

RURAL ELECTRIFICATION FUND



Supply and delivery of Solar Mini-grid equipment for
sixteen(16) rural sites

INTERNATIONAL COMPETITIVE TENDER

TENDER NUMBER:	REF/INTER/09/05/2022
CLOSING DATE:	28 JUNE 2022
CLOSING TIME:	1000HOURS
DATE OF ADVERT	27 MAY 2022
REFUNDABLE TENDER FEE:	FREE

SUBMISSION OF BIDS/TENDERS

All bids/tenders must be deposited in the Tender Box located at:

Rural Electrification Fund
Room 713 7th Floor, Megawatt House
44 Samora Machel Avenue
HARARE
ZIMBABWE

RURAL ELECTRIFICATION FUND



DECLARATION BY THE ACCOUNTING OFFICER IN TERMS OF SECTION 19(2)(C) OF THE PUBLIC PROCUREMENT AND DISPOSAL OF PUBLIC ASSETS REGULATIONS, 2018.

TENDER NUMBER: REF/INTER/09/05/2022

TENDER DESCRIPTION- Supply and delivery of Solar Mini-grid equipment for sixteen(16) rural sites

DECLARATION

The procurement for the tendered services is based on neutral and fair technical requirements and bidder qualifications.

Signed

.....
J.V MASHAMBA
CHIEF EXECUTIVE OFFICER

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1.0 SCOPE OF SUPPLIES

This document is a Bidding Document (BD) for the Supply, delivery and supervision of the installation process of Solar equipment for solar mini-grids as specified in the Technical Specifications section of this document. The procurement for the tendered services is based on neutral and fair technical requirements and bidder qualifications. The Lots or sites as follows:

SOLAR PROJECTS SITES				
Lot No	Project Name	PROVINCE	DISTRICT	SIZE OF PLANT
1	Chikwizi Primary School	Manicaland	Chimanimani	10kW
2	Musiyabako Primary School	Manicaland	Mutare	10kW
3	Chibeta Prim, Sec	Mashonaland East	Mutoko	15kW
4	Chidye Prim, Sec, Clinic	Mashonaland East	Mutoko	15KW
5	Moyomusande Primary School	Mashonaland West	Sanyati	10kW
6	Kuwirirana Primary School	Mashonaland West	Mhondoro	10kW
7	Ganganyama Primary School	Mashonaland Central	Rushinga	10kw
8	Maparepare Prim Sc	Mashonaland Central	Rushinga	10kw
9	Dende Primary and Secondary	Midlands	Gokwe North	15kW
10	Manyoni Prim and Secondary School	Midlands	Gokwe South	15kW
11	Davhata Prim, Sec, Clinic	Masvingo	Chiredzi	15kw
12	Chinyika Prim, Sec, Clinic	Masvingo	Bikita	15kw
13	Zindele Primary School	Matebeleland South	Gwanda	10kW
14	Mthangala Primary School	Matebeleland South	Insiza	10kW
15	Siamupa Primary School	Matebeleland North	Binga	10kW
16	Sebhewule Primary School	Matebeleland North	Tsholotsho	10kW

2.0. TERMS AND CONDITIONS TO BE OBSERVED IN TENDERING

2.1 Terms and conditions

The tender and any contract shall be governed by the Public Procurement and Disposal of Public Assets Act (Cap 22:23) and the Public Procurement and Disposal of Public Assets Regulations, 2018. Orders will be placed by and/or contracts entered into by and between the Rural Electrification Fund (REF) and the successful bidder after approval of the tender in whole or in part by Rural Electrification Fund (REF). REF shall not accept any liability for any order/contract(s) which does not bear the authentic signature of anyone of the authorized signatories at the time of placement of the order/contract. The authorized signatories are the Executive Director Finance, and the Chief Executive.

The Tenderer must acquaint himself/herself with the “**Terms and conditions to be observed in tendering**”. The Purchaser shall not be responsible for any misunderstanding of incorrect information however obtained except information given in writing by the Purchaser.

2.2 Cost of Tender

Bidders shall bear all costs associated with the preparation and submission of their bids.
REF will be not responsible or liable for any such costs incurred by the bidders, regardless of the outcome of the Tender Process.

2.3 Tender Documents

Suppliers are expected to examine carefully the whole tender document. Failure to furnish all the information required in the bid document or submission of Tender not substantially responsive to the said document in every respect will be at the Supplier’s risk and may result in rejection of the bid.

2.4 Tender Queries and Clarifications

All queries regarding the tender shall be forwarded by the bidding company in writing on duly signed company letterhead by hand to Rural Electrification Fund 7th Floor, Megawatt House, 44 Samora Machel Avenue, Harare, Zimbabwe, not later than four (4) calendar days from the closing date of the tender. Clarifications pertaining to the queries received shall be forwarded to all prospective Tenderers not later than three (3) calendar days from the date the query was received. If a prospective tenderer sends a query less than the stated days above, the query shall not be responded. Any neglect, delay or failure on the part of the Tenderer to obtain additional information on the above or any other matters, which the tenderer considers necessary, shall not relieve him/her from responsibility as a Tenderer.

