Hitachi's Electric Power and Energy Systems

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SUSTAINABLE development of the global power sector is expected in the medium to long term due to economic growth. In the near future, the power industry will be facing many fundamental changes such as the deregulation of the power market and the soaring prices of oil, gas, and coal. Improved power generation efficiency is crucial to reducing CO_2 emission to prevent global warming.

Beginning with its first steam turbine that went on line in 1933, Hitachi has given the world more than 1,500 steam and gas turbine units of 100 GW or greater capacity. As steam temperature in turbines increased thanks to the use of newly developed materials, the efficiency of coal- and gas-fired plants drastically improved. Hitachi has expanded its business markets from physical plant facilities such as supercritical pressure coal-fired plants and high-efficiency gas turbines to EPC (engineering, procurement, construction) and O&M (operation and maintenance).

In the 21st century, nuclear power will continue to play an important role in the generation of electricity not only as a highly economical source of energy but also as a means of solving environmental problems and providing energy security. In the area of light-water reactor development, Hitachi has been improving the performance and reliability of its ABWRs (advanced boiling water reactors). With regard to the fuel cycle, Hitachi is developing various technologies related to fuel reprocessing and radioactive-waste disposal.

Meanwhile, hydroelectric power plays an important role in reducing CO_2 emissions. Using hydroelectric power technology, over 40 pumped-storage power plants have been built in Japan since 1959 to shave the peak and the bottom load in the power grid.

Hitachi has been energetically conducting research and development to improve customers' competitiveness and profitability. Since large-scale calculations have become easy in recent years because of computer development, CFD (computational fluid dynamics) methods are widely used to design higher efficiency gas and steam turbines. Although conventional flow analysis was limited to considering ideal gas, compressible flow through complicated shapes can be solved today. The development of the software tools used is based on the passion and effort of young researchers. These tools are also employed to analyze the combustion reactions of turbulent flow in boilers and the burners of gas turbines to reduce NO_x to the environment.

This issue of the Hitachi Review will highlight some of the latest technologies and developments in the areas of electric power and energy. The technologies introduced here represent only a small portion of those under development at Hitachi, but we believe that these development activities will support the further development of power and energy systems. Hitachi will continue in our efforts to provide our customers with the best available technology and solutions.