Energy Fiji Limited

Tender Document

Tender No. : MR 204/2020

Supply of 1 x 350KW Canopy type Standby Rating Generator for EFL's Navutu Power Station

Generation SBA
Energy Fiji Limited

4 September 2020

KamendraS@efl.com.fj

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1.0 Invitation for Tenders

Energy Fiji Limited is inviting bids for Supply of 1 x 350KW Canopy type Standby Rating Generator for EFL's Navutu Power Station. The Detailed scope of supply listed in the following pages.

Interested bidders may obtain Tender Document at the:

Supply Chain Office
Energy Fiji Limited
Head Office
2 Marlow Street, Suva
Contact: 322 4360 / 999 2400

All tenders shall submit all documents required including spares pricing as per price template.

During evaluation of tenders, EFL will invite a tenderer or tenderers for discussions, presentations and necessary clarification before awarding of the contract

The tender submissions close on the 30/09/2020

2.0 Instruction to Bidders

2.1 Eligible Bidders

2.1.1. This invitation is open to all Bidders who have sound Financial Background, and have previous experience in supply of generating equipment & accessories.

2.1.2. Bidders shall provide such evidence of their continued eligibility satisfactory to EFL as EFL shall reasonably request.

2.1.3. Bidders shall not be under a declaration of ineligibility for corrupt or fraudulent practice.

2.2 Eligible Materials, Equipment and Services

2.2.1. The materials, equipment, and services to be supplied under the Contract shall have their origin from reputable companies as specified by EFL and from various countries and all expenditures made under the Contract will be limited to such materials, equipment, and services. Upon request, bidders may be required to provide evidence of the origin of materials, equipment, and services.

2.2.2. For purposes of this Contract, "services" means the works and all project-related services including design services.

2.2.3. For purposes of this Contract, “origin" means the place where the materials and equipment are mined, grown, produced or manufactured, and from which the services are provided. Materials and equipment are produced when, through manufacturing, processing or substantial or major assembling of components, a commercial recognized product results that is substantially different in basic characteristics or in purpose or utility from its components.

2.2.4. The materials, equipment and services to be supplied under the Contract shall not infringe or violate any industrial property or intellectual property rights or claim of any third party.

2.3 One bid per Bidder

2.3.1. Each bidder shall submit only one bid. A bidder who submits or participates in more than one bid will cause all those bids to be rejected.

2.4 Cost of Bidding

2.4.1. The bidder shall bear all costs associated with the preparation and submission of its bid and EFL will in no case be responsible or liable for those costs.

2.5 Site Visits

2.5.1. No site visits are required for this tender.

2.6 Contents of the Bidding Documents

2.6.1. The technical proposal shall contain the following:

(i) Bid Form for Technical Proposal and Appendix to Technical Proposal
(ii) Form of Bid Security;
(iii) Power of Attorney;
(iv) Information on Qualification;
(v) Confirmation of Eligibility;
(vi) Schedule of Major Items of Equipment
(vii) Schedule of Technical Particulars & Guarantees
(viii) Schedule of Times for Delivery & Completion and Contract completion times
(ix) Schedule of Subcontractors Statement of Experience
(x) Schedule of Bidders Tools & Equipment
(xi) Schedule of Contractors Health & Safety Plan
(xii) Schedule of Other Documents and Drawings to be submitted with the bid
(xiii) Any other materials required to be completed and submitted by bidders in accordance with these Instructions to Bidders.

2.6.2. The Financial proposal shall contain the following:

(i) Bid Form for Price Proposal and Appendix to Price Proposal;
(ii) Schedules of Prices:
    I. Design, Drawings and Documentation
    II. Civil Works, Installation and Other Services;
    III. Grand Summary; and
    IV. Recommended Spare Parts for Generator maintenance until 8,000hrs

(iii) Any other materials required to be completed and submitted by bidders in accordance with these Instructions to Bidders.

2.6.3. The bidder is expected to examine carefully the contents of this Bidding document. Failure to comply with the requirements of bid submission will be at the bidder's own risk. Bids which are not substantially responsive to the requirements of the bidding documents will be rejected.

2.6.4. The following are the mandatory commercial submission of a successful tender bid;

- Pricing Schedule
- Program of Works
- Company Profile (Max 2 pages in standard A4)
    - Work History - Project/ Work done with referee, EFL work history.
    - Company background
    - Bidder available resources e.g. Manpower, Machines & Equipment.
    - OHS Policies or Plan
- Fiji Revenue & Customs Service (FRCA) compliance
- Fiji National Provident Fund (FNPF) compliance
- Signed checklist declaration (Appendix 5.1)

Failure to submit required documents may affect bid compliance even make it non-compliance.

2.7 Clarification of Bidding Documents

2.7.1. A prospective bidder requiring any clarification of the bidding documents may notify EFL in writing by fax (hereinafter the term “fax" is deemed to include electronic transmission such as facsimile, cable and telex), or email addressed to:

Bobby Naimawi
Chief Finance Officer
2 Marlow Street,
Suva, Fiji
Phone: +679 3224 185
Email: BobbyN@efl.com.fj

2.7.2. EFL will respond to any request for clarification which it receives earlier than 10 days prior to the deadline for submission of bids.

2.8 Amendment of Bidding Document

2.8.1. At any time prior to the deadline for submission of bids, EFL may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective bidder, modify the bidding documents by issuing addenda.

2.9 Language of Bid

2.9.1. The bid, and all correspondence and documents related to the bid, exchanged between the bidder and the EFL shall be written in the English language.

2.10 Bid Prices

2.10.1. Unless specified otherwise in Employer's Requirements, Bidders shall quote for the entire facilities on a “single responsibility" basis such that the total bid price covers all the Contractor's obligations mentioned in or to be reasonably inferred from the bidding documents in respect of the design, manufacture, including procurement and subcontracting (if any), delivery, construction, installation and completion of the facilities. This includes all requirements under the Contractor's responsibilities for testing and commissioning the facilities and, where so required by the bidding documents, the acquisition of all permits, approvals and licenses, etc.

2.10.2. Bidders shall give a breakdown of the prices in the manner and detail called for in this bidding document, or any issued addenda.

2.10.3. Local Supplier Bids shall be given on Delivered At Place (DAP) basis. The point of delivery shall be EFL’s Navutu Depot in Lautoka. The term DAP shall be governed by the rules prescribed in the current edition of Incoterms (i.e. the eighth version - Incoterms 2010), published by the International Chamber of Commerce, Paris.

2.10.4. For Oversea Suppliers, bids shall be given on Cost, Freight & Insurance (CIF) or Delivered Duty Unpaid (DDU). Preferred CIF, and the point of delivery shall be Lautoka Port coming via sea or Nadi Airport coming via Air. The Shipping terms shall be governed by the rules prescribed in the current edition of Incoterms (i.e. the eighth version - Incoterms 2010), published by the International Chamber of Commerce, Paris. Stated Otherwise with validation.

2.11 Bid Currencies

2.11.1. Prices shall be quoted in a single currency only.

2.12 Bid Validity

2.12.1. Bids shall remain valid for a period of 180 days from the date of Deadline for Submission of Bids specified in Sub-Clause 2.15.

2.13 Format and Signing of Bids

2.13.1. The bidder shall prepare one original and two (2) copies of the technical and financial proposals, clearly marking each one as: "ORIGINAL-TECHNICAL & PRICE PROPOSAL", "COPY NO. I - TECHNICAL & PRICE PROPOSAL", etc. as appropriate. In the event of discrepancy between the original and any copy, the original shall prevail.

2.13.2. The original and all copies of the bid shall be typed or written in indelible ink (in the case of copies, Photostats are also acceptable) and shall be signed by a person or persons duly authorized to sign on behalf of the bidder. All pages of the bid where entries or amendments have been made shall be initialled by the person or persons signing the bid.

2.13.3. The bidder shall provide one electronic copy of the Technical and Financial proposals on EFL's electronic tender hosting website; https://www.tenderlink.com/efl

2.13.4. The bid shall contain no alterations, omissions or additions, except those to comply with instructions issued by EFL, or as necessary to correct errors made by the bidder, in which case such corrections shall be initialled by the person or persons signing the bid.

2.14 Sealing and Marking of Bids

2.14.1. The bidder shall seal the original copy of the technical proposal and the original copy of the price proposal and each copy of the technical proposal and each copy of the price proposal in separate envelopes clearly marking each one as: "ORIGINAL-TECHNICAL & PRICE PROPOSAL", "COPY NO. I - TECHNICAL & PRICE PROPOSAL", etc. as appropriate.

2.14.2. The bidder shall seal the original bids and each copy of the bids in an inner and an outer envelope, duly marking the envelopes as "ORIGINAL", "COPY No. 1", etc.