2.5 Tender Responses

Suppliers wishing to respond to the tender must submit three(3) copies of bid documents only. The bids must be clearly marked. The bids must be in sealed envelopes and deposited in the Tender Box situated at:

Rural Electrification Fund
Room 713 7th Floor, Megawatt House
44 Samora Machel Avenue
Harare
Zimbabwe

By not later than 10.00am on the advertised closing date. Prospective suppliers may attend the opening of tender at Megawatt House, 7th Floor on the above closing date and time.

2.6 Amendment of Tender Documents

At any time prior to the deadline for the submission of the tenders, Rural Electrification Fund may for any reason whether at its own initiative or response to a clarification requested by a prospective supplier modify the tender document by amendment(s). Such amendment(s) will be notified in writing or by e-mail to all prospective suppliers, who have purchased the tender documents and these amendments will be binding on them.

In order to afford the supplier reasonable time in which to take the amendment(s) into account in preparing their tenders, Rural Electrification Fund may, extend the deadline for submission of tenders.

2.7 Language

The tenders and all relevant correspondence and documents exchanged between the Seller and Purchaser shall be written in English language.

2.8 Tender Validity Period

Tender validity period is the **period** in course of which the supplier is bound by the **tender**, in relation to its content and conditions offered (price, execution time, guarantee, etc). Tender prices shall remain valid and fixed for a minimum of ninety (90) days period after the deadline from the date of submission of the tender. Bidders must state clearly in writing the price validity of their bid document.

2.9 Payment Terms and Conditions

Rural Electrification Fund(REF) shall pay the winning bidder in ZW\$ (**Zimbabwe local currency**). Any other payment terms and conditions resulting in REF paying a deposit or advancing payment such bidders must state ability to secure a bank guarantee from a registered commercial bank acceptable to REF equal to the amount to be advanced. The bank guarantee must be provided within two weeks of contract signing. Bidders are therefore requested to clearly state payment terms and conditions in the bid document.

2.10 Errors of Extension or addition

The Rural Electrification Fund reserves the right to adjust arithmetical in the bid total price. Any adjustments made by the Rural Electrification Fund to a bid total price will be stated to the bidder prior to the acceptance of the bid, and will be made on the basis that the unit price is taken as correct and all extensions and additions will be adjusted accordingly.

In such cases the effect will be that the total amount of the bid will be altered so that this amount agrees with the amount arrived at after the errors of extension or additions have been corrected

2.11 Penalties/Liquidated damages

The purchaser shall without prejudice to its other remedies under the contract, deduct from the contract price, as liquidated damages, sum equivalent to 0.5% of contract price of the delayed service delivery for each week of delay until actual delivery, up to a maximum of 10% of the tender sum.

2.12 Delivery Period

The successful bidder is expected to deliver the goods within the delivery period stated in the bid document from the date of the Purchase Order or signing of agreement. The delivery period must be stated in weeks.

REF reserves the right to reject any deliveries, submissions or items that do not meet the specifications provided in this tender.

2.13 Company Profile

The company profile to include financial details such as Banking Institution Name; Bank Key: Branch; Town/City; Bank Account Number; Type of Account; Account Holder Name; and Sort/Swift Code. VAT registered companies to provide vat number. Provide full name of a person who is authorized to sign for and behalf of the company, cell phone number, email and physical address.

2.14 Bid Preparation

The bid shall be prepared in typewritten indelible ink. Bids must be properly spirally bound. A clearly labeled table of contents with correct page numbers or index must be provided on the second page of the bid document. Company name, tender number, tender description, closing date must be displayed on the cover page of the bid document. ALL HAND WRITTEN BIDS SHALL BE REJECTED AS NON-COMPLIANT.

2.15. Bid Bond/Security

The Bid bond for this tender shall be RTGS\$500,000.00.00(local bidders) and payable using the following options (S.I 5 of 2018 section 26).Please note that foreign bidders must provide the bid bond of equivalent value in the currency of their bid.

Option 1

A certified bank cheque; or

Option 2

A bank guarantee; or

Option 3

A cash deposit to Procurement Regulatory Authority of Zimbabwe (PRAZ)

NB: If Option 3 is chosen please note that the Tenderer must pay a non-refundable Bid Bond/Bid security establishment fee equivalent to ZW\$60,000.00(local bidders) and USD750.00 (Foreign bidders) to the Procurement Regulatory Authority of Zimbabwe in line with S.I. 299 of 2021 PART V item 4.

Any bid not accompanied by a Bid Security or Bid Securing Declaration, where this is a requirement of bidding, will be rejected by the Procuring Entity as non-responsive.

