

Three (3) 48 MW GENERAL ELECTRIC LM6000 MW
GAS TURBINE GENERATOR
4500 MT DIESEL SOLE USE FUEL TERMINAL
(CONFIGURABLE FOR MULTI-GAS)

Proposed Scope of Work

RPConnect NOVOsol proposes POWER GENSET unit capable of providing continuous 47,300 KW at ISO conditions. We have 3 available for delivery at the moment. Given the operating conditions, the unit capacity has been conservatively rated at 43,240 kW, based upon manufacturers estimates of efficiency and performance given average humidity and temperature conditions. The total of 3 units of base plate capacity, when fully synchronized will deliver continuous 129,720 kW.

The core of the GENSET proposed is a General Electric manufactured LM6000 Aero-derivative turbine generator, which is capable of operating on multi-fuels; but optimized and turned for Diesel fuel. The LM6000 GENSET is coupled with a synchronous GE generator providing continuous power at 13.8 KV at 60Hz. The LM 6000 is capable of 5-minute fast starts, full power in 10 minutes and ability to start and stop in 15-minute intervals, uniquely suited to Reserve power dispatch service and economics.

The power units are designed to operate in low level elevation site conditions, a high temperature and humidity climate with moderate dust load in the air intakes. All unit operations are based on manufacturers documentation for new or remanufactured performance.

Example: LM6000 gas turbine power generators with heat recovery



Power Generation System (scope of supply)

Gas Turbine: The General Electric LM6000 offers 40 MW to over 50 MW with up to 42% efficiency and 99% Reliability, fast ramp rates, 10-minute starts, cycling and load following capability, high efficiency and modular maintenance. The LM6000 "SPRINT" generates a maximum power (ISO) of 47,300 kW at 60Hz with a heat rate of 8620 kJ/kWh. The single igniter turbine is a two shaft / two spool engine consisting of a five stage low pressure compressor, fourteen stage high pressure compressor, a two stage high pressure turbine and a five stage low pressure turbine.

SPRINT (spray Inter-cooling) Power Boost: SPRINT boosts engine performance using a spray system inter-cooling design that increases mass flow by cooling the air during compression. The system generates an atomized water spray using nozzles between the high and low compressors using air from the engine. The SPRINT system requires a purified water system per specification MD-TD-000-3 at 200 to 450 kPa.

Generator: The equipment package is supplied with an air-cooled 2-pole 63.5 KVA @ 0.85 pf, 13,800 volts 60Hz generator outside of the turbine enclosure and capable of handling full continuous power requirement over a wide ambient temperature range. A cooling water loop and fans mounted on each end of the generator rotor shaft inboard of the bearings draw air through the generator filter assembly. The generator includes a brushless excitation system with a permanent magnet generator along with neutral and line side cubicles for the power connections.

Turbine Base plate and Enclosure: The package is supplied with a single step vertical offset parallel speed reducer with a gear rated power of 52,200 kW from a turbine speed of 3627 rpm to a generator speed of 3000 rpm with a 1.209:1 ratio. The unit design includes a steel housing and clockwise rotation.

The gas turbine is supplied with a weatherproof acoustic enclosure and a removable roof for quick engine maintenance. The enclosure is completely assembled and mounted over the base plate prior to testing and shipment with sound attenuation to the average of 85 dBa at 1 meter and 1.5 m above ground. The turbine is completely ventilated using belt driven fans.

The engine is shock mounted and shipped in position with the exception of the coupling spacer, which is shipped in a separate container. The support structure for the gas turbine generator consists of a two-piece ski assembly sectionalized between the turbine and the generator. The unit is designed for U.S. seismic Zone 4, suitable for earthquake areas.

Electro Hydraulic Start System: The equipment package is supplied with a electric motor driven hydraulic pump assembly, filters, coolers and controls, mounted on the auxiliary equipment module. A hydraulic motor is also mounted on the accessory gearbox. Hydraulic hoses are furnished to connect the auxiliary equipment module and the main base plate. The standard start cycle is 10 minutes.