2.14.3. The inner and outer envelopes shall

a) be addressed to EFL at the following address:

Bobby Naimawi
Chief Finance Officer
2 Marlow Street,
Suva, Fiji
Phone: +679 3224 185
Email: BobbyN@efl.com.fj

And

b) bear the following identification:

Bid for: MR 204/2020 - Supply of 1 x 350KW Canopy type Standby Rating Generator for EFL's Navutu Power Station.

2.14.4. In addition to the identification required, the inner envelope shall indicate the name and address of the bidder to enable the bid to be returned unopened in case it is declared "late" pursuant to Deadline for Submission of Bids.

2.14.5. If the outer envelope is not sealed and marked as above, EFL will assume no responsibility for the misplacement or premature opening of the bid.

2.15 Deadline for Submission of Bids

2.15.1. Bids must be received by EFL at the address specified above no later than 1600 hours (Fiji Time) 30 September 2020.

2.15.2. EFL may, at its discretion, extend the deadline for submission of bids by issuing an addendum, in which case all rights and obligations of EFL and the bidders previously subject to the original deadline will thereafter be subject to the deadlines extended.

2.16 Late Bids

2.16.1. Any bid received by EFL after the deadline for submission of bids prescribed above will be rejected and returned unopened to the bidder.

2.17 Modification and Withdrawal of Bids

2.17.1. The bidder may modify or withdraw its bid after bid submission, provided that written notice of the modification or withdrawal is received by EFL prior to the deadline for submission of bids.

2.17.2. The bidder's modification or withdrawal notice shall be prepared, sealed, marked and delivered in accordance with Sealing and Marking of Bids, with the outer and inner envelopes additionally marked "MODIFICATION" or "WITHDRAWAL", as appropriate. A withdrawal notice may also be sent by fax but must be followed by a signed confirmation copy.

2.17.3. No bid may be modified by the bidder after the deadline for submission of bids.

2.18 Rejection of one or all Bids

2.18.1. EFL reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids, at any time prior to award of Contract, without thereby incurring any liability to the affected bidder or bidders or any obligation to inform the affected bidder or bidders of the grounds for the rejection.

2.19 Process to be Confidential

2.19.1. Information relating to the examination, clarification, evaluation and comparison of bids and recommendations for the award of a contract shall not be disclosed to bidders or any other persons not officially concerned with such process.

2.19.2. Any effort by a bidder to influence EFL's processing of bids or award decisions may result in the rejection of the bidder's bid.

2.19.3. Lowest bid will not necessarily be accepted as successful bid.

2.20 Clarification of Bids

2.20.1. To assist in the examination, evaluation and comparison of bids, EFL may, at its discretion, ask any bidder for clarification of its bid. The request for clarification and the response shall be in writing or by fax, but no change in the price or substance of the bid shall be sought, offered or permitted except as required to confirm the correction of arithmetic errors discovered by EFL in the evaluation of the bids in.

2.21 Preliminary Examination

2.21.1. Energy Fiji Limited will examine the tenders to determine whether they are complete, whether any computational errors have been made, whether the documents have been properly signed, and whether the tenders are generally in order.

2.21.2. Arithmetical errors will be rectified on the following basis. If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail, and the total price shall be corrected. If the tenderer does not accept the correction of the errors, its tender will be rejected. If there is a discrepancy between words and figures, the amount in words will prevail.

2.21.3. Energy Fiji Limited may waive any minor informality or non-conformity or irregularity in a tender which does not constitute a material deviation, provided such waiver does not prejudice or affect the relative ranking of any tenderer.

2.21.4. Prior to the detailed evaluation, pursuant to Clause 21, Energy Fiji Limited will determine the substantial responsiveness of each tender to the tender document. For purposes of these paragraphs, a substantially responsive tender is one, which conforms to all the terms and conditions of the tender document without material deviation Energy Fiji Limited's determination of a tender's responsiveness is to be based on the contents of the tender itself without recourse to extrinsic evidence.

2.21.5. If a tender is not substantially responsive, it will be rejected by Energy Fiji Limited and may not subsequently be made responsive by the tenderer by correction of the nonconformity.

3.0 Technical Specification

3.1 Information to Tenders

3.1.1 Scope of Supply

The contract includes for the Supply of One (1) x 350 KW(e), 415V, 50Hz three phase Canopy type Standby Rating Generating set.

The contract also includes:

(i) Three copies of Operating, Servicing and Maintenance Instructions and Spare Parts Manuals. Additionally, one softcopy of mentioned Manuals.
(ii) One set of diagnostics software with required equipment e.g. Laptop, connecting cables.
(iii) Any necessary erection materials including a complete set of special tools and equipment necessary to erect, operate, service and maintain the genset.
(iv) A list and price of spare parts for operating and maintaining the Plant up to 8,000 hrs, to include but not limited to the following:
- Normal maintenance spares for engines and all other auxiliaries
- Emergency and safety spares for engine and all other auxiliaries
- General and special tools for engine and all other auxiliaries
- Test and calibration tools for engine and all other controls and auxiliaries
- Cleaning/reconditioning/remanufacturing tools for engine components and auxiliaries
- Machine shop tools
- Duplicates of software/programs, licenses, software keys, passwords, etc. supplied in this contract shall be hand over and shall form part of the completed installation.

(v) Detailed design calculations, specifications and drawings used in the contract.

3.1.2 Information with Tender

Tenders must fill in all Schedules and give all particulars pertaining to the Diesel Generating Plant offered.

In particular, they shall supply the following in their tender:

a) Preliminary performance schedule, which shall form the basis of the contract performance program.
b) Drawings showing all dimensions of the complete Diesel Generating Plant.
c) Drawings or Schedules showing the shipping dimensions and weights.
d) One copy in the English Language of the Design Codes to which the tenderer elects to design the Diesel Generating Plant and its ancillaries.
e) A list of recommended maintenance, safety, and emergency spares for engines and auxiliary equipment for a service period of 8,000 hrs with all prices quoted. Other parts, tools and equipment specified in sub-clause 5.1.1 (iii).
f) A maintenance programme in terms of machine operating hours, indicating when minor and major servicing, such as oil change periods, filter changes, protection tests, top overhauls and major overhauls are to be carried out. The programme should also include the spare parts anticipated to be changed and the time and manpower required to carry out the work.

3.1.3 Drawing and Information to be Supplied by Contractor

3.1.3.1 The following must be submitted with the tender:

(i) General arrangements for the plant, giving dimensions, weights and basic specifications of diesel engine and generator and other equipment.
(ii) Illustrations and printed matter showing constructional details and details of instrumentation, protection and accessories.
(iii) Life cycle cost calculations
(iv) Preliminary Project Schedule.
(v) List of spare parts, tools, diagnostic & calibration tools instruments and other equipment necessary to carry out maintenance, overhauls, inspections, and repairs expeditiously.
(vi) Special tool lists an and spare parts list with pricing required for operation and maintenance

3.1.3.2 The following drawings are to be submitted with the contract, in printed and electronic/AutoCAD formats:

(i) Certified general arrangement drawings showing all fittings and accessories provided and including dimensions and weights and the specifications for diesel engines, generator and accessories.
(ii) Electrical and instrument diagrams showing the local/auto start, stop and output control circuit and the protection, instrument systems, auto voltage and governor controls.
(iii) Excitation System and AVR detailed drawings.
(iv) Combined Instrumentation and piping diagram with operational parameters.
(v) Certification of all the final design calculations, drawings and evidence of compliance to such design parameters.

3.1.3.3 Submission of Drawing

All drawings submitted pursuant to this clause, shall form part of the contract, after approval by the Engineer. The sequence of submission of all drawings shall be such that all information is available for checking each drawing when it is received.

Notation on drawings shall be in the English language.

3.1.4 Programme of Works

The programme proposed for this Contract is outlined below; however, the Contractor may forward their own programme of works acceptable to EFL.

Completion Periods;

NOTE: All the periods given below are to be measured from the date appearing on the Purchase Order

	Milestones	Duration
1	Period of receipt by the Engineer of final and sufficient information relating to the contract and enabling the design of the system	1 Calendar Week
2	Manufacture Completed	4 Calendar Week
3	Factory Tests Completed	1 Calendar Week
4	Delivered to Site, EFL Navutu Depot	3 Calendar Week
5	Installation Completed	1 Calendar Week

6	Commissioning Completed	1 Calendar Week
7	Training of staff – operation & maintenance	1 Calendar Week

Liquidated damages shall apply to the period given in sub-paragraphs (b) of 1.5.

