46ESS-46: Combined Cycle Gas Turbine Power Plants

Victor Galadimawa

A combined-cycle power plant uses both a gas and a steam turbine together to produce up to 50 percent more electricity from the same fuel than a traditional simple-cycle plant. The waste heat from the gas turbine is routed to the nearby steam turbine, which generates extra power. This pushes the efficiency of the power plant higher and gives operators more profit.

The global challenges in the energy industry and the push towards renewable energy is seeing a demand in increase of power plant efficiency. Conventionally, gas power plants have been operated with a bottoming cycle to achieve higher efficiencies in the range of 40-50 percent. With packaged equipment, this has proven to be a beneficial configuration. However, a new barrier is being broken and is the thrust of this paper.

When the sound barrier was broken for the first time it was a global victory and something akin to this is happening in the combined power plant world-efficiencies of 60 percent are now being achieved. This paper assesses this success; its key points and the technology responsible for this leap.