Fire Protection System: The equipment package is supplied with a factory installed fire protection system complete with optical flame detection, hydrocarbon sensing and thermal detectors., piping and nozzles in the engine compartment. The fire protection system includes cylinders containing CO2 mounted on a separate module. A 24 V DC battery and charge to power the fire protection system is also included. All alarms and shutdowns are annunciated at the unit control panel. An alarm sounds at the turbine if the gas detectors detect high gas levels, or if the system is preparing to release the CO2. When the system is activated the package shuts down the ventilation dampers automatically close and the CO2 cylinders are automatically released into the turbine compartment via multiple nozzles. Auxiliary enclosures are equipped with hand held extinguishers.

Battery System: The equipment package is supplied with a 24 V DC battery system for the fire

detection system and gas turbine generator control system. The package is also supplied with a 125 V DC battery system for control cooling backup and a 240 V DC battery system to power the mineral lube oil system DC motor driven backup pump. All battery systems are valve regulated lead acid type. Battery systems are installed in the power control module.

Generator Protective Relays: The equipment package is supplied with a microprocessor based generator protective relay module system mounted in the turbine control panel.

On/Off Line Cleaning and Soak Wash System: The equipment package is supplied with an online cleaning system, which allows the compressor section unit to be cleaned during full power operation. The same system and reservoir are utilized for off line cleaning. The unit requires purified water (MD-TD-000-4) and detergent (MID-TD-0000-5).

Air Inlet and Gas Exhaust System: the equipment package is supplied with a three stage filtration system consisting of inlet screens, purifier and final barrier filter removing 99% of all particles down to 5 microns. Acoustical louvers for noise control are installed in the inlet filter reducing noise down to 82 dBa. The package includes a circular axial air exhaust outlet with flanges for heat recovery or installation of an exhaust stack.

Instrumentation and Power Plant Control

The plant will be outfitted with consolidated Controls, Instrumentation and Communications system. The Woodward MicroNet control panel is mounted in the Power Control Module. A touch screen display provides convenient operator control. An Ethernet or RS485 Modbus interface is provided to transmit via telemetry unit conditions.

- Plant DCS control system provides integrated fuel management system, PLC sequencer, vibration monitor, digital multi-meter and generator protective relays. Alarms and shutdown events recording.
- Local Electrical Control Panels
- Communications and Networking Connectivity
- Cabling, cable trays and steel framework systems
- On-Line Monitoring and Diagnostics (M&D) system
- Manual and Automatic sequencing
- Site specific HMI and programming

Fuel System

The fuel system is dual fuel and optimized for Diesel-2 with necessary shutoff valves, piping and instruments between the fuel connection and the engine. The units can operate multi-gases including LPG, Syngas and LNG.

Lube Oil System

The equipment package is supplied with two separate lube oil systems; synthetic lube oil system for gas turbine core and intermediate pressure turbine and mineral lube oil system for generator, low-pressure compressor and power turbine. Each system has duplex filters, simplex shell and tube coolers and thermostatically controlled oil heaters. The synthetic lube oil system is located on the turbine base plate. The mineral lube oil system is mounted on the auxiliary equipment module next to the gas turbine base plate. The auxiliary equipment module provides simplified piping connections and reduces installation time and costs. Synthetic Oil: MID-TD-0000-6. Mineral Oil: ISO VG 32.

Electrical Balance of Plant

NOVOsol will provide a balance of plant to the on-site substation. NOVOsol will provide up to 32 KVA on-site substation connections using qualified personnel and certifications of compliance (quotation assumes that a substation exists and access can be acquired, no transmission lines included).

- Generator Step Up Transformers (GSU) for both the gas and steam turbine generator
- Independent MV/LV distribution plus current and voltage Transformers
- Gas Insulated Switchgear (GIS)
- ISO 61850 Compliant Process Bus Network
- High Voltage Disconnect Switches and transmission to on-site substation
- HV Surge Arresters, Insulators
- Generator Protection and Control System

Civil works, Facilities, buildings and structures

This proposal assumes that site acquisition and preparation as a power station has been provided including Foundations, Facility lights, air conditioning, emergency and fire protection plus security fencing.