3.1.5 Liquidated Damages

3.1.5.1 General

Liquidated damages will be payable by the Contractor to the Purchaser if the Contractor has failed to provide deliveries of information and plant within the programme set out in sub-paragraph 1.5 (b) below.

3.1.5.2 Amounts of Liquidated Damages

The amount of Liquidated damages shall be as follows:

(i) Delay to supply Information.

Should the Contractor fail to supply to the Engineer within the stipulated period from the date of the Purchaser's Contract Acceptance Letter all the information required to be supplied by the Contractor, under sub-paragraphs (3.1.3.1) and (3.1.3.2) of 3.1.3 and as more fully described in 3.1.4, liquidated damages shall be determined and charged at the rate of F$1,000.00 per calendar week of delay or part thereof during which all the aforementioned information is supplied, as stipulated in 3.1.3 and 3.1.4.

(ii) Delay to Complete and Deliver, Install and Commission

Should the Contractor fail to complete the Commissioning within the period set out in 3.1.4, liquidated damages for such late execution shall be charged at a rate of FJ $1,000.00 per generating set per calendar day of delay or portion thereof.

3.1.6 Design and Standardisation

The generating plants together with its auxiliaries shall be designed and manufactured to ensure:

(i) Satisfactory operation under prevailing atmospheric conditions at the site.
(ii) Safety of operation and maintenance personnel.
(iii) Facilitate economical, easy and simple inspection, maintenance and operations

3.1.7 Tools and Instruments

The Contractor shall supply all special tools and instruments which may be necessary to carry out the installation, commissioning, operation maintenance, overhauls, inspections and repairs expeditiously, for all the equipment supplied through this contract. These tools and instruments should cover:

- Normal maintenance, emergency, and insurance spares for engines and auxiliary equipment
- General and special tools for engine, auxiliary mechanical & electrical equipment.
- Testing and calibration tools for control & instrumentation on engine, mechanical and electrical equipment.
- Computer programs (Software/hardware) used in the operation, monitoring, setting and /or maintenance of all the equipment supplied through this contract

Exceptions and items required but not supplied must be highlighted along with the current market rate for each of such items. Unless the Employer has granted any relief or exemption, the contractor is expected to include all such tools and instruments in the bid price. List of such tools and instruments should be provided with the Tender with their unit prices.

3.1.8 Provision for Handling the Plant

All heavy parts of the plant supplied under the contract shall have provisions for lifting, slinging and handling during delivery, erection, maintenance and overhauls. A legible name plate indicating the safe limits shall be prominently displayed where possible.

3.1.9 Packing

All material and equipment are to be packed to be transported to the site so that they are protected against climatic conditions and handling to which they may be subjected to in transit and storage at the site.

Spare parts or components supplied shall be individually and suitably preserved, packed and sealed to withstand tropical weather conditions. The packing shall be sufficient to withstand, rough handling during transit and exposure to extreme temperatures, salt, high humidity and precipitation during transit and open or prolonged storage. Preservation chemicals/agents may be employed to ensure that goods delivered are received in good shape and that they can be stored for long durations without fear of corrosion or contamination.

All markings within the inside and on the outside of casings or packaging are to be either of a water proof ink, material or protected by Shellac or varnish to protect obliteration in transit, handling and storage.

3.1.10 Insurance

The Tenderer shall deliver the complete equipment supply, Delivered Duty Unpaid to the transfer point identified in the Tender specification.

3.2 Scope of Work

The scope of work to be carried out under the terms of this specification comprises the Supply of One (1) new Canopy Standby Diesel Generating sets with a maximum Prime rated capacity of 350KW(e) at 0.8 PF lagging, 415 volt, complete with all necessary mechanical and electrical auxiliaries including but not limited to, excitation equipment, cooling system, engine alarm control panel - both local and provisions for remote starting, metering and instrumentation, generator alternator and engine protection, engine auxiliary drives and associated controls, Motorized Breaker, Automatic Transfer Switch, Cabling to the ATS.

3.3 Design Requirements

The work performed and equipment offered to this specification shall have a proven track record of satisfactory service in similar applications under site conditions, similar or more severe than those specified herein. The contractor shall provide a detailed schedule of each of the equipment having met the required design criteria and standards and include deviations from the current standards used in the design. The decision of the Employer in certifying and acceptance of the result shall be one of the main factors in evaluation and certifying completion of the contractor’s performance and settling the payments due to the contractor for the performance.

The specification provided in the tender document is for guidance; however, the contractor is allowed to improve on such conditions and indicate in the tender documents if the intent of such deviations establishes that the products provided are equal to or better than what is mentioned in the tender document.

3.4 Reference Conditions

The following environmental conditions are applicable to this site.

(i) Elevation above mean sea level
- 5-20 meters

(ii) Ambient air temperature
- Design Temperature 45 ^{o}C
- Minimum 15 ^{o}C

(iii) Relative Humidity
- Maximum relative humidity 95%
- Minimum relative humidity 70%

(iv) Seismic Condition
- All equipment shall be capable of withstanding an acceleration of 3.3 m/sec^{2} in any direction without sustaining any damage.

The temperature of the fresh water supply is always less than 30^{o}C at the site. The following is an analysis of the supply water available:

pH	8.3
Alkalinity	mg $CaCO_3$/Ltr68.2
Chloride	mg/Ltr7.3
Sulphate	mg SO_4/Ltr 8.4
Free COB2B	mg/Ltr0.62
Temporary Hardness	mg/Ltr3.6
Permanent Hardness	mg/Ltr64.0
Total Hardness	mg $CaCO_3$/Ltr68.2
Total suspension solids	mg/Ltr<1
Total dissolved solids	mg/ltr126

3.5 Capacity and Rating

3.5.1 Genset Capacity

The net maximum continuous site rated capacity per generating plant shall not be less than 350KW(e) at the specified reference conditions and 0.8 power factor lagging. The output shall be 3 phase and 415 volts at 50 hertz.

The net maximum continuous site rated capacity of the diesel generating gensets shall be defined as the electrical output available at the alternator output terminals LESS the sum of rated full load electrical power requirements of all auxiliaries.

3.5.2 Rating

The maximum continuous and short time rating of the alternator at the specified site conditions shall comply with AS1359 and shall be sufficient to enable the maximum continuous site rated capacity and overload capacity of the gen set to be obtained at the specified reference conditions.

The continuous and overload rating of the diesel engine shall be in accordance with ISO 3046 Part I and shall be sufficient to enable specified maximum continuous rated capacity and overload capacity of the genset to be obtained at the specified reference conditions in accordance with the adjustment provisions of ISO 3046 Part I.

In determining the ratings of individual items of the equipment, reference shall be taken of the conditions at the Power Station as specified in clause 3.

3.6 Plant Layout Requirements

3.6.1 Safety Aspects

All items of the equipment shall inherently be designed for safe operation and the plant shall be designed such that, the plant may be operated in compliance with the Health and Safety Act Work Act 1996 of the Republic of Fiji, or existing OHS regulations in Australia/New Zealand.

3.7 Control

3.7.1 All panels, cubicles, mountings, instruments, protective devices, control equipment and connections necessary for the safe, convenient and reliable operation of the generating plant and for effective fault indication shall be provided and installed. Effective dissipation of heat generated by components shall be provided.

3.7.2 Where appropriate, solid state electrical circuitry is preferred. Relays shall be of the plug-in type, fitted with retaining clips and provided with adequate dust covers. Relays shall have a reliability of operation appropriate to the application.

3.7.3 All control components shall be clearly identified and labelled in accordance with a scheme. Cable identification shall be of the slip-on type sized to fit neatly over the cables.

3.7.4 Indication of the status of the control system shall be displayed on the diesel generator control board (and duplicated as specified at the remote-control panel).

3.7.5 The control system shall disable operation of the generating units under fault conditions.

3.7.6 Control System

A control system shall be provided to enable control of the diesel generating unit, through start, run, load, unload and stop, to be exercised from engine room or control room and this control mode shall be defined as local control.

The following Control Mode should be available for Mode of Operation for the Generator;

(i) MW Mode for Base Loading
(ii) Droop Mode for Remote Control of these Generator as they be controlled from our remote Control Center. Provision for remote raise and lower of Speed and Voltage should be provided in this Mode of Operation
(iii) Asynchronous Mode for Frequency Control.

3.7.7 Diagnostic Software

The generator shall be provided with an effective tool for diagnosing problems of the engine and ability to configure system parameters. This shall allow access to the Electronic Control Modules with a communication adapter to connect to ECM.