2.16 Administration Fees for Special Oversight Committee(SPOC)

The tender is subject to review by Special Oversight Committee (SPOC)in terms of section 54 of the Public Procurement and Disposal of Public Assets Act. Accordingly, Bidders should pay a non-refundable administration fee of **ZW\$30,000.00** payable to the Procurement Regulatory Authority of Zimbabwe. Proof of payment must be

submitted together with the Bid documents. Foreign bidders shall pay a non refundable fee of **USD\$400.00** accordingly.

2.17 Contract Administration Fee Payable by the Contractors

Bidders are advised that the winning bidder shall be required to pay contract administration fees in line with S.I 219 of 2020 Part VI. **Bidders are encouraged to determine the applicable fees before submission of bids.**

2.18 Companies owned by same person

No bidder may submit more than one bid, either individually or as a joint venture partner in another bid, except as a subcontractor and a conflict of interest will be deemed to arise if bids are received from more than one bidder owned, directly or indirectly, by the same person. REF shall disqualify both bids in case of such a conflict of interest.

3.0. EVALUATION CRITERIA

The evaluation criteria of the tender shall include the below listed requirements. Bidders who fail to comply with any of the clauses below may be disqualified from the tender as their bid will not be compliant.

3.1 Compliance to technical specifications- Bidders must complete the tables provided under the technical specifications clause without fail. Bids without completed or incorrectly completed technical tables will be rejected as non-compliant.

3.2 Bidders must attach the following company documents without fail:

- A Certificate of Incorporation - in terms of the Companies Act (Chapter 24:03).
- or equivalent registration document in country of residence.
- CR14- indicating names and addresses of the directors and their shareholding Structure.
- CR 6 Form -principal place of business
- Proof of registration with Zimbabwe Revenue Authority (ZIMRA) - in the form of a valid current tax clearance certificate ITF 263 and VAT registered companies in addition to submit VAT Certificate.
- Proof of current registration/clearance with National Social Security Authority(NSSA).

3.3 Price-Bidders MUST use the pricing format below.
Failure to use the correct pricing format may lead to disqualification:

SUMMARY PRICING TABLE

Lot No	Province	Site Name	Unit Price VAT Excl USD\$	VAT USD\$ Incl	Total VAT USD\$ Incl
1	xxxxxxxx	Xxxxxxxxx			
2	xxxxxxxx	Xxxxxxxxx			
3	xxxxxxxx	Xxxxxxxxx			
4	xxxxxxxx	Xxxxxxxxx			
5	xxxxxxxx	Xxxxxxxxx			
GRAND TOTAL					XXXXXXX

PRICING PER SYSTEM - Each bid must have clear itemized pricing as shown on the table below without fail. Bids without the pricing format below may be rejected as non-compliant.

NO:1-ITEMISED PRICING SCHEDULE FOR A 10KW SYSTEM

DESCRIPTION OF COMPONENTS QUOTED. (Bidders must clearly state the cost of components)	QTY (each)	Unit Price VAT Excl USD	VAT USD\$ Incl	Total price Incl ZW\$
Xxxxxxxxx				
Xxxxxxxxx				
Xxxxxxxxx				
Grand total				Xxxxxxxxxxxxxx

NO:2-ITEMISED PRICING SCHEDULE FOR A 15KW SYSTEM

DESCRIPTION OF COMPONENTS QUOTED. (Bidders must clearly state the cost of components)	QTY (each)	Unit Price VAT Excl USD	VAT USD\$ Incl	Total price Incl ZW\$
Xxxxxxxxx				
Xxxxxxxxx				
Xxxxxxxxx				
Grand Total				

