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The Project will use a GE Frame 7EA CTG with dry low NO_x combustors to repower ECGS Unit 3. The repowering will result in the new Frame 7EA CTG, coupled with an HRSG, replacing the existing boiler as a steam source for the existing steam turbine. Such a combined cycle power plant makes maximum use of the natural gas fuel energy by first generating electricity through combustion in the combustion turbine (Brayton topping cycle) and then using the exhaust gas waste heat as a source to generate steam for the steam turbine to also generate electricity (Rankine bottoming cycle).

To increase the efficiency of the combustion turbine on hot days, an evaporative cooler will be used to cool the turbine inlet air. The evaporative cooler reduces the temperature of the inlet air from its dry bulb temperature close to its wet bulb temperature by evaporating water into the incoming air stream.

To take better advantage of the steam output from the HRSG, the existing steam turbine is being modified to increase the steam flow through the exhaust of the turbine. Although the design work to perform this modification is still underway, it is anticipated that this modification will result in the steam turbine mechanical output rating being increased from 44 to 48 MW. The existing generator to which it is coupled is capable of handling up to 50 MW.

The Project is designed for full-load and part-load operation. Similarly, the plant is also designed for intermediate cycling duty with multiple starts per week if needed.

The use of a Frame 7EA CTG with an evaporative cooler and HRSG is a well-proven combination. At the ECGS Site, the repowered Unit 3 can achieve a net heat rate of 8,093 British thermal units per kilowatt hour (Btu/kWhr) (HHV) after accounting for plant auxiliary loads. This results in an efficiency of 42% during full-load operation (100% load). Part-load operation (down to 60% load), or boosting MW output using the HRSG duct burners, would result in lower operating efficiency. The performance improvement resulting from this Project will make Unit 3 the most efficient thermal generation unit in the IID system.