AMEA-Sylacauga Plant Fact Sheet

In 2004, the Alabama Municipal Electric Authority (AMEA) became the first organization in Alabama in more than 80 years to build a municipally-owned power generation plant.

The AMEA-Sylacauga Plant is owned collectively by AMEA's 11 municipal electric systems.

Plant Terms

Raw Water Tank - The large tank at the entrance is the raw water tank. This tank supplies the make-up water for the cooling tower, water for the demineralizer system and plant water. The tank holds 311,000 gallons of water.

Gas Compressors - The purpose of the gas compressor is to increase the supply gas pressure to the required operating pressure of the turbines. (Supply ~ 450 lbs. to 680 lbs. for operating).

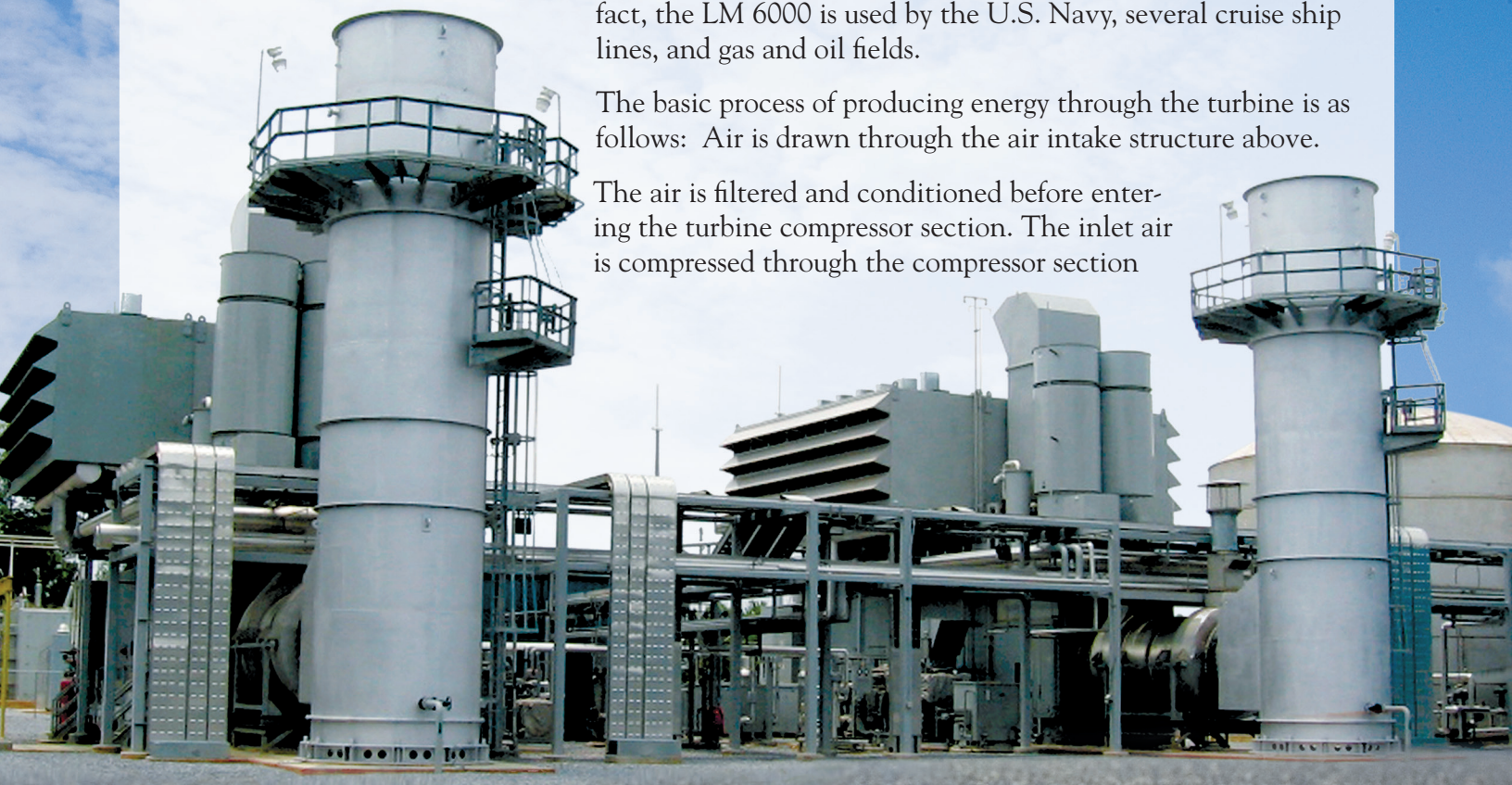
Cooling Tower - The cooling tower supplies cooling water to the lube oil coolers and the chillers. The cooling water passes through tubes, located inside the chiller and lube oil heat exchangers. The tubes isolate the cooling water from the process.