3.7.8 Generator Protection

Generator Warning & shutdowns shall be required for;

(i) Warning/shutdown with indication for:
- Low oil pressure
- High coolant temperature
- Overspeed
- Emergency stop
- Failure to start (overcrank)
- Low coolant temperature
- Low coolant level

(ii) Programmable protective relaying functions include:

- Generator phase sequence
- Over/Under voltage
- Over/Under Frequency
- Reverse Power (kW)
- Reverse reactive power (kVAr)
- Overcurrent

All protection must compile to Standard Planning Data for Synchronous Generators (Appendix E.1) and filled in.

3.7.9 Generator Circuit Breaker

The Generator Circuit Breaker shall be a retractable type which can be raked out during maintenance. This is also a compulsory requirement.

3.7.10 Automatic Transfer Switch (ATS)

The Automatic Transfer Switch must be supplied that capable of switching over to the standby plant of power outages . This is also a compulsory requirement.

3.8 Diesel Engine and Auxiliary Equipment

3.8.1 Compliance

The diesel engine shall operate satisfactorily on the fuel oil as specified in 5.7.4 of this section and generally in accordance to ISO 3046, unless specified otherwise. The diesel engine shall be equipped with all ancillary equipment required to satisfactorily achieve the required performance under the specified site conditions.

Generator shall be provided with following installation for protection and safety of machine:

(i) Generator system;
- Anti-condensation space heaters
- Coastal Insulation protection

(ii) Charging system;
- 24 volts, 45 amps charging alternator
- Battery disconnection switch
- Battery charger

3.8.2 Engine Governing

The engine shall be provided with an electronic controlled actuator/governor having programmable provisions/adjustment of droop, speed synchronizing, load sharing and limiting, and isochronous operation and synchronizing indications.

For engine speed control, it shall be set up for direct-acting operation whereby a loss or interruption of electrical/electronic signal, the fuel shutoff valve will shut off fuel and cause engine shutdown.

The governor shall be capable of parallel operation with other gensets within the power plant.

The governing requirements must comply with ISO 3046, class M2, the genset to comply with ISO 8528-5, class G2.

3.8.3 Engine combustion air system and Silencer

Exhaust gas driven turbochargers are to be provided. The turbocharger rotor shall be statically and dynamically balanced to ensure a smooth and vibration free operation.

The generator supplied must be weather and soundproof to meet noise level: 50Hz –85dBA @ 1m @80% Load. A 'critical grade' silencing is required.

3.8.4 Engine Fuel Oil System

Specification of Industrial Diesel Fuel available for use is as follows:

Characteristic	Clear and Bright at Ambient Temp	Test Method	Average of last 12 months
Colour	4.0 max.	D1500	2.0
Density @ 15°C (Kg /m³)	920 max.	D1298/D4052	851.0
Ash (% by mass)	0.01 max.	D482	< 0.01
Carbon residue	0.2 max.	D189/D4530	< 0.20
Cetane number	35 min.	D613	-
Cetane index	35 min.	D4737	54
Cold filter plugging point (°C)	11 max.	IP309	9
Flash point (°C)	65 min.	D93	80
Sulphur (% by mass)	1.0 max.	IP336	0.45
Water (% by volume)	0.1 max.	D95	0.07
Sediment (% by mass)	0.02 max.	D473	< 0.02
Viscosity @ 40°C (mm²/ s)	1.8 - 5.8	D445	3.1
Neutralisation Value (Strong Acid #) (MgKoH/g)	nil	D664/D974	nil
Conductivity @ 23°C (Ex refinery) (pS/m)	100 - 450	D2624	200
Conductivity @ 23°C (Within terminal) (pS/m)	70 - 450		-

3.8.4.1 The standby generator must have a day tank. Available runtime must be provided for 100% load condition with a full day tank. Available run time must be at least 8 Hours.

3.8.4.2 The fuel filters shall be capable of removing all foreign matter above a particle size of 5 microns and shall have a capacity sufficient to ensure 500 hours full load operation between servicing.

3.8.5 Engine Lubrication Oil System

a) The engine shall be equipped with a positive pressure forced-feed lubrication system to all moving parts of the engine. There shall be no moving part which requires manual lubrication whilst in operation. The engine lubricating oil system pressurising pump shall be attached to and driven from the engine. It shall be of the positive displacement type and shall be equipped

with a pressure relief valve (with provisions to adjust the pressure) to regulate oil pressure at the engine bearings and to prevent a build-up of excessive pressure within the system

b) Provisions to check the oil level with a graduated dipstick while engine is running should be provided.

c) If the engine sump is wet type a sump drain facility shall be provided with positive locking against accidental opening. A high and low oil level shall be provided on the oil sump to allow shutting down of generating set in case of very low oil level and very high oil level due to fuel or water leakage into oil sump.

d) The engine shall be fitted with full flow type lubricating oil filters. The Tenderer is required to specify the type of lubricating oil filter recommended with its economic justification. Mobil, Pacific Energy, and TOTAL presently provide lubrication oil in Fiji. Tenderer is asked to specify at least one type of recommended lubrication oil from each lube oil supplier.

3.8.6 Instruments & Protection

All engine sensors, gauges; automation/instrumentation shall be mounted/located in a manner allowing ease of access for service, testing, maintenance, troubleshooting and replacement of faulty components. Mounting of control panels and terminal boxes on the engine shall be extremely minimal and where it cannot be avoided, they shall be fitted with vibration mounts. Instrumentation and Control wires/cables as well as connection plugs and terminations to be used shall be double insulated and additional measures taken to avoid damage caused by excessive heat and vibration. Sufficient spare plugs, terminal lugs, and/or jackets shall be provided.

3.8.6.1 Local engine instrumentation should include at a minimum:

a) Lubricating oil temperature
b) Lubricating oil pressure
c) Coolant temperature
d) Water outlet pressure
e) Cylinder exhaust temperature.
f) Operating hours
g) System DC volts
h) AC Volts, phase, HZ
i) Indication to identify when the normal/mains source is supplying and one to indicate when the standby set is online. Also provide indication for both normal and standby source availability.

3.8.6.2 Engine shutdowns shall be required for:

a) Coolant Water outlet temperature high
b) Alternator bearing temperature high.
c) Engine lubricating oil pressure low.
d) Engine lubricating oil temperature high.
e) Radiator water level low
f) High oil sump level
g) Low oil sump level
h) Overspeed trip (Electrical, which shall be set lower than mechanical overspeed).
i) Electrical fault which is a group alarm for differential fault on the generator.
j) Emergency stop both local and remote.
k) Control supply failed.

l) Over Cranking

3.8.6.3 On the operation of any one of the above Protection:

a) The engine should shut down completely.
b) The generator circuit breaker should trip and display C/B open remote alarm.
c) Data logging with time sequence of all alarms.

To avoid the engine restarting when the trip is reset, the engine override shutdown timer should be locked out to the desired stop down time.

In addition, a provision must be available for remote engine shutdown as per above list.

3.8.7 Engine Protection (Electrical)

The engine shall be fitted with all protection devices necessary to ensure safe operation of the engine under the specified operating conditions. Such devices shall, where applicable, be integrated with other protection devices specified.

The following protection equipment is a minimum requirement. However, the tenderer shall also include any additional items deemed necessary to satisfy the requirements of this section.

a) Overspeed Trip
   - The engine shall be provided with an over-speed trip which shall operate independently of the normal speed governor and shall act directly upon the supply fuel to the engine. Operation of the over-speed trip shall also operate auxiliary contacts for the initiation of all alarms and for switchgear tripping
b) Low lubricating oil pressure shutdown
   - The engine shall be provided with a mechanically operated device which shall operate independently of normal speed governor and shall act directly upon the engine fuel supply. Operation of this trip shall also operate auxiliary contacts for the initiation of all alarms and for switchgear tripping. The setting pressure of the device shall be much lower than the electrically operated device but above the safe operational requirements.

c) High coolant temperature
d) Low coolant Level
e) Failure to start (over crank)
f) Emergency stop

3.8.8 Engine Crankcase Ventilation

The engines shall be equipped with an engine crankcase breather or condensation trap, together with associated electrics, valves and pipe work to effectively condense lubricating oil fumes so that no lubricating oil is discharged outside the power station.

3.8.9 Engine Exhaust System

The engine shall be provided with a residential exhaust system comprising steel exhaust piping, expansion bellows, exhaust silencers and all necessary hangers and supports for a horizontal mounted arrangement. The exhaust piping shall be of thick-walled steel sized in accordance with the engine manufacturer's requirements.

An exhaust extension piece must also be supplied to extend the exhaust line.