NOVOsol will provide:

- Power Station site clearing and improvements including earthworks and drainage
- All civil works and facilities for equipment operations
- Office, control room and warehouse and BOP switch room plus any additional enclosures for construction and emergency power genset, maintenance shed and auxiliary equipment (lifting equipment)
- All interconnect piping, valves and cabling including steelworks, racks, grating, ladders, decks, etc.
- Potable, service and waste water systems.
- Instrument and service air systems.
- Water treatment and storage for plant waste including Lubricating oils (turbine & generator) and Turbine wash detergent and rinse water
- Temporary facilities for workforce accommodation, site office, warehousing for equipment
- Any special tools
- 2 mw of diesel power genset for emergency power, construction and commissioning power

Spare Parts

The construction and commissioning spares shall be provided by the supplier and shall be replenished as the spares are used. Upon acceptance of the plant, the commissioning spares shall be handed over to the plant maintenance.

Diesel Fuel Supply

The power plant will require a continuous supply of Diesel fuel to support four (4) by LM6000 turbine power generation. The on-site facility will be sized for once a month delivery, operational for 100 hours a month plus 20% contingency.

- 4500 MT of Diesel storage and supply facility for the full 4 unit power station

Cost Summary

Total Price of each GE LM 6000 with Fuel Storage and BOP power plant delivering up to a maximum of approximately 172,960 kW based upon manufacturers estimates of efficiency and performance given average humidity and temperature conditions. All other features included.

Site and Site Preparation (estimate)	USD \$1,050,000
LM6000 Power Generator Equipment: --	USD \$25,500,000
4500 MT Diesel Fuel Storage	USD \$1,600,000
Fuel Management System and Electrical BOP	USD \$2,250,000
Civil Works and Interconnects for scope of supply	USD \$1,200,000
Project Management:	USD \$4,950,000
Total	<u>USD \$36,550,000</u>

Purchase Terms & Conditions Summary

Terms will be as follows:

- 10% deposit to secure generation equipment on contract signing
- 40% in the form of advanced payment (inclusive of deposit) due on the effective date of the agreement
- 20% upon design approval
- 20% on shipment
- 10% (Balance) on start up
- Payments will be made in US-dollars.
- Payments will be made within 5-days of presentation of invoice for the milestone.

Financing (expected terms and interest based on customer financial condition)

- 20% equity investment including 10% deposit to secure generation equipment on contract signing
- 80% debt financing, 12 year term / 6% interest

Conditions 1:

The customer will be responsible for site acquisition and access to the utility grid including power off-take, power metering and financial agreements either private or public

Conditions 2:

The customer will be responsible to secure any and all relevant construction and operating permits from the national and local government agencies and the customer will pay any and all such fees. The customer will be responsible for any studies and analysis in regards to environment, structural, site, grid, etc. beyond the equipment and programming provided.

Warranty:

The warranty will be for a period of 1-year or 6,000-operating hours from start up date. The supplier reserves the right to use new or remanufactured systems, sub-assemblies and parts to ensure delivery and continued operation of the power generators and equipment through the warranty period.

Spare Parts & Spares Depot:

Each unit should have emergency spare parts; all units may share total spares compliment. A detailed list of spares supplied and prices will be provided prior to shipment.

Scope of Services

The following are services that will be provided in relation to the equipment and materials within the scope of the work:

- Design and construction drawings, documentation and relevant information
- Project management, engineering, procurement, environmental, health and safety management, construction management and quality assurance.
- Transport to site of all equipment, freight forwarding and customs clearance
- Installation of equipment
- Commissioning
- Plant acceptance testing and performance
- Grid code compliance testing
- Operator and maintenance training and documentation
- Disposal of waste during construction
- Provide equipment, tools and machinery required during construction
- Workforce accommodation and transportation
- Design and safety studies as required by relevant codes and regulations
- Third party design and inspection verification
- Assist in obtaining power plant relevant permits, approvals and certifications
- Obtain statutory certification of any and all pressure systems, gas systems, cranes, and equipment as applicable

Schedule & Delivery

Delivery time will be 25 -weeks counted from firm purchase order, financing arrangements and major equipment (3 x LM6000) delivery confirmation. Current earliest commissioning date given 2015 contract on equipment: December 2015

Project Design and Engineering Study

An engineering study will be performed by RPConnect NOVOsol to determine how the project will be performed to meet the client needs, project requirements, financial projections, power requirements, civil, structural, Geo Technical and M.E.P. engineering requirements, along with service and maintenance requirements to perform as proposed. All engineering, including documents and studies is the exclusive ownership of system.

