effective measures for nuclear nonproliferation and its role in the rule-making with regard to the protection of radioactive materials.

(3) Support for Asian Countries Aiming to Introduce or Expand Utilization of Nuclear Energy

- 1) Support for Development of Knowledge Base and Infrastructure

Usually, countries introducing nuclear power generation for the first time must first

develop the necessary knowledge base and infrastructure, and Japan should, based on its own experiences in this regard, provide relevant support.

In addition, it is important to formulate methods for establishing the necessary knowledge base and infrastructure through forums such as the IAEA and promote investment by developed countries in the construction of nuclear power plants in developing nations by including nuclear power plants as an object for Clean Development Mechanism (CDM) and make institutional improvements with regard to trade and finance in this area so as to facilitate Japanese exports of nuclear equipment.

2) Stable Supply of Nuclear Fuel

The supply of nuclear fuel and the management of spent fuel are vital for nuclear power generation, but the dissemination of technologies related to the enrichment of uranium and the reprocessing of spent fuel is undesirable from the viewpoint of nuclear non-proliferation. Therefore, deliberations are underway on various proposals for providing nuclear fuel supply services within some sort of multilateral framework or introducing international controls on such services in order to not only enhance the reliability of fuel supply but also ensure nuclear nonproliferation. Japan should actively participate in such deliberations.

3) How to Deal with India

When considering nuclear cooperation with India, which has not signed the NPT, Japan should carefully examine possible effects thereof on international nuclear disarmament efforts and the nuclear nonproliferation regime, and heed the importance of fostering strategic relations with India while also examining the matter from the viewpoint of the fight against global warming.

(4) R&D of Technology for Contributing to Development of Human Society Such as Those for Long-Term, Stable Energy Supply and Management of Radioactive Waste in a Manner That Makes Environmental Load Lower

All developed countries, including Japan, are responsible for continuing to promote research and development activities with a view to constantly modifying and improving nuclear energy technologies in order to enable the use of such technologies in enhancing public interests and welfare over the long term and paving the way for sustainable development.

In order to fulfill this responsibility, Japan should aim to achieve world-leading results by continuing to promote nuclear research and development activities such as

those related to fast-breeder reactor cycle technology and technologies for treating and disposing of high-level radioactive waste as well as nuclear fusion projects like ITER. In this regard, it is important to actively exploit cooperation with developed nations and other countries so as to achieve effective results in an efficient manner.

Another point requiring attention is the progress in the technology for the utilization of radiation that has resulted remarkable achievements in a broad range of fields from its interaction with the information and materials technologies. Such achievement is called as co-evolution. Furthermore, the new field called as quantum beam technology is emerging in conjunction with other related technology fields, and research results on the global cutting-edge are being awaited. Japan should conduct its research and development activities while paying attention to the importance of promoting such co-evolution of various technology fields, so that it can achieve results that will contribute to the development of the human society.

Moreover, Japan should steadily implement the basic and underlying research for the above-mentioned research and development activities. The government and industrial sector must establish mechanisms for “knowledge management” so as to systematize research and development results including implicit knowledge, and pass them to future generations and share basic data within relevant international frameworks.

Chapter 2: Status of Nuclear Energy Development and Utilization in Japan and Other Countries

This chapter explains in detail, and in a comprehensive manner, recent activities in the public and private sectors that concern research and development and use of nuclear energy under the headlines of “Japan’s Nuclear Energy Administration,” “Strengthening of Basic Activities for Research, Development and Utilization of Nuclear Energy,” “Steady Promotion of Utilization of Nuclear Energy” “Promotion of Research and Development of Nuclear Energy,” “Promotion of International Activities,” “Improvement of Evaluation on Research, Development and Utilization of Nuclear Energy.”

Composition of Chapter 2

Paragraph 1: Japan’s Nuclear Energy Administration

1. Japan’s Administrative Framework for Nuclear Energy
2. Activities of Japan Atomic Energy Commission
3. Policy Deliberations by Relevant Administrative Authorities

Paragraph 2: Strengthening of Basic Activities for Research, Development and Utilization of Nuclear Energy

1. Assurance of Safety
2. Guarantee of Peaceful Uses
3. Treatment and Disposal of Radioactive Wastes
4. Coexistence of Nuclear Energy and People/Local Community

Paragraph 3: Steady Promotion of Utilization of Nuclear Energy

1. Utilization of Energy
2. Utilization of Radiation

Paragraph 4: Promotion of Research and Development of Nuclear Energy

1. Implementation Status of Research and Development of Nuclear Energy
2. Large-Scale Research and Development Facilities
3. Development of Knowledge and Information Base

Paragraph 5: Promotion of International Approaches

1. Maintenance and Strengthening of Nuclear Nonproliferation Regime
2. International Cooperation
3. Nuclear Industry

Paragraph 6: Improvement of Evaluation on Activities for Research, Development and Utilization of Nuclear Energy

Reference Materials

This section of the white paper contains organizational charts related to nuclear energy administration (as of the end of December 2006), details of decisions made by the Japan Atomic Energy Commission, nuclear energy-related budgetary information for fiscal 2006 and chronological tables.

Note: Some of the data included in this part in the case of the previous year's edition is available in the "relevant collection of data" on the Japan Atomic Energy Commission's website (<http://www.atomicenergycommission.jp/jicst/NC/about/hakusho/index.htm>), and the list of data available therein is appended to the end of this year's edition.