

Section 2.0 Scope of Work and Supply

The Scope of Work and Supply is comprised of the following outlined items:

Major Generation Equipment

Installation of two (2) Owner Supplied GE LM2500 PE gas turbine generator packages complete with auxiliary skids, modular control rooms, inlet filters and exhaust stacks.

GE interface points are as follows:

Equipment System	Limits of GE Package
<ul style="list-style-type: none"> All supply piping, including Fuel Gas, Liquid Fuel, Demineralized Water, Lube Oil, Compressed Air, Instrument Air, Hydraulic Start Oil 	<ul style="list-style-type: none"> Flanged or threaded connection on GE Package base plates.
<ul style="list-style-type: none"> Inlet Air-to-Filter 	<ul style="list-style-type: none"> Atmosphere
<ul style="list-style-type: none"> Turbine/Generator Ventilation Air 	<ul style="list-style-type: none"> Atmosphere
<ul style="list-style-type: none"> Turbine Exhaust 	<ul style="list-style-type: none"> Flange & Expansion Joint for connection to Exhaust Stack or SCR
<ul style="list-style-type: none"> Instruments on GE Package Base plate 	<ul style="list-style-type: none"> Terminal box on base plate
<ul style="list-style-type: none"> Instrument wiring in Turbine Control Panel 	<ul style="list-style-type: none"> Terminal in Turbine Control Panel
<ul style="list-style-type: none"> High Voltage Connections 	<ul style="list-style-type: none"> Bus bar in GE Package generator line side cubicle
<ul style="list-style-type: none"> Generator Ground Connections 	<ul style="list-style-type: none"> GE Package Neutral cubicle
<ul style="list-style-type: none"> Electric Motors 	<ul style="list-style-type: none"> Terminal box on individual motors
<ul style="list-style-type: none"> Ladders and Platforms for Air Filter 	<ul style="list-style-type: none"> Ladders and Platforms for Inlet Air Filter and Vent Fans

2.0 Balance of Plant

The contractor will design and install the facility as described in the following sections of this document. The design assumes that certain facilities that have been provided in the adjacent 2 x LM6000 PC Plant will also serve this 2 x LM2500 Plant and includes the necessary Structural, Mechanical, Electrical, Instrumentation, and control System to install the above Major Equipment.

The Balance of Plant scope of supply will be comprised of the following:

- Contractor will provide complete design of the facility including civil, structural, buildings, mechanical, electrical, instrumentation and control.
- Contractor will provide concrete foundations, plant gravel, fencing and security gate.
- Owner will provide a reasonably level graded site.
- Owner will provide access roads to the site.
- Contractor will provide Installation of the complete Power Plant with the inter-ties as described later in this document and including:
 - Mechanical installation of the various items of equipment with the associated inter-ties of Demin water, natural gas fuel, liquid fuel, sanitary sewer, and waste water.
 - Electrical installation of the plant including a 13.8 KV feed to (2) existing GSU Transformers, area lighting, grounding, lightning protection, and cathodic protection.
 - Installation of Instrumentation and Control System including plant instrumentation, metering and DCS.

2.1 BOP Major Mechanical Systems

The Owner has purchased various pieces of BOP Equipment from the Contractor under another purchase contract. These include the following:

- (2) Simple Cycle Exhaust Stacks
- Liquid Fuel Treatment System
- (2) Fuel Gas Coalescing Filter Separators
- (3) Fuel Gas Compressors with 4160V MCC
- Demineralized Water Treatment System with Pumps
- (1) Instrument Air Compressor

2.1.1 Simple Cycle Exhaust Stack

The Contractor will install Owner furnished (2) 40 ft. exhaust stacks in accordance with the standards set out by GE for each LM2500 machine.

