



POWER PLANT #8

Turbine Inlet Air Chilling with Thermal Energy Storage



When Saudi Electric Company sought to improve the operating performance and power output of Power Plant #8, they came to Stellar Energy for a custom, world-class **turbine inlet air chilling (TIAC)** solution. The requirement was to increase power generation from 10 gas turbines to meet peak electrical demand during the intense heat of the summer season. Because of water limitations in the region, the system was required to be air-cooled and operate on a design day temperature of 122°F (50°C).

Stellar Energy provided engineering, construction management and equipment procurement and supply for the project which included an office, machine room, turbine inlet chilling coils, filter house retrofit and a thermal energy storage tank. The 30,000 TR cooling load is satisfied with an 11,000 TR chilling plant and a 195,000 TR-HR **thermal energy storage (TES)** tank. At the time of completion, this TES tank had the largest stored TR-HR capacity in the world. It allows the chiller plant to be sized to one-third of the cooling load requirement. The chiller plant is air-cooled with large fan-cooled radiators.

The Thermal Energy Storage tank is charged with chilled water during off-peak, low-cost hours using compound centrifugal chillers. During high-cost peak hours, when power is most, the chillers are turned off and the chilled water in the tank is pumped to the cooling coils to reduce inlet air temperature and increase power output.

The performance of the TIAC with TES system has been impressive from day one. The solution adds 150 MW of increased output from the plant under the harshest of environmental conditions.

QUICK FACTS

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| Market: | Power Generation and Utilities |
| Design: | Field Erected |
| Scope: | Turnkey/EPC |
| Owner: | Saudi Electric Company |
| Location: | Riyadh, Saudi Arabia |
| Project Completion: | 2006 |
| Original Plant Capacity: | 500 MW Simple Cycle |
| Augmentation: | 150 MW |
| Tonnage: | 30,000 TR Chilling Load 11,000 TR Chiller Plant |
| Design Inlet Temp.: | 54.5°F / 12.5°C |
| Gas Turbines: | 10 – GE 7EA |
| Thermal Energy Storage: | 8 million gallons |



KEY BENEFITS

- Increased output by **25%**
- Increased **operational flexibility**
- Reduced **operating expenses**
- Increased **reliability**

The TIAC solution for Power Plant 8 was first-in-class when it was commissioned in 2006, and currently remains one of the best examples of TIAC with TES in the world.