3.8.10 Engine Cooling System

a) The engine shall be water cooled. The radiators shall be engine mounted and cooling fan engine driven. The radiators shall be of the heavy duty and pressurised type protected for humid and salt air conditions and shall be designed with adequate core cooling capacity. The radiators shall have a cooling capacity under the specified site conditions of 40 ˚C, sufficient to adequately satisfy the cooling requirements of the diesel engine operating at 100% of continuous site rating. In the design of the radiator, an allowance of not less than 20% shall be made for reduction in heat transfer capacity by fouling. Sizing calculations are to be provided with engineering submittals. Coolant water conditioning system shall be provided to adequately maintain cool water chemistry.
b) A thermostatically controlled diverting device shall be installed in the cooling water circuit to maintain the temperature of the water entering the engine jacket at the required level and to facilitate rapid warming up of the engine during start up.
c) All rigid piping shall have provisions to absorb shock and vibration caused by the engine while running.

3.9 Automatic Voltage Regulator Panel

A separate free standing panel or a panel incorporate within the control panel with anti-vibration mountings to house a Thyristor divert Automatic Voltage Regulator (or manufacturers standard), with a field circuit breaker (if required) and associated instruments and indications as listed below are required:

a) Generator volts
b) Field volts
c) Divert current
d) Field current
e) Field circuit breaker trip indicator

Note: A separate field suppression switch will be required if an alternative Automatic Voltage Regulator is used. The Contractor will have to supply information on the type and make of the automatic voltage regulator and provide the installation details.

3.10 Alternator, Excitation and Changeover Switching

3.10.1 Alternator

a) The alternator shall be flexibly connected to the prime mover. The alternator covers and vent openings shall have screens to protect any foreign objects from entry. The main rotor shall be of a rotating field type fitted with damper windings and should be self-ventilated.
b) The alternator offered shall be suitable for parallel operation with other generators in the National grid. The phase rotation of the existing plant is Red, Yellow, Blue or A, B, C.
c) Windings shall be star connected with both ends of each winding brought out to separate terminals for external star connection for appropriate neutral earthing resistor and isolator. Suitably sized switchgear and resistor shall be provided. The Neutral earthing system supplied shall be designed in manner that overheating of the resistor or associated connection accessories due to harmonics or load unbalance is minimized.
d) Each phase winding shall incorporate positive temperature coefficient thermistor for over temperature detection

e) A terminal box shall be fitted to the stator frame to enclose the winding and thermistor terminals. The terminal box shall be suitable for right angle termination of main cables in the alternator on either side of the stator.
f) The alternator frame earthing shall be external to the terminal box or to a suitable location within stator frame.
g) The Stator and Rotor windings shall be insulated to Class F standard or higher.
h) The wave form of the output voltage shall be sinusoidal for the full range of loads and power factors and should comply to AS1359.The zero sequence reactance of the alternator shall not exceed 30%.
i) Winding temperature rise above reference conditions shall remain within the limits stated in AS1359 under specified load and a 1-hour overload condition. The rotor shall be statically balanced and remain in dynamic balance up to 125% of rated speed.

3.10.2 Excitation

If the alternator is provided with a direct coupled shunt wound exciter, adequate access to the brush gear for inspection and maintenance shall be provided.

A Brushless type excitation is preferred that is fitted with protection for the diodes. Diode failure indication shall be provided and the machine shall continue to operate in the event of a single diode failure. Excitation transformer shall be protected by fuse and located in the alternator pit. It may be oil or air insulated.

Preference will be given to a dynamic excitation system.

Windings shall be insulated to Class H standard or higher with tropicalization and antiabrasion.

Provisions for the connection of automatic field suppression shall be provided.

3.10.3 Voltage Regulation

a) The regulated voltage shall remain within ± 1.5% of the set value under all specified steady load conditions for frequencies between 46 and 54 hertz. The engine-generator shall be able to operate on-load without limitation on the above-specified frequencies as per condition specified in (d) below.
b) The output voltage shall be adjustable within ± 10% of nominal.
c) The regulated voltage shall be taken as the average of phase to neutral RMS voltages of the three windings excluding cases where the current ratio between highest and lowest phases exceeds 2:1.
d) Under the condition of sudden application of (Specify Maximum Allowed) xx% rated load or the removal of full load, the voltage shall remain within a minimum of ± 7% and a maximum of ± 10% of the set value with 99% recovery effected within 0.5 seconds and full recovery within 1 second for frequencies between 46 and 54 Hertz. Tenderer shall provide performance test results of proposed equipment impact loading/load rejection capability.
e) The Contractor could provide, if possible, a value better than the above voltage regulation.
f) The maximum deviation in voltage shall conform to the requirements of IEC34.
g) Additional manual field regulation shall be provided with the selector and controls mounted on the front of the AVR panel (if available).
h) Voltage regulation equipment shall be suitable for parallel operation of alternators in the Fiji National Grid.
i) Equivalent characteristics for voltage regulation must be provided with a clear statement describing the type of voltage regulation offered so that reactive power loading can be shared equally or as desired between the existing generators and the one offered.

j) Control, Protection and Monitoring requirements are specified elsewhere. Alternator output shall collapse on short circuiting the output terminals in a manner which operates the protection relays.
k) Set voltage shall be re-established within 2 seconds of removing the short circuit. The differences in phase to neutral voltages for an out of balance loading between any two phases should not exceed ± 2 1.5% of nominal voltage.
l) On start-up, with automatic voltage control on and with a resistive load of 30% rated capacity applied to the output voltage, regulation shall be achieved within 3 seconds of the genset reaching a shaft speed corresponding to 46 Hz.

3.11 Other Electrical Components

3.11.1 Design Standards for Electrical Plant

All electrical components shall be designed for continuous operation when the plant is operating at full rated output under the conditions specified. Design standard for electrical works shall be IEC

Except for the Alternator and Exciter, the electrical components and cables shall be selected such that, under full rated plant output, the current and voltage conditions for the components do not exceed 80% of the manufacturer's safe working rating.

The temperature rise of the air within the enclosed cubicles shall not exceed 30°C at the full rated output at the specified reference conditions. The IEC Wiring Regulations shall apply to all electrical works. All capacitors used, shall be designed to withstand 2.5 times the test voltage for 1 minute at its rated values. Electrolytic capacitors could only be used in printed circuit boards according to the design.

Note: Synchronising facilities for parallel operation of the generating plant should be provided with installation. Provision for generating plant to close on dead bus should be provided.

All circuit components shall have provisions for testing, fault tracing and shall have Test/Disconnect terminal blocks with relevant drawings.

3.12 Wiring, Cable and Connections

All wiring work shall be carried out neatly to the satisfaction of the Employer and in accordance with the SAA regulations or better.

Insulation shall be non-flammable, non-hygroscopic, fungus resistant and shall not be affected by normal plant operating temperatures or by oils and lubricants.

Insulation resistance shall not be less than 100 MΩ at a voltage which is the greater than 500 V dc or equivalent to a DC voltage equal to twice the peak working voltage.

Wiring for control and monitoring system shall be colour coded PVC insulated complete with wire numbers inserted and enclosed in "galvanised screwed conduits" terminating in terminal boxes. The connections should also be water tight.

3.12.1 Cable size

The minimum cable size shall be:

a) Control Wiring, 1.5 mm^2
b) Power Wiring, 2.5 mm^2

A copper Busbar or multi strand soft drawn copper cable shall be used where the cross-sectional area of conductor exceeds 95 mm^2.

Wiring terminations shall be identified according to the wiring diagrams and the conductors shall be securely clamped in approved terminal blocks by means of self-locking screwed clamps.

Any High voltage cables used shall be XLPE and armoured with steel wire.

3.12.2 Training

The contractor shall provide on-site training for up to 4 persons nominated by the Employer in the correct operation of plant installed for a period of one week prior to preliminary site testing of the gensets is completed. The tenderer shall include this training cost in their proposal.

Operating and Maintenance Manuals as specified shall be made available by the contractor before such training is commenced.

3.13 Testing and Commissioning

3.13.1 General Requirements

The Contractor shall be responsible for performing all required tests, including the provision of materials, test equipment, measuring equipment and any specific arrangements that may be deemed necessary by the Employer to achieve the testing required with the exception of the supply and cost of fuel, electricity and water required for site preliminary and acceptance tests. The required tests are specified in the following sections of this specification.

3.13.2 Factory Acceptance Test (FAT)

Factory acceptance tests shall be conducted on both sets tested on normal running conditions and stated running preferences.

The Factory Acceptance Test (FAT) is a process that evaluates the equipment during and after the assembly process by verifying that it is built and operating in accordance with design specifications. FAT ensures that the components and controls are working properly according to the functionality of the equipment itself.

The 2 generators shall not be shipped to Energy Fiji Limited until required factory testing are completed satisfactorily, all variances are resolved, full test documentation has been delivered to EFL and approval in writing given by EFL. Successful completion of the factory tests and the Employer (EFL) approval to ship shall in no way constitute final acceptance of the system or any portion thereof. These tests shall be carried out in the presence of the Employer's authorized representatives unless waived for witnessing by Employer.

