

World's Best Power Plants



The Demonstration Plant, built inside of Joban Joint Power Co.'s Nakoso Power Station is the first successful, long-term and continuous operation within one year of start-up — representing a huge achievement toward commercialization of IGCC.

LONG-TERM CONTINUOUS OPERATION FOR IGCC PLANT

MITSUBISHI HEAVY INDUSTRIES

Clean Coal Power R&D Co. Ltd. (CCP) and Mitsubishi Heavy Industries Ltd. (MHI) of Japan began the design of the Integrated Gasification Combined Cycle (IGCC) Demonstration Plant in June 2001. CCP was established at the same time for this purpose. The IGCC Demonstration Plant incorporates an air-blown gasifier, a wet syngas clean-up system, an M701DA gas turbine, a heat recovery steam generator (HRSG), a steam turbine and a generator. All of these components were supplied by MHI and by Mitsubishi Electric Co. Ltd. as a full turnkey project.

In September 2008, long-term continuous operation exceeding 2000 hours was successfully achieved by the IGCC demonstration plant. Since initial firing of the gasifier in September 2007, steady progress has been made during initial plant commissioning, which continued until March 2008. Long-term continuous operation began in June 2008. In September, it proved its reliability with successful nonstop operation during the three summer months when electric power demand was high. This is a huge achievement toward commercialization of IGCC. There are no other examples of such successful long-term continuous operation within one year of start-up on these new systems. This is a result of

advanced technical capabilities based on previous experience, research and development.

The Demonstration Plant was built inside of Joban Joint Power Co.'s Nakoso Power Station, which is located about 209 km north of Tokyo, in Iwaki City, Fukushima Prefecture, Japan.

It has a gross plant output of 250 MW. The gasifier is an air-blown type with a dry coal feed system. Wet MDEA is used for syngas clean-up, and gypsum is produced as a byproduct to recover sulfur from the syngas. The gas turbine is a 2200 degF class machine. The air-blown IGCC system with a dry coal feed system is able to attain high net thermal efficiency due to very low aux power consumption by a much smaller air separation unit — compared to systems that use oxygen-blown type gasifiers — and due to less latent heat loss in the gasifier unlike a wet coal feed system.

There are now plans to further optimize plant operating parameters to achieve higher net plant efficiency, as well as to demonstrate that sub-bituminous coals can be applied successfully to this gasification system. There are also plans to perform a 5000-hour durability test. The purpose of these activities is to further verify and enhance the performance, durability and economics required for an IGCC commercial plant. ♡