- Payment shall be strictly in local currency at the prevailing exchange rate. REF shall use the RBZ exchange rate(mid-rate) when making payments.
 - **The bid price should clearly and separately show the unit price and the total price of the equipment to be supplied.**
 - Bidders must be bid for all the lots only.
 - The USD\$ prices shall be used for purposes of tender evaluation.
 - Bidders MUST state clearly whether they charge VAT or not.
- 3.4. Payment terms- REF prefers payment after delivery, however where a bidder require pre-delivery payment they must state ability to secure a bank guarantee from a registered commercial bank acceptable to REF equal to the amount to be advanced. The bank guarantee must be provided within two weeks of contract signing. NOTE: Foreign bidders must provide a bank guarantee confirmed and backed by any local commercial banks or provide a bank guarantee issued by any local banks.
- 3.5. The bid prices must be quoted Delivered Duty Paid DDP (2020),that means including the cost and risk of freight and all import costs until delivery. Bidders must state that the bid price is DDP(2020). The supplier shall deliver the equipment to REF Central stores located at number 22A James Martin Road Lochinvar Harare, Zimbabwe.
- 3.6 Training-The winning bidder is required to train REF staff on system installation,operation and mantainance.The training shall take place in Harare at a site to be selected. REF shall meet the costs of the venue. Bidder must state that they shall train REF staff on system installation,operation and mantainance without fail.
- 3.7Reference letters- The bidder must provide three reference letters for (3) similar projects they did in the last five (5) years. At least 1 of the project should be in Zimbabwe, References more than five (5) years old will be rejected.**The reference letters must therefore clearly state the size of the solar systems installed.**
- 3.8 Proof of quality certification(ISO)- the solar equipment must be manufactured by internationally recognized quality certification organization. Attach proof of the quality certification for the manufacturer of the equipment.
- 3.9 Letter of agency-Bidders must attach a letter of agency issued by the manufacturer or principal distributor of the solar equipment without fail.
- 3.10 Bidders must be registered with the Procurement Regulatory Authority of Zimbabwe (PRAZ) - Bidders must attach proof of registration with PRAZ on the list for engineering or consultancy services. In case tender is awarded to foreign bidders who are not PRAZ registered, such bidders shall be required to register with PRAZ before contract signature.
- 3.11 REF reserves the right to amend tender/contract scope at the evaluation stage in line with budget resources available.

- 3.12 Bidders must state the required payment terms. REF favors payment after delivery, however where bidders require pre-delivery payment they must state ability to secure a bank guarantee from a registered commercial bank acceptable to REF equal to the amount to be advanced. The bank guarantee must be provided within two weeks of contract signing.
- 3.13 Delivery period- the maximum delivery period for the equipment is **12 weeks**. Bidders must state a delivery period accordingly.
- 3.14 Compulsory Site Visit- there is no site visit scheduled for this tender.
- 3.15 Bidders must STATE that they are prepared to accept payment in local currency only (ZW\$). Bidders must provide their local bank account details without fail.
- 3.16 Bidders MUST clearly state in their bids that they have checked that the goods tendered “fall” or “do not fall” under the Consignment Based Conformity Assessment (CBCA) programme as required by the Government of Zimbabwe. If the goods tendered “fall” under the CBCA programme, bidders must further state that all costs associated with this requirement will be to the supplier’s account.
- 3.17 Compliance with SPOC administration fees-Bidders must attach proof of payment for SPOC administration fees as per clause 2.16 of the Bidding Document(BD).
- 3.18 Bid bond compliance-Bidders must attach proof of bid bond compliance as per clause 2.15 of the Bidding Document without fail.
- 3.19 Bid validity of a minimum of 90 days is required and must be clearly stated.
- 3.20 Warranty period-Bidders must state a warranty period of 12months against manufacturer’s defects for all equipment.
- 3.21 REF reserves the right to reject any deliveries that do not comply with the tender specifications at the point of delivery.
- 3.22 Tenders must be submitted in three (3) copies and the ORIGINAL” copy must be clearly marked.
- 3.23 The Bidders must submit the bid with a duly filled in and signed Declaration on Non-Engagement in Corrupt or Fraudulent Practices Form APPENDIX 6.Bidders shall complete this form in ink only.
- 3.24 The bidder must submit with the bid a duly filled in and signed attached Form of Tender Annexure 3. Bidders shall complete this form in ink only.

4.0 FINANCIAL INFORMATION

All prices must be inclusive of all costs required in the implementation of this tender. The delivery address is: REF Central stores located at number 22A James Martin Road Lochinvar Harare, Zimbabwe.

All VAT registered supplier must show VAT separately in their bid. All equipment necessary for the execution of the tender is to bidders account.

5.0 TENDER AWARD CRITERIA

Tender shall be awarded to the lowest priced bidder to specification for all the lots. This means the tender shall be awarded to a sole bidder with the lowest total price to specifications for all the lots. This is meant to ensure standardization of equipment supplied.

6.0 CONTACTING THE PURCHASER

Any effort by the bidder to influence REF in the tender evaluation, tender comparison, and contract award or order placement decisions will result in the rejection of the bidder's bid.

7.0 CONFIDENTIALITY

After the public opening of tenders, information relating to the examination, clarification, evaluation and comparison of tenders and recommendations concerning the award of the contract shall not be disclosed to bidders or other persons not officially concerned with such process until the award of contract is announced. **No bidder shall contact the Purchaser on any matter relating to this** tender, from the time of the tender opening to the time the tender is awarded. Any bidder in possession of confidential tender information will be obliged to reveal the source of information and/or face disqualification of their bid.

8.0 CORRUPT OR FRAUDULENT PRACTICES

Rural Electrification Fund requires that Tenderers observe the highest standard of ethics during the procurement process and execution of contracts. A tenderer shall sign and submit together with the bid the attached form (Annexure 2), that states that they have not or will not be involved in corrupt or fraudulent practices.