The bidder prices shall factor all costs for the Factory Acceptance Testing, including all associated travel costs for two (2) engineers or representatives as nominated by the Employer.

3.13.3 The Testing programme shall generally consist of;

a) Tests prior to delivery to the site. Such tests are intended to ensure no faulty or unsuitable items are delivered to site.
b) Preliminary tests at site for individual and assembled components. Such tests shall demonstrate the ability of components to perform their designed function in accordance with the Specification and performance.

c) Commissioning tests on the completed installation. Such tests shall demonstrate that the performance of the installation that meets the Specification and guaranteed performances.

The sequence of tests shall be subject to the prior approval of the Employer. The proposed programme of tests shall be submitted to the Employer at least 6 weeks before the commencement of the commissioning tests. The Contractor shall perform any additional tests that the Employer may deem necessary to satisfy that the plant complies with the Specification.

All tests shall be performed in the presence of and to the satisfaction of the Employer or nominated representative. The limits of accuracy shall be as specified in ISO 3046/111.The results of all tests shall be recorded and certified by the Contractor and copies of the certified results delivered to the Employer within 2 weeks of the completion of the tests.

Defects revealed during testing shall be rectified at the Contractor's expense and the tests subsequently repeated until all defects are eliminated. Live load shall be available at the site to provide suitable loading conditions at the time of testing. The frequency of measurements proposed during the tests shall be subject to an agreement by the Employer in advance.

A regulatory certificate and approval required for the installation and equipment shall be obtained by the Contractor on the Employer's behalf and supplied to the Employer prior to operation of that equipment

3.13.4 The TEST for the generating plant shall comprise:

a) A general inspection of the equipment to check its compliance with the specified requirements.
b) Measurement of the cold resistance of the electrical windings.
c) Determination of the alternator opens circuit and short circuit characteristics.
d) Pre-starting and start-up procedures, alarm and shutdown tests, synchronising tests and engine compression tests.
e) A continuous trial sequence shall be performed on site.
    - 0.5 hour at 20% rated load
    - 0.5 hour at 30% rated load
    - 0.5 hour at 40% rated load
    - 0.5 hour at 50% rated load
    - 0.5 hour at 60% rated load
    - 2.5 hour at 70% rated load
    - 2.5 hour at 80% rated load
    - 2.5 hour at 90% rated load
    - 8 hours at 100% rated load
f) Generator Circuit Breaker Closer on Dead Bus and load up

At the above-mentioned loads, all the parameters listed in the local instrumentation and those in remote engine control panel shall be monitored. The accuracy of the measurements shall be as in ISO 3046. In addition, the specific fuel consumption and the specific lubricating oil consumption shall be calculated and provided with the tender document.

3.14 Commissioning Tests

3.14.1 The test shall consist of (if applicable):

a) Inspection and verification of the complete plant to determine the overall compliance, correctness of all adjustments and settings, operational suitability of the installation against

the specified requirements and shall include checking the tightness of all connections and fastening devices.

b) Verification of the correctness of operation of all protection devices and systems, including the related relative sensors settings. Induced faults imposed to simulate the responses shall be as close as possible to the actual fault conditions.
c) During the continuous trial the following parameters shall be measured at intervals not exceeding 30 minutes.
   (i) Alternator output, kW or kVA.
   (ii) Alternator output voltage
   (iii) Alternator output current and Temperatures
   (iv) Alternator output frequency
   (v) Power factor
   (vi) Exciter voltage
   (vii) Exciter current
   (viii) Engine parameters as specified
   (ix) Fuel consumption

d) Verification of the correctness of operation of all starting, synchronising, paralleling, stopping control systems and dead bus closing both automatic and manual.
e) Verification of compliance with the total harmonic distortions as specified.
f) Verification of specific fuel and specific lubricating oil consumption.
g) Verification of the operation of the changeover switching, both automatic and manual. The following must be confirmed:
   (i) On mains failure, supply be restored from the standby set
   (ii) Standby set is running and mains is restored
   (iii) Supply restored via mains, standby set goes in cool down mode
   (iv) Fail mains again and ensure standby set picks up from cool down mode

The Contractor shall carry out such further tests as the Employer may require to satisfy the Contractor's installation meets all the specified requirements.

If the condition of components inspected is considered unsatisfactory by the Employer, necessary remedial action shall be taken by the Contractor and the appropriate test repeated until satisfactory results are obtained. All such work shall be at the expense of the Contractor.

3.15 Service

The tenderer shall nominate the type and extent of the servicing facilities, the availability of spare parts, and numbers of field service engineers trained and certified to supervise service work on the engines offered.

The tenderer shall indicate the anticipated long-term availability of spare parts.

The Tenderer shall offer an extended 3,000 engine hour warranty or 12 months whichever occurs first for the engine and all auxiliary systems supplied.

3.16 Spare Parts

The tenderer shall provide a guarantee from the Manufacturers that all spare parts, materials and components used in all the equipment supplied in this tender shall be available for procurement for

a period of 10 years after the equipment has been successfully commissioned and accepted by the Employer.

4.0 Deliverables

4.1 Schedule 1 - Technical Particulars

1. Tender's **Name:**

_____

2. Diesel Generator Plants

2.1. Make of Engine/s _____

Type of Engine/s _____

Year of Manufacture _____

Make of Alternator _____

Type of Alternator _____

Rated Speed (rpm) _____

2.2. Engine/s manufactured by and Country _____

Alternator/s manufacture and Country _____

2.3. Continuous/standby rated output at Alternator terminals:

(i) ISO 3046/1 Conditions _____

(ii) At specified site conditions _____

3. Fuel Consumption Guarantee

(i) Based on fuel oil having a net calorific value of 42,700 kJ/kg and specific gravity of 0.84 at ISO 3046/1 conditions in kJ/kWhe, net plant:

% of Full Load	Specific Fuel Consumption in Kg/kwh electrical Output for fuel type specified
	Net kg/kWh measured at alternator terminals
75	
85	
100	

(ii) 0% Tolerance in above consumption at rated load per ISO 3046/1

4. Lubricating Oil Consumption Guarantee

(i) Lubricating oil consumption

% of Full Load	Specific Lubricating Oil Consumption Litres/kWh
100	

(ii) 0% Tolerance in above lube oil consumption at 100% load

5. Ancillary Power

The continuous/standby net site rating should be measured with all the electrical driven engine ancillaries and auxiliaries when the diesel generating plant is operating at maximum continuous rating.

6. Engine governor

(i) Manufacturer _____

(ii) Model _____

(iii) Type _____

(iv) Conforms to Class a Regulations [Yes / No]

If no, please specify _____

(v) Is the load control motor

24V dc, 3 wire system [Yes / No]

If no, please specify _____

7. Installation Data

(i) Overall Dimensions of the plant

Length _____ mm

Width _____ mm

Height _____ mm

(ii) Total weight of engine and alternator _____ kg

(iii) Minimum turning radius for the assembled plant _____ mm

(iv) Weight of heaviest part to be lifted for:

Installation _____ kg

Maintenance _____ kg

(v) Minimum recommended clear access space for operation and/or maintenance at:

Free end of engine _____ mm

Sides of plant _____ mm

Excitor end of plant _____ mm

(vi) Type of installation selected i.e. solidly mounted or with a combined under base: _____

8. Vibration Characteristics

8.1. Anti-Vibration Mounting (if applicable)

(i) Make and type _____

(ii) Number per genset _____

(iii) Isolation efficiency over a range of frequencies (%) _____

9. Diesel Engine

9.1. Specification

(i) Number of cylinders _____

(ii) Bore _____ mm

(iii) Stroke _____ mm

(iv) Speed _____ rpm

(v) Type of aspiration _____

(vi) I.S.O. Standard Power at ISO 3046/1 conditions (MW) _____

(vii) Recommended lubricating oil _____

(viii) Method of starting _____

10. Alternator

(i) Type _____

(ii) Make _____

(iii) Maximum continuous rating:

- _____ KW at U.PF
- _____ KW at 0.8 PF

(iv) Rated Voltage _____ KV

(v) Rated Frequency _____ Hz

(vi) Full rated load current_____Amps

(vii) State compliance to what Standard to which the alternator is made and tested

_____

(viii) Insulation class of:

- Rotor _____
- Stator _____

(ix) Temperature rise:

- At max continuous rating _____°C
- After 10% overload for one hour _____°C

(x) Efficiencies

% of Maximum Continuous Rating	Efficiency at Unity pf	Efficiency at 0.8 pf
100		
90		
80		
70		
60		
50		

