Niland Gas Turbine Unit 1 and Unit 2 Balance of Plant Control Communications Upgrade (No. 200257)

Project Description

The Niland Gas Turbine Plant consists of two GE LM6000 PD SPRINT NxGen combustion turbine generators with a nominal 93 megawatt simple-cycle facility located in Niland, CA in Imperial County. Each unit is able to deliver over 48 MW on a gross electrical basis. The plant began commercial operation on May 29, 2008. The turbine units are intended to be operated during on-peak periods.

The current Balance of Plant control communications system[1] has experienced frequent faults, resulting in failure to start when the units are dispatched. The BoP control provides local monitoring and operator interface functionality, supervisory control of plant programmable logic controllers and associated equipment, remote access for monitoring, starting and control of the Niland Gas Turbine Plant. If the BoP control communication system fails, IID cannot use the Niland turbine units in the reserve stack, since they cannot be started from the System Operations Center.

The NGTP turbines units 1 and 2 are critical for providing the SOC with voltage support, spin and non-spin reserve capacity and reactive regulation. The gas turbines are a key part of the IID resource portfolio by providing energy and ancillary services to the IID Balancing Authority. Both units are dispatchable within 10-minute with fast start feature.

The BoP control upgrade will replace outdated, obsolete hardware and associated software[2]. This includes the Open Platform Communications server, Human Machine Interface, PLCs, and ethernet switches that must function in coordination to have the units available for start-up and operation. Additional components in the upgrade include a plant process data historian and modern compatible software. A re-engineered communication network will be included to provide a robust and reliable system that will perform as required. The communication network runs through a detailed procedure to interface with unit-specific equipment needed to fire the units. Any loss or break in communication from either the turbine generators or the BoP leads to a failed start-up and inability to control the BoP systems, including gas compressors, continuous emissions monitoring, ammonia injection, gas compressors, air compressors, etc. The BoP control requires a direct and compatible communication network to alleviate these complications. Due to the nature of the OPC server technology, the communication between all the devices is compromised if one of the devices is not operational. This causes the master to lose the ability to send/receive information from the rest of the devices.

The control package for the gas turbine generator set provides all control functions required for the reliable and safe operation of the equipment, including fuel control, variable geometry control, sequencing, alarming, etc. It also provides spray intercooling for power augmentation, producing an additional seven MW per turbine generator. Implementing these upgrades will increase the reliability of the units and ensure the units are capable of responding to system demands.

[1]*The Balance of Plant (BoP) is a power engineering term which refers to the various supporting and auxiliary components of a power plant system required to produce energy. BoP systems provide the support needed to keep the plant running stably and efficiently. Some important balance of plant components include inverters, transformers, switchgear, circuit breakers, etc. while the primary power generating equipment includes turbines, power generators, etc. A BoP power plant system is comprised of both electrical and mechanical devices.*

[2]*The network server and workstations utilize Windows Server 2003 and Windows XP Professional, respectively. These operating systems have not been supported by the manufacturer for many years. Second, once communication to the operator workstation is lost to both units the communication to Remote Dispatchers is lost, compromising system reserve, system reliability and associated cost impacts. Additionally, computers and PLC hardware scheduled for replacement is obsolete and unavailable other than in secondary markets increasing probability of extended downtime in event of failed components.*