Rural Electrification Fund will reject a proposal for award if it determines that the tenderer has engaged in corrupt or fraudulent practices in competing for the contract. A Tenderer who is found to have indulged in corrupt or fraudulent practices will be automatically disqualified.

9.0 SUBMISSION OF BIDS

- 9.1 The tender must be enclosed in sealed envelopes, endorsed on the outside with the advertised tender number, the closing date and description of tender and must be sent by courier in time to be submitted or deposited in the Tender Box

situated at, **Rural Electrification Fund, Room 713, 7th Floor Megawatt House, 44 Samora Machel Avenue, Harare**, by 10.00 hours on the closing date notified.

- 9.2 Tenders which are properly addressed to the Procurement Administrator in envelopes with the advertised tender number, the closing date and tender description endorsed on the outside are not opened until 1000 hours on the closing date.
- 9.3 **Note:** Tenders which are not received by 1000 hours on the closing date whether by hand or by courier will be treated as late tenders and will be rejected.
- 9.4 Tele-fax and e-mail bids are not accepted i.e. electronic bidding is not accepted.
- 9.5 Any tender submitted that does not fully comply with the above terms and conditions will be rejected without further consideration as will tenders received after the published closing date.
- 9.6 Bidders are required to adhere to the instructions regarding preparation and submission of tenders as those who do not comply will be disqualified.
- 9.7 Tenderers are free to attend and witness the public tender opening at the above captioned address. The opening ceremony shall be done on the tender closing date soon after the closing time.

10.0 RIGHT FOR ACCEPTANCE OR REJECTION OF ANY OR ALL BIDS

The Fund reserves the right to accept the whole or part of the tender. The Fund reserves the right to accept or reject any bid and to annul tendering process and reject all bids at any time prior to award of contract/order, without incurring any liability to the affected Tenderer(s) or obligations to inform the affected Tenderer(s).

12. TECHNICAL SPECIFICATIONS SECTION OF THE TENDER

Instructions to bidders

Bidders are required to study the technical specifications provided and complete the technical tables provided without fail. Bids not complying with this requirement shall be rejected as non-compliant.

Part II

Technical Requirements for Solar Photovoltaic Mini-Grid Power Generation

1.0 Background

The Rural Electrification Fund (REF) is a statutory body governed by the Rural Electrification Fund Act (Chapter 13:20). The Fund was established to facilitate the rapid and equitable electrification of rural areas in Zimbabwe because post-independence, the Zimbabwe Government gave high priority to rural infrastructure development programmes, which included the rural electrification.

The national grid access is around 40% for whole country but rural population access rate is only 27.7 %. There are still a lot of areas in Zimbabwe where electricity supply is unavailable. In urban areas, many have resorted to using expensive generators to combat electricity shortages, while in rural areas, around 90% of people use a variety of traditional forms of energy like kerosene to light their homes resulting in indoor pollution. This has led to a burgeoning interest in alternative energy resources.

Zimbabwe is rich in solar resource, which is renewable, and free, with local radiation data in the range of 1900–2300 kWh /m²/year for most areas. Solar power solution is suitable and sustainable in most areas of Zimbabwe and there are many areas which have been identified in REMP (Rural Energy Master Plan) for Mini grid technologies particularly solar micro/mini grids and solar home systems. There are various solar systems installed across the country but consumer trust in solar technology has been tainted by an influx of poor quality products over the years and the performance thereof fell short of expectation in some cases. In order to overcome the power challenges in the non-electrified rural areas, REF has embarked on installing solar micro/mini grids at identified areas starting with pilot projects the success of which will lead to the rolling out of many projects across the country.

2.0 Objective

REF intends to procure solar equipment for the installation of 16 institutional solar micro grids systems. All solar systems to be installed are PV- battery based.

The picture below shows the typical set up of a solar micro grid which includes the PV array and power cabinet underneath.



Figure 1 – Example of mini-grid Solar system

REF has identified a total of 16 sites, for the small Mini grid solar plants and the capacities are 10KWp, and 15KWp. These sites will be distributed in all rural provinces of Zimbabwe

Table 1: small Mini-grid Systems list

Solar system size	Number of systems
10KWp	10
15KWp	6

3.0 System Design Requirement

Major equipment sizes for the small Mini grid components comprising Mini-grid PV Array, Energy Storage System, and Energy Conversion System are given table 2 below:-

Table 2: Mini-grid System Sizes

Type.	No of sites	PV capacity	Mini grid inverter	Storage
		(KWp)	(KVA)	(kWh)
1	10	10KWp	10	57.6
2	6	15KWp	15	86.4
Total	16			

Note:

Bidders are not expected to visit the project sites. The high-level design as given in table 2 above should guide all design parameters.