(xi) Voltage wave form on open circuit:

- (Ph - Ph) _____ Volts
- (Ph - N) _____ Volts

Amplitude of 3rd Harmonics _____

Amplitude of 5th Harmonics _____

Amplitude of 7th Harmonics _____

Amplitude of 9th Harmonics _____

Amplitude of 11th Harmonics _____

Amplitude of 13th Harmonics _____

(xii) Inherent Regulation at rated voltage at:

- unity pf _____
- 0.8 pf _____

(xiii) Reactance

- Reactance at full rated voltage _____
- Leakage reactance XL _____

- Direct axis synchronous reactance Xd _____
- Quadrature axis synchronous reactance Xq _____
- Direct axis transient reactance X'd _____
- Direct axis sub-transient reactance X"d _____
- Quadrature axis sub-transient reactance X"q _____
- Negative phase sequence reactance X_2 _____
- Zero phase sequence reactance X_0 _____

(xiv) Time Constants

- Direct axis transient open circuit T'do _____
- Direct axis transient short circuit T'd _____
- Direct axis transient sub transient short circuit T"d _____

(xv) Characteristic Curves

Tenderer to enclose following:

1) Manufacturer's Generator Characteristic Curves showing:
   a. Open Circuit Saturation
   b. Short Circuit Saturation
   c. Air Gap Line
   d. Rated Current Saturation at 0.8 pf
2) V-Curves at rated voltage
3) Capability Curves at rated voltage.

(xvi) Characteristic Curves

(xvii) Excitation current at max continuous generator output amps

(xviii) Type and make of stator winding temperature monitoring device

- Range _____°C to _____°C
- Accuracy ± _____°C

11. Excitor

(i) Make and type _____

(ii) Type of Enclosure _____

(iii) Rated output _____ Amps _____Volts

(iv) Maximum voltage _____

(v) Class of Insulation _____

(vi) Alternator Noise

Frequency Hz	163	125	250	500	1000	2000	4000	8000	**Total**
Sound dB(A)									

(vii) Excitor winding Temperature rise at maximum continuous rating _____°C

12. Automatic Voltage Regulator

(i) Make and type _____

(ii) Regulated voltage range under all specified steady load conditions for frequencies between 46 and 54 hertz. _____ to _____ volts.

(iii) Does the voltage remain within a minimum of ± 7% and a maximum of ± 10% of the set value with 99% recovery effected within 0.5 seconds and full recovery within 1 second with a sudden application of 60% of full load. [Yes / No]

If No, please specify _____

(v) Does the voltage remain within a minimum of ± 7% and a maximum of ± 10% of the set value with 99% recovery effected within 0.5 seconds and full recovery within 1 second with a sudden removal of 100% load. [Yes / No]

If No, please specify _____

(vi) Does the maximum deviation in voltage conform to the requirements of AS1359.
[Yes / No]
If No, please specify _____

(vii) Is a manual field regulation provided with the selector and controls mounted on the front of the AVR panel.
[Yes / No]
If No, please specify _____

(viii) Is voltage regulation equipment suitable for parallel operation of alternators
[Yes / No]
If No, please specify _____

(ix) Does the regulation equipment have the following:

- Droop adjustment [Yes / No]
- Voltage level adjustment [Yes / No]
- Gain setting control [Yes / No]
- Stabilising quality control [Yes / No]

(iv) Does the alternator output collapse on short circuiting the output terminals in a manner which operates the over current, differential, reverse power and earth fault protection relays.

[Yes / No]

(v) Can the Set voltage be re-established within 2 seconds of removing the short circuit (as in 7.0 I above).

[Yes / No]

(vi) What is the percentage difference in phase to neutral voltage for an out of balance loading between any two phases: ± _____ % of nominal voltage.

(vii) Can voltage regulation be achieved within 3 seconds of the genset reaching a shaft speed corresponding to 46 Hz upon starting with a resistive load of 30%?

[Yes / No]

If No, please specify _____

13. Engine Protection Devices

(i) Are there any provisions for the termination of remote alarms for:

- Low lubricating oil pressure [Yes / No]
- Low fuel pressure [Yes / No]
- High Cooling water temperature [Yes / No]
- High Lubricating oil temperature [Yes / No]
- Engine overspeed [Yes / No]
- High & low sump level [Yes / No]

14. Instrumentation

(i) Are the following Engine monitoring provided at the engine control and alarm panel:

- Cooling water pressure inlet [Yes / No]
- Cooling water temperature inlet [Yes / No]

- Lube oil pressure [Yes / No]
- Lube oil temperature inlet [Yes / No]
- Engine speed indicator [Yes / No]
- Alternator Winding temperature with switch [Yes / No]
- Alternator hot air temperature [Yes / No]
- Cylinder Exhaust temperature [Yes / No]

(ii) Are the following Alternator monitoring parameters provided at the engine common control desk and for remote metering:

- Generator MW [Yes / No]
- Generator Mar [Yes / No]
- Generator Field current [Yes / No]
- Generator Output Volts [Yes / No]
- Generator Output Amps [Yes / No]
- Generator Output Power Factor [Yes / No]
- Generator Output Frequency [Yes / No]

15. Engine Starting System

(i) Type of engine starting system together with any technical advantages.

_____

_____

16. Turbocharger

(i) Make _____

(ii) Type _____

(iii) Maximum speed _____ rpm

(iv) Maximum operating temperature _____ °C

(v) Boost pressure ratio _____kPa

(vi) Type of vibration level monitoring device provided _____

_____

17. Air Intake System

(i) Air Intake Filter

- Make and type _____
- Smallest particle allowed to pass through the filter _____ microns
- Pressure loss across filter _____ kPa
- Is a Service Indicator provided [Yes / No]

18. Fuel System

(i) Fuel Water/Separator

- Make and model_____
- Efficiency _____ %

(ii) Fuel Flow Meter

- Make and model _____
- Flow rate range _____ to _____ m/s
- Pressure drop across the flow meter at engine full rated load _____ kPa
- Accuracy of flow meter ± _____ %

(iii) Engine Fuel Supply Filter (Primary/Secondary)

- Make and Type _____
- Pressure drop across filter at engine full rated load _____ kPa
- Degree filtration _____ microns
- Are service indicators provided [Yes / No]

19. Lubricating Oil System

(i) Type of Engine Lubricating Oil _____

(ii) Are Full Flow Lubricating Oil Filters provided [Yes / No]

- Degree of filtration _____ microns

(iii) Are Bypass Lubricating Oil Filters provided [Yes / No]

- Degree of filtration _____ microns
- Are differential pressure gauges provided [Yes / No]
- Is there any provision to extend the differential pressure set points to the engine common alarm panel [Yes / No]

20. Engine Exhaust System

(i) Silencers attenuation rating _____dBA

- Temperature Monitoring Unit_____
- Make and Type _____

- Range _____ to _____ °C
- Accuracy ± _____%

21. Engine Crankcase Extraction

(i) Are there any local Crankcase pressure indicators [Yes / No]

(ii) What are the safety devices for preventing a build-up of excessive crankcase pressure.

_____

_____

22. Engine Cooling System

(i) Engine Cooling Radiator

- Type _____
- System pressure _____ KPa

4.2 Schedule 2 - Parts

The tenderer shall list below the spare parts which he would recommend should be stored at the facility to ensure 10 years of operation and servicing, at 8,000 hours per year at 90% load for the gensets and auxiliary equipment offered for mechanical, electrical and electronic systems in the tender.

Description of Item	Unit	Recommended Qty	Rate ExW	Total Cost

4.3 Schedule 3 - Special Tools Etc.

The tenderer shall list full details of all special tools, fixtures, appliances or test equipment required to operate, service and maintain the gensets and auxiliary equipment offered (mechanical, electrical and electronic systems in the tender) over the 8,000hour service life listed above.

Item (Tool etc)	Function

4.4 Schedule 4 – Deviations

The tenderer shall list below all deviations from the specifications and tender document.

Where no such deviation from specification is listed, full compliance with specification will be required.

Description of Item	Unit	Recommended Qty	Rate ExW	Total Cost

Specification Clause #	Deviation	Justification

4.5 Schedule 5 - Overhaul and Expected Life Time of Components

Component	Time Between Overhauls Hours	Expected Life Time Hours
Piston		
Cylinder Liner		
Cylinder Head		
Inlet Valve		
Exhaust Valve		
Injector Nozzle		
Injector Pump		
Main Bearing		
Large End Bearing		
Turbocharger		
(Addition Parts)…		

4.6 Schedule 6 - Maintenance Schedule in Terms of Machine Hours

Provide a detailed maintenance program in terms of machine operating hours, indicating when servicing and replacing of parts is required along with expected labour hours for each task. The schedule should include the spare parts that are anticipated to be replaced, time required to carry out the task and the manpower requirements. Assume 90% loading, 8,000 hours per year operation over a 5-year time period. All spare parts prices should be for new parts, delivered EX Works. If a remanufactured parts program is available, separate alternative life cycle costs schedules should be provided along with clear conditions/terms/warranty for remanufactured components.