RPConnect NOVOsol will publish a complete design set for review by the owner on the applicability to the conditions of the project and its site location. Upon written approval of the owner this process will begin and the design engineers will commence to perform the outlined scope of work in the engineering study proposal. The study will allow us to determine and provide:

- Project Overview and Outline
- Process Flow Diagram for each Main Process Unit
- Major Equipment List for each Main Process Unit
- A Schedule for Delivery of the Equipment
- An Estimated Schedule for the total installation of the project
- Preliminary Utility Process Flow Diagram
- Estimate of Required Additional Equipment
- A Schedule for Delivery of the Equipment
- A Preliminary Plot Plan Layout
- Process Flow Diagram
- Electrical power production of the facility
- Estimated Facility operation cost
- Estimated Facility maintenance cost

Maintenance & Service

Interval	Scheduled Maintenance Action	Outage Duration
4,000 hours (every 4K h)	Borescope inspection (includes cool-down time)	12 hours
25,000 hours	Hot section interval* 1) On-site hot section replacement (combustor, HPT, IPT)	4 days ^(a)
50,000 hours	Depot maintenance ^(b) 1) Major hot section overhaul (combustor, HPT, IPT) 2) Inspect booster, intercooler, scroll frames, HPC, aft shaft and bearings ^(c) 3) Power turbine overhaul	4 days ^(a)
75,000 hours	Hot section interval ^(b) 1) On-site hot section replacement (combustor, HPT, IPT)	4 days ^(a)
100,000 hours	Depot maintenance ^(b) 1) Major hot section overhaul (combustor, HPT, IPT) 2) Inspect booster, intercooler, scroll frames, HPC, aft shaft and bearings ^(c) 3) Power turbine overhaul	4 days ^(a)

RPCConnect NOVOsol Overview

RPCConnect NOVOsol is a partnership between NOVOsol Power Company and the FK Construction Ltd. as a world-class provider of both traditional Fuel Oil, Diesel & Natural Gas and alternative Solar, Solar Thermal and BIO mass power systems, including procurement, planning, infrastructure engineering, construction, EPC and operation and maintenance services. NOVOsol brings the necessary comprehensive experience to any power project that ensures success.

NOVOsol via the FK Engineering group of companies has successfully delivered:

2 – General Electric LMS 100 LNG fired power plants for the Department of Energy, Government of Sierra Leone West Africa in 2013

2 – LNG Terminals for the CHEVRON as part of the West Africa Gas pipeline from Nigeria to Ghana, completed in 2014

NOVOsol Power was founded in CANADA to provide comprehensive combustion control systems and alternative power systems for both grid-connect and remote prime power applications. Partnering in 2011 with FK Construction of Lome TOGO, NOVOsol can now provide complete turnkey solutions to global applications.

NOVOsol is pleased to provide services to numerous public and private enterprises including mining, transport, oil and gas and commercial / industrial end users. Our expertise covers all aspects of power generation, successfully planning, assembling and commissioning subsystems manufactured by the leading global industrial producers into fully operational systems.

Service: RPCConnect NOVOsol is fully capable of working in South America, Asia, Africa or USA bringing the required domestic and international resources.

Engineering: Our engineering services range from pre-construction to feasibility studies, environmental and site surveys, full spectrum electrical, civil and mechanical engineering. Our customers will receive ongoing reports; advice and evaluations of the best solution to best meet their needs.

Construction: Our construction professionals have completed mission critical projects around the world using proven practices that ensures the project is delivered on time and on budget.

Procurement: Being well versed in the global suppliers of the best equipment and services, our clients can leverage our knowledge and relationships to source the best solution.