Conduction transfers the heat from the process to the cooling water. The heated cooling water is returned to the cooling tower. The cooling tower removes the heat from the returning cooling water through evaporation. The cooling tower requires about 120 gallons per minute of make-up water to maintain the correct water levels. Water is lost through evaporation and blow-down.

Turbine and Generator - This is the turbine, or engine, that drives the electrical generator – General Electric (GE) LM 6000. The GE LM 6000 gas turbine is a stationary gas turbine that is derived from the family of C6 jet engines. The aircraft version of the engine is used to drive several types of commercial aircrafts, like the Boeing 747-400 and currently Air Force One. The LM denotes that these engines have land and marine applications. In fact, the LM 6000 is used by the U.S. Navy, several cruise ship lines, and gas and oil fields.

The basic process of producing energy through the turbine is as follows: Air is drawn through the air intake structure above.

The air is filtered and conditioned before entering the turbine compressor section. The inlet air is compressed through the compressor section



and is mixed with natural gas at the combustion section. The air and gas mixture are ignited, and the addition of the heat causes rapid expansion of the gases. The expanding gases are directed through the turbine stages causing the turbine blades to rotate, thus creating mechanical energy. Note: energy conversion gas to thermal to mechanical. The mechanical energy from the turbine rotates an electrical generator that produces the electrical power. The combustion turbines utilize water injection to reduce nitrogen oxide (NOx) air emissions. The plant can be started and producing electrical power within 15 minutes after initiating a start command. When both units are operating at full power, the two engines will burn approximately 950,000 cubic feet of natural gas per hour. The turbine shaft horsepower at full output is 54,610 hp. A typical 18-wheeler tractor-trailer engine produce 475 horsepower. The mechanical work of the turbine is equivalent to 115 tractor-trailers.

Generator - The generator is driven by the turbine low-pressure shaft at 3600 rpms, and produces the electrical energy that is supplied to the transmission system. The total plant net production is 95,000 kWs. The gas turbines produce a combined power output of 95,000 kW/hr.

Switchyard – The generator step-up transformers increase the generator voltage from 13.8kV to 115kV transmission voltage. The electrical switchyard is connected to the Alabama Power 115kV transmission system through the Alabama Power – Sylacauga Interconnect Station.

Mechanical Room- The chillers are large air conditioners that cool the inlet combustion air for the turbine. Each one of these chillers has a cooling capacity of 2,100 tons – for a combined total of 4,200 tons. That's equivalent to 1,400 homes with air conditioners sized at 3 tons each. The chilled air enables the turbine to achieve maximum production during hot summer days.

Central Control Room- The plant equipment can be operated, monitored and controlled from the human-machine-interface (HMI) consoles located in the control room. The control system sequence and algorithms were developed by GE to provide safe and efficient control for the LM 6000 equipment. The microprocessor control system interfaces with field devices to monitor the condition of the units and alerts the operator of unsafe conditions, conditions outside normal parameters, and automatically shuts down the unit when necessary to avoid possible damage to personnel or equipment.

Demineralized Water Tank- The water from this tank is used in the turbine to reduce NOx emissions, and for power augmentation. The tank holds 311,000 gallons of water.

Reverse Osmosis - The RO building is where the raw city water is demineralized for the turbine NOx and Sprint water injection. The chlorine in the raw water is removed by a charcoal carbon pre-filter, ideal for chlorine removal, before entering the three stage Reverse Osmosis system. Reverse Osmosis is the process of using pressure to force water through a semipermeable membrane which captures 98% of dissolved minerals in the water. Finally, the remaining ~2% of minerals in the water are removed via two Ion Exchange Polishing Bottles operated in series. The finished water is low conductive less than 1 micro mho.

It is essential that the water injected in the turbines have a low mineral content to prevent deposits on the turbine internals.

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