4.7 Schedule 7 - Price Schedule

Supply of 1 x 350KW Canopy type Standby Rating Generator for EFL's Navutu Power Station

	Description	Total: $ (VEP) Currency: ____
1	1x **350MWe Standby Rating** Canopy type generating set with all auxiliaries; • Generator:_____ • Generator Circuit Breaker • Automatic Transfer Switch (ATS) • Exhaust extension piece	
2	Freight, transportation cost, Insurance, Delivered Duty Delivery Location: _____	
3	Three sets of Hardcopy & One Softcopy for Spare parts manuals, Operation & Maintenance manuals, drawings, design & technical information required for site installation, software, and other documentation as per tender	
4	One set of diagnostics software with required equipment e.g. Laptop, connecting cables	
5	Factory Acceptance Test Report Only	
	TOTAL (VEP)	
5	Commissioning works	
6	Training for Operators	
	TOTAL (VEP)	
8	Warranty Duration	
	TOTAL (VEP)	

Please specify currency (FJD, USD, AUD, NZD)

Notes:

1. Technical;
    a. The bids must as per the Technical Specifications in the Tender Documents. Bids that do not conform to the technical Specification will be disqualified

   b. Tenderers shall provide proof of successful completion within the stipulated delivery period of similar contracts undertaken in the past.
   c. Documentary evidence to prove that the items offered comply with the Technical Specification must be provided.
   d. Contractor to verify all drawing measurements onsite.
   e. The Supplier/ Contractor shall provide a warrant for Goods or services for provided unless stated otherwise.
   f. EFL's Engineer or his representative shall have the right to inspect and/or to witness test the Goods at the factory or place of manufacture, for their conformity to the specifications
   g. The Goods supplied under this Contract shall conform to the standards mentioned in the Technical Specifications

2. Financial;
   a. In case of discrepancy between unit and total cost, the unit cost shall prevail
   b. Any advance payment will require a bank guarantee. And this added cost will be beared by bidder
   c. The currency used in the tender bid prices must be indicated in the tender bid
   d. Prices shall be fixed during the Supplier's performance of the Contract and not subject to variation on any account.
   e. EFL financial terms are applicable for these works.
   f. For Foreign Supplier, any On-Shore work with incur a withholding Tax of 15% e.g. commissioning, training etc.
3. EFL Energy Fiji Limited uses Federation Internationale Des Ingenieurs Conseil (FIDIC) Contract template. General conditions of this contract shall be governed by it.
4. Failure to submit required documents may affect bid compliance. Failure to submit mandatory items as stated in Compliance Checklist will result in non-compliance.
5. Contractor shall provide all materials, tools equipment and labour necessary to perform works.
6. A detailed work plan to be provided with expected date for the works.
7. Installation & Commissioning works must incorporate all cost incur for this activity e.g. travel, accommodation, visa etc.
8. All Sub-contractors to be used for any part of the works are to be declared.
9. Factory Acceptance Test (FAT); All cost will be beared by bidder/supplier.

4.8 Schedule 8 - Compliance Checklist Declaration

I_____ of _____ located at _____ confirm that the bid submitted for the following tender MR 204/2020 : Supply of 1 x 350KW Canopy type Standby Rating Generator for EFL's Navutu Power Station bid complies to the mandatory bidder submission as stated in Sub Clause 2.6;

	Yes	No	Comments
All Deliverable Schedules			
Company Profile			
Detailed Scope of Work/Supply			
Statement of Exclusion or Amendment for Tender Specification (if Any)			
Program [preferred Gantt Chart]			
Shipping Term (if Applicable)			
Payment Term			
Price Validity [preferred 60 days]			
Engine Specification			
Generator Specification			
Breaker Specification			
Engine Country of Origin			
Standard Planning Data for Synchronous Generators in Appendix E.1			

Scope of Supply;

	Yes	No	Comments
Generator as per spec			
Synchronizer with a Generator Circuit Breaker			
Automatic Transfer Switch (ATS)			
Warranty			

Note that these submissions are mandatory submission for a successful tender bid. This declaration must be signed and submit as well.

Name: _____

Position: _____

Company: _____

Sign Off: _____

Date: _____

4.9 Schedule 9 - Tender Check List

(To be filled and accompanied with the tender Proposals/Documents)

Tender Specification Form **Tender Number: _____**

Tender invitation and acceptance Term & condition of the Tender

The following information has to be filled by the bidder and submitted with the tender Documents:

1. Company Name: _____
2. Director/Owner(s): _____
3. Postal Address: _____
4. Phone Number: _____
5. Fax Number: _____
6. Office Location: _____
7. Tin Number: _____
8. Company Registration Number: _____
9. FNPF Employer Registration Number: _____
10. Number of Branches & Locations: _____
11. Years of Experience: _____

I declare that all the above information is correct.

Name: _____ Position: _____ Sign: _____

Date: _____

5.0 Appendix

6.0 Tender Form

To: Bobby Naimawi
Chief Finance Officer
2 Marlow Street,
Suva, Fiji
Phone: +679 3224 185
Email: BobbyN@efl.com.fj

Sir,

1. Having examined the Tender Document, the receipt of which is hereby duly acknowledged, we, the undersigned, offer to supply ……..
(Description of Goods) in conformity with the said Tender Document for the sum ……..……
…….. *(total tender amount in words and figures)* or such other sums as may be ascertained in accordance with the Schedule of Prices attached herewith and made part of this Tender.

2. We undertake, if our Tender is accepted, to deliver the Goods in accordance with the delivery schedule specified in the Schedule of Requirements.

4 We agree to abide by this Tender for a period of 90days from the date fixed for Tender opening under Clause 19 of the Instructions to Tenderers, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

5. Until a formal Contract is prepared and executed, this Tender, together with your written acceptance thereof and your notification of award, shall constitute a binding Contract between us.

6. We understand that you are not bound to accept the lowest or any Tender you may receive.

Dated this: _____ day of _____ 201_.

[Signature] [In the capacity of]

Duly authorized to sign Tender for and on behalf of

TENDER SUBMISSION CHECK LIST

The Bidders must ensure that the details and documentation mention below must submitted as part of their tender Bid

Tender Number _____

Tender Name _____

1. Full Company Name: _____

(Attach copy of Registration Certificate)

2. Director/Owner(s): _____
3. Postal Address: _____
4. Phone Contact: _____
5. Fax Number: _____
6. Email address: _____
7. Office Location: _____
8. TIN Number: _____
(Attach copy of the VAT/TIN Registration Certificate - Local Bidders Only)
9. Company Registration Number: _____
(Attach copy of the Business License)
10. FNPF Employer Registration Number: _____
(For Local Bidders only)
11. Contact Person: _____

I declare that all the above information is correct.

Name: _____

Position: _____

Sign: _____ Date: _____

7.0 Tender Submission - Instruction to bidders

It is mandatory for Bidders to upload a copy of their bid in the TENDER LINK Electronic Tender Box no later than 4.00pm (**1600hrs Fiji Time) Wednesday 30th September, 2020.**

To register your interest and tender a response, view 'Current Tenders' at: **https://www.tenderlink.com/efl**

For further information contact The Secretary Tender Committee, by e-mail **JReddy@efl.com.fj**

In additional, hard copies of the tender, one original and one copy must be deposited in the tender box located at the EFL Head Office, 2 Marlow Street, Suva, Fiji no later than Wednesday 30th September, 2020 to be inserted - Addressed as

Tender – MR 204/2020 – Supply of 1 x 350KW Standby Rating Generator for EFL's Navutu Depot, Lautoka

The Secretary Tender Committee

Energy Fiji Limited

Head Office

Suva

Fiji

Hard copies of the Tender bid will be accepted after the closing date and time provided a soft copy is uploaded in the e-Tender Box and it is dispatched before the closing date and time.

Tenders received after **closing time 4.00pm (1600hrs Fiji Time) Wednesday 30th September, 2020.**

- Will not be considered.

- Lowest bid will not necessarily be accepted as successful bid.

It is the responsibility of the bidder to pay courier chargers and all other cost associated with the delivery of the hard copy of the Tender submission.

The Tender Bids particularly the "Price" must be typed and not hand written.

(Tender Submission via email or fax will not be accepted)