2.1.2 Plant Fuel Gas System

The Contractor will install the plant fuel gas system outlined as follows:

- Interconnect to Owner gas metering and regulation station above ground adjacent to the existing at the Arrecife Power House.
- Install two (2) Owner Furnished redundant coalescing filter separators on a common skid.
- Furnish and install redundant pressure regulators.
- Install three (3) Owner Furnished fuel gas compressors required to raise the 230 psi. supply pressure to the required 450 psi. supply pressure to the LM2500 gas turbines.
- Furnish and Install all plant fuel gas carbon steel piping, valves and fittings from plant inlet fuel gas interconnect to the fuel gas Compressors and to each gas turbine regulator filter.
- Furnish and Install stainless steel piping from the fuel gas filter to the gas turbine generators.
- Each supply line to the LM2500 turbines will have a gas meter with totalizer.
- Each LM2500 package is equipped with gas detectors.
- The signals to monitor and control the gas pressure are taken to the LM6000 central control room.

2.1.3 Plant Liquid Fuel System

The Contractor will design and install the plant liquid fuel system outlined as follows:

- Supply and Install a diesel fuel offloading station with forwarding pump at a location adjacent to the main road in front of the existing Arrecife power house.
- Supply and Install a new pipeline from the diesel fuel offloading station to the diesel fuel storage tanks on the uphill side of the Arrecife power house.
- Scrap the (2) existing HFO storage tanks on the uphill side of the Arrecife power house and install (2) new Diesel Fuel storage tanks at the same location.
- Supply and install (2) 100% capacity fuel forwarding pumps to transport diesel fuel from the storage tanks to the site liquid fuel treatment equipment.
- Supply and Install a new pipeline from the Diesel Fuel storage tanks to the new plant liquid fuel treatment equipment.
- Install two (2) Owner Furnished Centrifuges for fuel treatment
- Provide and install treated liquid fuel day storage tank which will be supplied by the fuel treatment system.
- Install two (2) liquid fuel forwarding pumps.
- Install two (2) 100% capacity liquid fuel filter/regulator skids.
- Install two (2) 100% capacity liquid fuel injection pump skids.
- Provide and install all plant liquid fuel carbon steel piping, valves and fittings from the plant liquid fuel storage tank to liquid fuel treatment.
- Provide and install all plant liquid fuel stainless steel piping, valves and fittings from the plant liquid fuel treatment to the day storage tank and on to each gas turbine.

2.1.4 Water and Demineralized Water System

Contractor will install the following water & demin system:

- Install Owner Furnished Demin Water Treatment System
- Install Owner Furnished Potable Water Treatment System
- Provide and install all Demin water stainless steel piping, valves and fittings from the plant Demin storage tank to the gas turbines

The Demin water will meet GE's specifications as attached in Section 12.

2.1.5 Oily Water Drain System

The Contractor will furnish and install the oily water drain system as follows:

- Furnish and install below ground one (1) oily water separator with associated pumps and ancillaries.
- Furnish and install PVC or HDPE below ground piping and fittings from concrete oil containment units located at:
 - 1) All Transformers
 - 2) Gas Turbine Generator Auxiliary Skids

Piping is to be routed to the oily water separator. Waste oil piping is to be connected to the waste oil storage tank. Waste Water is to be connected to the existing waste water header system. The Contractor will make provisions to pump the waste oil to the existing waste oil tank at the Arrecife Power House.

2.1.6 Plant Fire Water System

Contractor will furnish and install the Firewater System extension that includes a pipeline connection to the existing main Firewater system.

- Headers routed throughout this LM2500 plant in accordance with NFPA Codes sized as 8" HDPE pipe.
- Monitors and Hydrants installed in accordance with NFPA Codes
- Portable fire extinguishers

2.1.7 Instrument and Service Air Systems

The instrument and service air systems will be as follows:

- Install one (1) Owner Furnished instrument and service air screw compressors with associated dryer and air storage tanks.
- Furnish and install galvanized steel piping, valves, fittings and instruments for instrument and service air systems from the air compressors to various required areas throughout plant for instrument air and service air. Furnish the appropriate quick connect connectors.

