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J-Power/EPDC

Commissioning of Pilot Test Plant for Developing Production Technology for Coal Gas Used for Fuel Cells

J-Power/EPDC's EAGLE (Coal Energy Application for Gas, Liquid and Electricity) pilot test plant has been commissioned for the development of production technology for coal gas used for fuel cells. After the installation of the facilities and the successful conclusion of tryout test runs of each unit, the gasification furnace received today, February 22, its maiden fuel charge to commence an approximately five-year gasification trial run up to fiscal 2006. The construction work was initiated in August 1998 on J-Power's Wakamatsu Operation & General Management Office in Kita-Kyushu City,

The present experiment is carried out as a study project directly subsidized by the Ministry of Economy, Trade and Industry and commissioned by the New Energy and Industrial Technology Development Organization (NEDO). The total project costs are in the order of 25 billion yen.

The ultimate target of the experiment is to achieve a viable Integrated Coal Gasification Fuel Cell Combined Cycle (IGFC) power generating system, and its specific objectives are:

1. to establish an optimum oxygen-injection coal-gasification furnace suitable for fuel cell operation.
2. to establish a refining process for refining the gas obtained by coal gasification to a level suitable for fuel cell operation.
3. to establish a total IGFC system and obtain data for up-scaling.

The oxygen-injection coal gasification system (coal throughput capacity: 150t/day; coal gas output capacity: 14,600Nm³/hour), the gas refining system, and the gas turbine generator unit (8MW) have been installed for test operation to pursue these objectives.

It should be noted that the pilot plant has no fuel cell and no steam turbine. Only a gas turbine has been installed for J-Power/EPDC's own research and the electricity generated from this turbine unit is used to power the various sub-units of the pilot plant system and for study purposes designed to acquire the gas turbine know-how for coal gasification.

In parallel with this pilot test, studies are also in progress to develop the solid oxide fuel cell (SOFC) required for the practical operation of the IGFC System. In August 2001, the Wakamatsu complex achieved a world-first record when the internal gas-reforming type unit (output capacity: 10kW) reached 755 hours of continuous power generating operation at an efficiency of 41.5% (High Heat Value (HHV)). As further efforts will be made to simplify the modular construction and upgrade performance, the target is to develop a 100kW level system suitable for commercial operation.

What's the Integrated Coal Gasification Fuel Cell Combined Cycle (IGFC)?

Consisting of a coal gasification unit, a fuel cell generating unit, gas turbine generating unit, a steam turbine generating unit, and ancillary equipment, this system:

1. supplies the hydrogen (H₂) and carbon monoxide (CO) obtained as the product gases of the coal gasification process, to a fuel cell for direct power generation;
2. and also feeds coal gas to a gas turbine for power generation;
3. and recovers the waste heats from these units to produce steam used to drive a steam turbine.

This triple power generation complex, a vision embraced for the first time throughout the world, is a generating system with an extremely high efficiency among the coal-fired power plants. The generating efficiency that can be achieved with this system is in the order of 60% (thus comparing most favorably with the approximately 42% generating efficiency currently achievable with the most advanced coal-fired thermal power plants).

The new technology also attracts worldwide interest for its greenhouse gas reduction potential: Compared with the conventional coal-fired thermal power plants, the IGFC system can achieve a reduction in CO₂ emissions by as much as 30% or so.

End of announcement