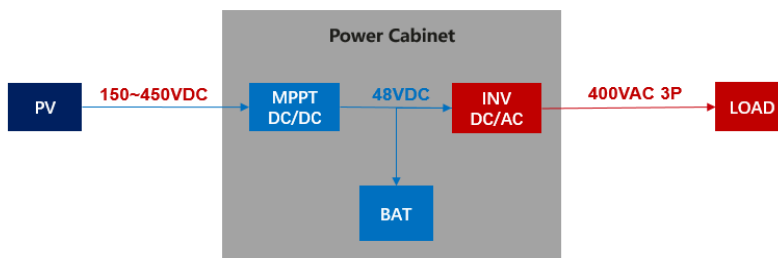
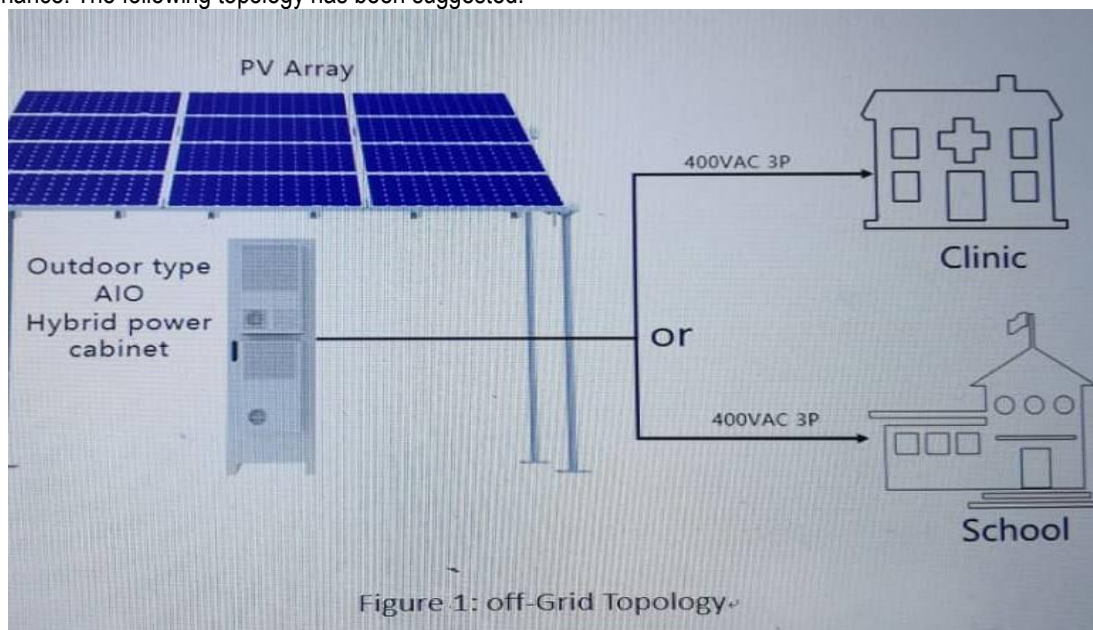
The construction of the power distribution network to customer points is not the responsibility of the bidder as REF will take care of the line construction.

3.1 Off-Grid Topology

The system shall be an outdoor deployment design and this configuration is recommended.

Advanced system topologies support the system to work in steady and high efficient status, easy installation and

maintenance. The following topology has been suggested.



Note: single phase supply voltage (230Vac) is acceptable as the targeted loads are predominantly single phase.

Figure 2: AIO Power cabinet Topology

The Sub-systems of solar system are as follows:

The Solar system is comprised of the PV Array, PV combiner box, support Structure and PV cables.

It also has an All in One (AIO) outdoor Hybrid power cabinet, which integrates the solar charger mode (MPPT), inverter modules and lithium battery modules. It must have outdoor type design IP55 protection level. Finally a **Remote monitoring system** which can remotely monitor the micro grid solar plant from the control center presumably at the provincial or head office.

3.1.1 The working mode is as follows:

In the daytime, when the solar energy is sufficient to supply power for the loads, solar energy will be converted by the solar charger and inverter and supply power to the loads and the surplus energy will be stored into the battery(while battery is not fully charged) at the same time.

On a cloudy day, solar panels and the batteries will provide the power, which is converted by the solar charger and inverter and supply power to the AC loads.

At night or on rainy days, when the batteries have enough power, the batteries will provide the power, which is converted by the integrated inverter module and supply power to the AC loads.

The system should reserve a port for diesel generator (D.G) input, and can be used in future depending on load consumption patterns such as:

- When battery power is not enough, the D.G will start to provide power to the loads and charge the battery at the

same time.

-When battery is fully charged and the D.G is off, the battery will supply power.

The output voltage of such topology is expected to be 230/400VAC nominal. Single phase loads are targeted.

3.1.2 Design for graceful degradation

REF requires that the mini grid system have a graceful degradation in case of a failure, i.e. a failure in one component should not cause the failure of the entire mini-grid system.