Operations & Maintenance: RPCConnect NOVOsol trains the customer operators and maintenance personnel in every aspect of their solutions including planning and spare parts that simply scheduled maintenance and minimize downtime.

Qualifications and Affiliates

RPConnect NOVOsol and FK group have provided services to numerous public and private enterprises including mining, transport, oil and gas and commercial / industrial end users. Expertise covers all aspects of power generation, successfully planning, assembling and commissioning subsystems manufactured by the leading global industrial producers into fully operational systems.

Equipment Partners. An important part of the world-class solutions we can offer our customer, NOVOsol brings a unique blend of Unique Product Solutions and Assemblies including;

- CATERPILLAR and CATERPILLAR MaK power generation
- CUMMINS power generation
- ROLLS-ROYCE energy
- GENERAL ELECTRIC Energy for STEAM TURBINE (Products and EPC)
- GENSERAL ELECTRIC Power for GAS TURBINE (Products and EPC)
- WARTSILA energy
- SIEMENS energy for STEAM TURBINE
- SHEC Solar Thermal Arrays and Receivers
- GEC AHLSTROM
- PERKINS power generation
- IVECO Power generation
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Partners and Experience.

RPConnect NOVOsol and FK group have the professional personnel to provide the best construction/engineering services to meet the project's goals. Drawing upon the interdisciplinary in-house expertise as well as our partners' network, we design to mitigate risk and add long-term value to the project. We oversee and coordinate all efforts so our clients are educated and always fully informed.

List of Keystone Projects and Strategic EPC Partners

PREVIOUS EXPERIENCE	
Nairobi Power Generation	Union FENOSA Kenya
Dabhan I Power Generation	Union FENOSA YEMEN
Solar & BIOGAS Cogeneration Plant	IMADE SPAIN
116 MW Power Generation Barge	Confidential, PHILLIPINES
Enviroil Power Generation Plant	Vitoria SPAIN
Deepwater Port and Gas Terminal	Lome, TOGO
Funtua – Gusua Highway	Funtua NIGERIA
Chekka – Tripoli Highway	Tripoli LEBENON
United Nations Development Center	NYC, USA
West Africa LNG Gas Pipeline (CHEVRON)	GHANA
PROJECTS IN PROCESS	
UNITED STATES EMBASSY	Lome, TOGO
Phosphate Mine & Distribution	Abidjan, IVORY COAST
60 MW Power facility	Confidential, SENEGAL
50 MW Solar Thermal Plant	Contunoe, BENIN
20 MW + 20 BBL Mini Refinery	Confidential, NIGERIA

Construction and Engineering

- USP&E – Power Engineering and Construction Company – Gas Turbine and Combustion
- ZAKHEM - Construction, Engineering and Investment Group
- OMNITech SL- Power plant EPC and O&M Services – LNG, D-2 and HFO fuels
- The CHAQUORY Group - Banking, Construction, Insurance, Manufacturing, Telecommunication, Transportation
- KHANSEBH Civil Engineering LLC- Civil Engineering
- RETRO Construction Co Ltd - Construction and Engineering
- PHILKO Ltd - Manufacturing & Erection, Civil Construction and Diversified Trade Business

Master Planning

- STANTEC - Architecture, Engineering, Environmental Sciences, Facilities Projects, Interior Design, Landscape Architecture, Planning Surveying, Project Economics for Infrastructure, Project Management
- SSH International – Architectural, Planning, MEP, Structural, and Roads & Infrastructure
- Butler, Rosenbury & Partners - Interior Design, Landscape Architecture, Structural Engineering

Consulting and Resource Management

- Management of Resources & Environmental Solutions - Environmental consulting in earth sciences and engineering, resource management, capacity building and institutional development
- Environmental Consulting Services, Inc - Environmental, Geotechnical and Construction consulting Services
- MFS Consulting Engineers LLC - Geotechnical, structural, site/civil and environmental engineering, and landscape architecture designs
- Hydro Tech Environmental Corp - Full service environmental investigation, remediation, and subsurface drilling