2.2 BOP Electrical Systems

2.2.1 13.8 KV System

The Contractor will perform the following work on the 13.8 KV system:

- Install two (2) Owner supplied 13.8 KV 2,000 amp generator circuit breakers with PTs and CTs
- Provide and install two (2) 13.8KV Fused Disconnect Switches.
- Furnish and install all 13.8 KV cabling, bus work, cable tray etc. from the generators to the generator circuit breakers and from Generator Breakers to GSU Transformers

2.2.2 13.8/4.16 KV System

The Contractor to provide the following:

- Furnish and install one (1) 13.8KV / 4160V auxiliary power transformer.
- Install (3) three Owner Furnished 4160 V MCCs to supply power to Gas Compressors

2.2.3 480V System

The Contractor will provide the 480V system as follows:

- Furnish and Install two (2) ea. 13.8KV/480V 750 KVA Aux. Transformers
- Furnish and install one (1) 480 V distribution switchboard
- Install one (1) Owner Furnished BOP 480V MCC
- Furnish and install cable tray / conduit with cabling from transformers to MCCs and from MCC to plant 480V equipment and motors.
- Furnish and install underground conduit, duct banks, or overhead cable tray mounted on the pipe racks.
- Install and connect owner supplied 600 KW Black Start Generator and ATS

2.2.4 120/240 System

The Contractor will provide the 120/240 system as follows:

- Furnish and install 480V/120/240V transformers, distribution panels and lighting panels as required with associated conduits, fittings and wire.

2.2.5 Plant Area Lighting

The Contractor will provide the plant area lighting as follows:

- Furnish and install area lighting consisting of four (4) 25 ft galvanized metal poles with two (2) 400 watt metal halide floodlights on each pole sufficient to illuminate both GTGs and common areas.
- The lighting system will be connected to the black start generator.
- 120 v power outlets will be furnished.

2.2.6 Ground Grid

The Contractor will provide the ground grid for the plant as follows:

- Furnish and install plant ground grid with associated ground rods and connections to plant equipment, buildings and fence. Ground grid to be connected to the Owners' existing main power plant grid.

2.2.7 Plant Electrical Cable Tray

The Contractor will provide the plant electrical cable tray work as follows:

- Furnish and install galvanized steel cable trays throughout plant. Cable trays to be mounted on pipe racks, cable trenches or within buildings for routing plant cabling. A separate cable tray will be installed for each of the 15 KV systems, 480V system, and instrumentation system cables.

2.2.8 Underground Conduit and Cable Systems

The Contractor will provide the plant underground conduit and cable system as follows:

- Furnish and install rigid galvanized conduit or PVC encased in concrete for all underground power, control and instrumentation systems.

2.2.9 Lightning Protection

The Contractor will provide lightning protection as follows:

- Furnish and install lightning protection on each gas turbine exhaust stack.

2.2.10 Batteries / Chargers / UPS Systems

The Contractor will perform the following work on the batteries / chargers / UPS systems:

- Furnish and install BOP UPS system for DCS remote PLC and associated equipment.

Note: 24 VDC batteries and 125VDC batteries and chargers are to be supplied as part of the GE packaged control house.

2.3 Plant Instrument and Control Systems

2.3.1 BOP Control System

The Contractor will furnish and install a BOP control system consisting of:

- One (1) DCS System

2.3.2 Plant Instrumentation Devices

- Gas Turbine Control Panel is supplied with each LM2500 gas turbine. The two Control Panels will be mounted in the modular pre-fabricated control Building.
- Contractor to furnish and install instrument devices, both pneumatic and electric, consisting of meters, pressure, flow, temperature and level where required.

2.3.3 Electronic Wiring and Pneumatic Piping

- Contractor to furnish and install necessary instrument wiring and pneumatic piping with associated Swagelok fittings, etc.

2.4 69 KV Scope of Work

2.4.1 Generator Step-up Transformers (GSUs) (Owner supplied)

- Contractor to install 13.8 KV cable from the Generator Breakers to the existing 69 KV GSUs.

2.4.2 Contractor to relocate two each 69 KV overhead transmission lines.

2.4.3 Protective Relaying

- Contractor to supply and install Differential and overcurrent protection relays for transformers.

2.5 Site Work

Contractor is responsible for the GEO TECH study, soil RESISTIVITY study, and HYDROLOGY to determine the creek levels for proper storm drainage, mud slides.