Therefore it recommends that the system be designed as below:

(a) Modular power supply

The power supply system should have a unified platform and intelligent scheduling logic. One cabinet can support the access of multiple power sources, such as the diesel generator, mains grid, and solar energy. The power system should have a soft-start function to avoid power supply spikes and front-end protection.

The PV charger modules should have a high solar MPPT tracking precision of at least 97%.

Lithium battery should be LiFeSO₄ (LFP) type, with a capacity 48 V/100 AH, Intelligent software anti-theft design. Long lifespan, 6000 times @ 0.5C, 85% DOD, 70% EOL, 35 °C

Integrated battery management unit:

Sampling: The voltage, current, and temperature of the entire battery cell or battery string can be monitored.

Management: Determines the SOC and SOH of the entire battery string.

Protection: Provides protection against reverse connection, overvoltage, overcurrent, over temperature, short circuit and anti-battery theft.

When the communication cable linking the monitoring system and the battery package is disconnected, the battery anti-theft function must communicate with the remote monitoring system by generating an alarm that should be picked up by the system administrator. In this case the algorithm assumes that the battery has been tampered with. It locks the battery and prevents it from charging and discharging. The battery can only resume its function once the communication cable is restored. The battery must support the GPS tracking function so that the battery can be continuously tracked on the GIS map. That way the battery can be located and recovered.

Electrochemical cell equalization: The electrochemical cell voltage difference is within 20 mV. There is an automatic equalization circuit.

Complies with CE, UN38.3, and IEC62619 and provides certificates and test reports.

Note: The Hybrid Power cabinet should have built-in good temperature control system, keep all the parts working in a stable temperature and humidity, make sure all the power modules achieve the design lifetime.

(b) Monitoring system

Bidders are required to provide a smart remote monitoring software system that will report on the operation of the mini-grid. The remote monitoring system shall be 3G/LTE capable as a minimum and shall integrate metering system that reports on power production, ESS state of charge, energy storage usage, diesel usage and overall system efficiency. The monitoring system shall have a provision of implementing a smart Automatic diesel Generator Start Control system.

The remote monitoring system shall provide a web based (HTML 5, JAVA, etc...) that will display essential micro-grid power station information.

(c)..Products and service supply scope

Bidders should supply the solar equipment to meet the designs provided.

A design for the system's major equipment (solar Array, Battery and inverter) is provided and the supplier is expected to submit their complete designs with evident compliance to the major equipment specified in the higher level designs provided. The supplier is expected to supply equipment which meets all the technical specifications provided and international standards (IEC and ISO).

(d) Drawings and supplementary information

The purpose of the drawings is to specify locations, dimensions, size and materials to be supplied and other characteristics of the equipment. The bidder shall prepare all the required drawings and include them in the technical proposal and will be part of the system design and technical bid, including Solar system layout and traceable connections to the inverter and battery cabinet(s).

The origin of the major electrical equipment should be provided. Specifications and warrantee of all equipment used in the project must be provided.

(e) Compliance to Standards and Certificates

The supplier shall provide IEC-standard certificates for Solar Panels, Battery Cells, and PV Inverters from an accredited laboratory. REF reserves the right to take samples for testing purposes before putting the systems in the field.

Each bidder proposal (technical capacity and product performance) will be measured using the defined detailed technical requirements. It is very important that each bidder provides accurate and complete information as requested in the table. Bidders that provide inaccurate, misleading or incomplete information will be disqualified.

(f) Quality and Integrity of Solar System Components

The bidder shall unconditionally guarantee that the solar equipment supplied shall be entirely of new manufacture using state of the art technology and not second hand, reconditioned and/or used equipment and shall be of the highest quality to ensure system reliability and availability for which it is intended.

(g) Equipment Guarantee

The system proposed by the supplier shall be fully guaranteed against all defects. The supplier shall guarantee to replace defective equipment /components both electrical and mechanical within stated warranty period to establish normal operation of the entire system. All the equipment at least need to have one year warranty.

(h) Operational Responsibilities

The supplier is responsible for safe handling of the equipment during transportation up to the specified destination. The supplier should provide their electrician to guide the installation and commissioning of the solar system physically on the ground. The supplier shall commit to supplying installation and maintenance manual of the equipment as part of compliance with tender. If installation and maintenance manual are not provided, the bidder is automatically disqualified.

(i) Equipment delivery

The supplier shall deliver the plant equipment at REF Central stores in Harare and the products will be checked against specifications for acceptance.

(j) Component/Subsystem Level Validation and Verification

The bidder must provide component/subsystem level performance test report for each component selected in the system. Test report must validate stated performance specification of each component/subsystem. Component/subsystem level test reports are required on the following components as applicable:

- a) Solar array power performance and efficiency testing
- b) Battery cycling and performance testing
- c) Inverter efficiency and performance testing
- d) Electrical safety testing of each component/subsystem

REF reserves the right to verify the authenticity of test reports via third party test facilities and/or retesting of any of the components specified if necessary. Bidders that provide inaccurate and false test reports shall be disqualified immediately.

