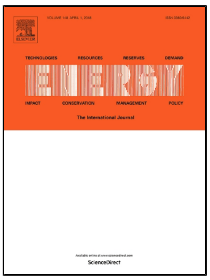
# Accepted Manuscript



Analysis of Increasing Efficiency of Modern Combined Cycle Power Plant: A Case Studies

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# Analysis of Increasing Efficiency of Modern Combined Cycle Power Plant: A Case Studies

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**Abstract**

The paper presents a comprehensive thermodynamic analysis of various gas turbine improvements in a modern combined cycle power plant designed to increase its electrical efficiency. The power plant was analyzed for use in: open air (convection, film and transpiration) cooling without and with cooling air cooler, closed air cooling, closed steam cooling and sequential combustion. The combined cycle power plant is equipped with a 200 MW gas turbine and a subcritical heat recovery steam generator with steam reheating. This article presents the effect of coolant cooling (air) and its use in the steam cycle of the combined cycle power plant. The influence of the higher permissible metal blade temperature in gas turbine on the electric efficiency of the gas turbine as well as the entire combined cycle power plant was also shown. It has also been proven that using industry - known solutions such as steam cooling and sequential combustion, the net electric efficiency of a combined cycle power plant can reach 0.63 - 0.65.

**Keywords:** combined cycle power plant, gas turbine, steam cooling, sequential combustion, air cooling

**Nomenclature**

$A$ – surface area, $m^2$
AF – air filter