- Contractor will prepare the existing site as required to accept the LM2500 GTGs and the following:
 - Contractor to prepare the site for storm water drains and adjoining slopes to prevent mudslides.
 - Contractor to install the foundations for the Gas Turbines, Gas Compressors and BOP Equipment
 - Contractor to install the Driveways
 - Contractor to install Gravel Paving

2.6 Fencing

Contractor is to furnish and install perimeter fencing with razor wire (3) three meters high, to include access gate.

2.7 Plant Communication System

- Contractor to provide communication and public address system for the new plant.
- Contractor, while one site, to furnish temporary telephones and email capability for construction communication purposes.
- Permanent telephone lines for operation of the plant will be provided by Owner.

2.8 Plant Civil and Structural

- Site preparation, rough grading, and finished grading to be furnished by Contractor based on an existing site requiring minimal cut and fill.
- Contractor to furnish and install all plant reinforced concrete foundations designed to IBC 2003. GSU foundation shall have 9" freeboard.
- Contractor to furnish and install concrete containment curbs and equipment foundations.
- Contractor to furnish and install plant gravel and asphalt paving as shown on the Plot Plans.
- Contractor to provide structural steel pipe racks to support overhead piping and cable trays. Pipe racks to be located as shown on Contractor's Plot Plan drawings.

2.9 Plant Buildings

- Furnish and install a prefabricated metal Building for the Demin water treatment system, associated pumps and instrument air compressors
- Furnish and install a Shed for the Fuel Gas Compressors
- Furnish and install a Shed for the Liquid Fuel Treatment System.

2.10 Plant Equipment Erection

- Contractor to unload all Plant equipment delivered to site.
- Contractor will provide all cranes and support equipment and manpower as required to erect the gas turbine generators.
- Contractor to provide for erection of all BOP equipment.

2.11 Cranes, Equipment and Tools

Contractor to furnish or provide for all plant construction required cranes, fork lifts, back hoes, hydraulic lifts, welding machines, air compressors, generators, temporary lights, trucks, pick-ups, etc. All lifting equipment will be certified. Operators of heavy equipment will be certified as trained and qualified for the equipment they are operating.

2.12 Transportation

Clover International will furnish transportation of all Contractor and Owner furnished equipment from US Port to site.

2.13 Lubricants and Chemicals

- Contractor will supply and install all lubricants, lube oils and chemicals for equipment.

2.14 Spares

- Contractor will make provision to supply, receive and store all commissioning spare parts furnished for equipment during start-up and commissioning.
- Contractor to provide Owner with recommended list of spare parts for Gas Turbine Generator and BOP equipment.

2.15 Construction Offices and Storage Facilities

- Contractor to provide construction offices for Contractor, Technical Representatives (3), and Owner (1).
- Owner to provide lay down area / storage and site for construction offices and construction utilities (electrical and potable water)
- Contractor to provide fenced storage as well as fencing around a lay down area and the construction site during construction.
- Contractor to provide sanitation facilities for Contractor, & Owner personnel during construction.
- Contractor to provide communication facilities for construction.

2.16 Engineering and Project Management

- Contractor to provide detailed engineering and specifications for all disciplines involved for the power plant including mechanical, electrical, instrumentation, DCS System, civil and concrete foundations.
- Contractor to provide project management complete with construction management, quality control / quality assurance, scheduling, administration, warehousing, and expediting including regular monthly reporting of all disciplines.
- Contractor to arrange for and provide fully qualified technical representatives during erection, testing, start-up, commissioning for the gas turbine generator units and Chillers.
- Contractor to provide startup, commissioning and testing of BOP associated systems.

- Contractor to provide operator and maintenance training for Power Plant on the Gas Turbine Generator Packages, Chillers, and Balance of Plant.
- Contractor to provide one (1) electronic and two (2) hard copies of the existing equipment O&M manuals in English only and any new equipment manuals will be supplied in both English and Spanish. This also includes training manuals, engineering calculations, commissioning and start-up manuals, test manuals, as-built drawings, design specifications and warranty manuals for plant equipment.

2.17 Cathodic Protection

Cathodic Protection will be provided for all steel underground piping.