

## Hitachi's Reliable Electric Power and Energy Systems



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With the general ongoing improvement in living standards, electricity consumption continues to increase worldwide. The International Energy Agency (IEA) predicts that electricity consumption in 2030 will be 1.9 times current consumption and that 75% of the energy sources will be fossil fuels such as coal and natural gas. This comes at a time when global warming has reduced the extent of Arctic sea ice to the lowest level since satellite observations began. Since about 33% of fossil fuel consumption is for generating electricity, the reduction of fossil fuel use in the power sector is an urgent problem. Hitachi, Ltd. has developed both nuclear and hydraulic power generation technologies that do not release carbon dioxide as well as thermal power generation technology that has the highest efficiency in the world.

Hitachi and General Electric Company (GE) jointly established new companies in the nuclear power field in June 2007 in the USA and in July 2007 in Japan with the aim of providing safe and reliable nuclear power generation plants. GE and Hitachi cooperatively developed highly reliable boiling water reactors [both of ESBWR (economical simplified boiling water reactor) and ABWR (advanced BWR) types]. The modular prefabrication technology reported in this issue will greatly shorten the period for constructing nuclear power plants, and the reported application of RFID (radio-frequency identification) technology will enhance the reliability of their construction.

Since its acquisition by Hitachi in 2003, Hitachi Power Europe GmbH, former Babcock Borsig Power Systems GmbH, has constructed in various countries highly efficient thermal power plants that operate at super critical pressure and discharge less carbon dioxide. To mitigate global warming, we have researched and developed CCS (carbon capture & storage) and A-USC (advanced ultra super critical) technologies in cooperation with several European universities. As a pilot project, an integrated gasification combined cycle plant using carbon capture equipment has been constructed in Japan as a national project.

More than 30 NO<sub>x</sub> removal systems that use DENO<sub>x</sub> catalyst, which has a longer lifetime, have been provided to China. In addition, more than 100 H-25 gas turbines, which have the highest level efficiency in this class, have been produced. The air-cooling mechanism of 100-MW class generators has been studied by numerical simulation, and optimization of their cooling structure has reduced their energy loss by more than 40%. These research and development efforts are covered in this issue.

This issue of the Hitachi Review highlights some of the latest technologies and developments in the areas of electric power and energy. Although the technologies introduced here represent only a small portion of those under development at Hitachi, we believe they will support further advances in power and energy systems. We will continue in our efforts to provide our customers with the best available technologies and solutions.