Coal-Fired Power Generation Technologies for Addressing Climate Change

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(1) Principles of Energy Policy

“3 E + S”

Stable Supply (Energy Security)

Cost Reduction (Economic Efficiency)

Environment

Safety

Global Viewpoint
- Developing energy policies with international movement appropriately
- Internationalizing energy industries by facilitating business overseas

Economic Growth
- Contribution to reinforce Japan’s locational competitiveness
- Activating Japan’s energy market through energy system reform

(2) Position of Coal in “Strategic Energy Plan”

(i) Position
Though coal has a problem—it emits a large amount of greenhouse gas—it is now being re-evaluated as an important base-load power supply because it involves the lowest geopolitical risk and has the lowest price per unit of heat energy among fossil fuels. It is an energy source that we should use while reducing the environmental load through the utilization of highly efficient coal thermal power generation technology, etc.

(ii) Policy Direction
In addition to promoting the replacement of aging thermal power plants and introducing available leading-edge technology through the construction of new facilities and the expansion of existing ones, GOJ further promotes the development of technologies to drastically reduce greenhouse gas emissions per unit of generated power (e.g., IGCC) by largely improving the power generation efficiency. It is necessary to use coal while reducing the global environmental load by promoting the introduction of such high-efficiency technologies not only in Japan but also globally.
World Energy and Electricity Demand Trend toward 2035

World’s Energy Demand

Source: World Energy Outlook 2013
○Japan’s coal fired power plant has attained the world’s highest efficiency by supercritical (SC) and ultra supercritical (USC) technologies, and can keep the level for a long period by operating and maintenance know-how.

Changes in the efficiency of coal fired power generation by country

Importance of appropriate operation and maintenance of plant

Source: "Ecofys International Comparison of Fossil Power Efficiency and CO2 Intensity 2013"
In many developing countries, especially the emerging Asian countries, coal continues to be the fuel of choice due to its supply stability and affordability. Encouraging and supporting highly efficient low emission coal power plants is a pragmatic measure that substantially improves energy efficiency while reducing energy-related GHG emissions without harming economic growth.

Source: IEA “WEO 2013”
If the most advanced coal fired power technology is introduced to all the coal fired power plants in the US, China, and India, the CO2 reduction effect is estimated to be about 1,500 million tons, which is larger than the amount of total annual CO2 emissions in Japan.
Projects related to Clean Coal Technologies and CO2 Capture/Storage/Utilization

○ As technology development of IGCC/IGFC, “Integrated coal gasification fuel cell combined cycle demonstration project (Osaki Coolgen Project)” is now promoted.
○ Regarding CO2 capture and storage (CCS), technology development for cost reduction of CCS, large-scale demonstration project and storage potential study etc. are now implemented.
○ Regarding CO2 capture and utilization (CCU), technology development for effective utilization of CO2 such as “Artificial photosynthesis” is now implemented. In Japan, CO2 storage potential is estimated to be limited, promotion of CCU is important.

[Example of Project: Osaki Cool Gen Project]
Regarding future direction of high efficiency and low emission coal fired power technologies, it is important to promote technology development of IGCC, IGFC and A-USE by utilizing Japan’s technological advantages and put them to practical use.

Source: Advisory Committee for Natural Resources and Energy, Strategic Policy Committee (14th meeting), Document No.5 “Energy related technology development road map”