CALDWELL ENERGY COMPANY

POWERFog®

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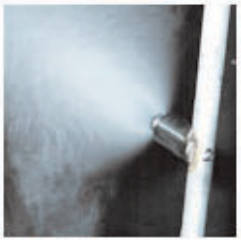


Traditional methods of cooling combustion turbine inlet air involved using uncontrolled amounts of water sprayed over wetted media. Now, injecting carefully regulated amounts of micron sized droplets into the inlet air of your combustion turbine(s) allows even more power to be generated. PowerFog® systems can cool the air down to the saturation temperature of the ambient air without creating a power limiting pressure drop.

PowerFog® systems cool atmospheric air from the dry bulb temperature all the way down to the wet bulb temperature. The drier the air, the more cooling can be achieved. You might think that these systems would not be effective in humid climates, but this is not true. While the dry bulb temperature increases as the sun moves higher in the sky, the wet bulb temperature stays relatively constant. This means that the greatest amount of cooling is achieved right when you need it most, during the hottest part of the day. At a design point of 95°F(35°C)/50% Relative Humidity (RH), a typical combustion turbine will realize about a 6% increase in power. In a dry hot climate, a 100°F(38°C)/20% RH condition will yield about an 11% increase. These systems are by far, the least expensive means to improve your plants performance. Installation takes only a few days, and can frequently be done while your turbine is on-line.

System Design

All systems should be sized based on historical weather data for your plant's location. CEC maintains a database of five years of hourly weather data for 262 stations around the country. Our advanced modeling system optimizes each CTIAC system relative to your technical and economic requirements. For each system there is an optimal design point which will maximize your return on investment in the system.

Performance Engineered Combustion Turbine Inlet Air Cooling

One of the most cost-effective ways to increase combustion turbine power output in high temperature ambient conditions is to reduce the air temperature by evaporating water into the turbine's inlet air. This denser air increases the mass flow to the turbine and since combustion turbines rely on this mass flow for power, output is significantly increased. On a 90°F day, with 20% relative humidity, inlet air temperature can be reduced to 63°F simply by evaporating water into the turbine's air stream. For the majority of combustion turbine types, this means a 9% increase in power output.

CEC engineered the PowerFog® system specifically for combustion turbine applications. This Combustion Turbine Inlet Air Cooling (CTIAC) system uses CEC's proprietary high pressure pinless nozzle design which maximizes evaporative efficiency and hence the power output of the combustion turbine. Custom engineered advanced control system logic, combined with multiple nozzle arrays, are designed to optimize the system's performance and reliability. Special features provide safe system operation.

The PowerFog® nozzle creates a fog by spraying a high pressure water thru a proprietary swirl chamber, sheering the water into micro-fine droplets. Water pressures can vary, typically between 1,000 and 3,000 pounds per square inch depending on the optimal droplet size to ensure evaporation. Increased pressure reduces the size of the droplets. The key to determining the system design is the residence time of the water droplets in the inlet air, prior to the cooled air entering the compressor of the combustion turbine.

It is important to carefully integrate fogging systems into the design of the inlet system. Items such as trash screens and silencing panels downstream of the fogging nozzles can turn a good theoretical concept into a bad turbine application.

Caldwell Energy Company engineers, designs, manufactures, and installs all types of Combustion Turbine Inlet Air Cooling (CTIAC) systems, including fogging, chilling, refrigeration, and thermal energy storage systems. Let us help you find the optimal augmentation system for your power plant today.

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