



QURAYYAH IPP

Turbine Inlet Air Chilling with Thermal Energy Storage



With a desert climate and rapidly increasing power demands, Saudi Electric Company sought to boost power production with a new combined-cycle gas-fired power plant equipped with **turbine inlet air chilling (TIAC)** and **thermal energy storage (TES)**. Located on the eastern coast of Saudi Arabia, the Qurayyah Independent Power Project (IPP) is the largest independent power generation project in the world, designed to deliver approximately 3,927 MW of electricity. The project company, Hajr Electricity Production Company, includes Saudi Electric Company (SEC), ACWA Power International, Samsung C&T and MENA Fund.

Stellar Energy was selected to supply the massive chilled water plant because of the company's global reach and large-scale project experience. Qurayyah IPP comprises six identical groups of equipment—two Siemens gas turbines, two heat-recovery steam generators and one steam turbine—each delivering 655 MW. Qurayyah IPP is designed with the highest thermal performance possible at more than 50 percent efficiency, which is 14 percent more efficient than any other traditional steam power plant in Saudi Arabia.

For the turbine inlet air chilling system, Stellar Energy provided 16 water-cooled chiller modules and two secondary pump skids integrated with turbine inlet chilling coils, filter houses and a thermal energy storage tank. The modules supply each plant with 46,000 TR, for a total of 92,000 TR. The system charges the thermal energy storage tank with cold water during low-peak, low-cost hours, and discharges the chilled water to run the chiller plants during the high-peak, high-cost consumption period. The water-cooled plants utilize HCFC 134a, a non-ozone depleting refrigerant. The system design minimizes the number of chiller compressors, enhancing plant reliability and reducing overall operations and maintenance costs. The design also calls for two stages of chillers for superior efficiency and power consumption.

QUICK FACTS

Market:	Power Generation & Utilities
Design:	Modular
Scope:	Design and Fabrication
Owner:	ACWA Power
Location:	Qurayyah, Saudi Arabia
Project schedule:	April 2012 – October 2013
Original plant capacity:	3,308 MW Combined Cycle
Augmentation:	619 MW
Tonnage:	92,000 TR
Gas turbines:	12 – Siemens SGT6-5000
Thermal Energy Storage:	16 million gallons



KEY BENEFITS

- Increased output by **619 MW**
- Increased **operational flexibility**
- **50%+ efficiency**
- Increased **reliability**