

Abstract for
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Development of Advanced-USC Boiler
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Abstract

IHI are on the way of developing the Advanced-USC coal-firing Boiler technology, which features the 700 deg-C steam condition. The target of the development is to achieve over 46%(net, HHV) thermal efficiency. In Japan, 9 year's national project began in 2008. On the other hand, there have been some major changes in electrical power market in the world recently. Especially in Japan, "The East Japan Earthquake" had changed Japanese electric power supply from nuclear power base to thermal power base, violently. Almost all nuclear power plants have been shut down and natural gas, oil and coal power plants are fully working to satisfy the market demands. In the USA, so called 'Shale gas revolution' is going on. In Europe, they are working toward the very aggressive target to reduce CO₂ emissions by significant use of renewables. In some developing countries, power generation by coal is increasing very rapidly. Despite these major changes in electrical power market in the world, the global needs on coal power generation is still high, even though the argument on the global warming seems not be proceeding in the way which we hoped some years ago. We can reconfirm that the improvement of the thermal efficiency of coal power plants should be the most fundamental and important measure for the issue we are confronting, and the continuous effort should be paid for it.

In the national project, IHI developed 700 deg-C class boiler technology mainly focused on the material and manufacturing technology development and verification tests for key components of boiler. Fundamental technology developments have been done during the first half of the project term. Material characteristic evaluation, Welding, pipe/tube bending test have been conducted, and the main features such as steam oxidation, high temperature corrosion, and fatigue, weldability and fabricability of the candidate materials have been confirmed. Long term material tests such as creep rupture of base materials and welds will be conducted for 100,000hrs over the end of the program. Now, IHI are preparing boiler components test. Some boiler superheater panels, large diameter pipes and valves etc, will be tested in a commercially operating boiler from 2015 to 2017.