

Lecture outline of Topic 3
on
Thermal power technologies for sustainable society

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Abstract

Thermal power technology is seemingly unrelated with or opposed to the sustainable society. The energy demands from the society, however, still increase and are too much to cover only with renewable energy technologies. Therefore, thermal power technology has an important role as a bridge builder for next generation.

A basic thermal power plant consists of a boiler and a steam turbine. An alternative power plant, “combined cycle” uses a gas turbine and a steam turbine. Thermal efficiency of the latter one is theoretically higher than that of the former one. Therefore, recently the combined cycle system is increasing for saving fossil fuels and reducing CO₂. Furthermore, the combined cycle system using coal, “IGCC (integrated coal gasification combined cycle)” has been developed.

As another topic, reducing environmental load is also important. For example, de-SO_x or de-NO_x technologies had been developed and the emissions drastically decreased.

A famous topic, reducing CO₂ emission may be important for using fossil fuels in a sustainable society. Carbon capture is one keyword and some technologies has been developed all over the world.

This lecture introduces four topics below to make an opportunity to think about “what is the best way to solve energy problem or create a sustainable society”.

- 1) Thermal power and other power generation technologies.
- 2) Efficiency.
- 3) Environmental load
- 4) CO₂ capture technology