The bidder should strictly deliver equipment whose brands have been used in the technical bid document and delivering equipment of different brands on the pretext of technical equivalence is deemed failure to adhere to tender requirements and will be regarded as fraud consequently leading to non-acceptance or rejection of the goods delivered.

(k) Commissioning

The solar system once installed in its final location must undergo commissioning and test results must be documented and in the event that the results are not satisfactory, REF will revert back to the supplier for the non performing component(s) for replacements according to equipment warranty policy.

(l) Spare parts

The bidder shall supply the usual spare parts that will ensure the system works for a full year without significant down time whenever replacements are necessary.

(m) Security

The bidder shall provide a robust fencing mechanism around the solar system to protect the expensive equipment used to build the system. The power conversion equipment including storage (battery) shall be housed in secure lockable cabinet(s) to guard against theft. The bidder must therefore prepare a fencing drawing which shall be at least 2m height. The material for fencing shall be L beam galvanized steel with spikes beyond 2 metres height.

**(n) Equipment specification
Component Level requirement**

The supplier shall observe the following specific guidelines in responding to each requirement stated in the table by indicating in the comment box:

FC = Full Compliance

PC = Partial Compliance

NC = No Compliance

The bidder, after indicating compliance as stated above, should put values and or comments which support how they are complying.

Please note: the bidder is expected to be 100% compliant to the technical specification for them to be considered for financial evaluation.

TECHNICAL REQUIREMENTS TABLE-The 10KW mini grid solar system should meet the follow requirements:

No.	Component	Parameter	Value	Bidders must state their product components in this column without fail
1	General	Type	10KW solar system	
		Documents list	Original brochures or catalogue including the datasheet of all components, Detailed Single line diagram of the solar system, Electrical connection/wiring drawings, Bill of Material, Solar array layout diagram, Energy Storage Module Assembly diagram, Inverter module assembly diagram, Operation and Maintenance manual: *Installation manual *User manual *Maintenance manual	
2	PV Module	PV Capacity	PV capacity should be not less than 10KWp	
		Type of PV module	Mono crystalline	
		Nominal Power of PV module	≥375Wp at STC	
		Efficiency of PV module	≥19.3%. Label of performance rating should be attached at the back of PV module	

		interconnection	Plug-in socket and extensions should be rated at minimum of 1000 VDC. All strings shall be connected to a junction/combiner box. The photovoltaic panels shall be installed in a series/parallel configuration as required to meet the proper voltage and current requirements.	
		Performance warranty	20 years with maximum degradation of 1% per year and maximum of 20% at the end of the warranty period	
		Product Warranty	Developers shall provide a minimum of 10-year warranty for PV modules for workmanship and manufacturing related defects.	
		Certification	ISO 9002 and ISO 14001 from manufacturer	
		Standards	The photovoltaic panel shall meet IEC 61215 standards.	
		Test results	Valid certificate and performance test results (series of product) that is conducted by an accredited testing laboratory	
		Product source	Manufacture's authorization letter should be provided for the PV modules	
		Anti-theft	The PV array should have anti-theft feature, once the PV module is lost, system can give warning.	
3	PV Array Support Structure	Size	The PV array structure shall be designed to support the proposed photovoltaic modules.	
		Type of mounting	Ground mounting. The photovoltaic module shall be mounted on a frame fixed on the ground by appropriate modern means.	
		PV module mounting	Rail and clip model made of aluminium properly secured.	
		PV support tilt angle	Design according to the tilt angle of the PV module as per the latitude of the location	
		Height of PV module installation	≥70 cm between the lowest level of the module and ground	
		Warning sign	Electrical hazard sign should be attached on each array	
		Strength	The photovoltaic array shall be capable of resisting wind speed of 40m/s and the structure shall have required appropriate features to withstand storms.	
		Protection against weather elements	All steel parts and the accessories of any steel structure have to be hot dip galvanized. The hot dip galvanizing shall be executed in accordance with ISO 1461. All tubular bars must be galvanized from inside and outside. Minimum thickness of the zinc coat is 40µm	
		Structure assembly	The installation bolts of photovoltaic panels and junction boxes shall be designed to secure the system properly.	
		Certification	The manufacturer of photovoltaic structure shall have ISO9001 and other relevant manufacturing process certifications.	

4	Hybrid inverter (cabinet)	Type	AIO (All In One) Mini grid inverter (cabinet)	
		System configuration	The AIO inverter power (cabinet) should be All-scenario and supports energy multiple inputs (solar, mains grid or D.G.)	
		Rated power	≥10KVA	
		Wave form	Pure sine wave	
		Nominal AC output Voltage	400Vac Three-phase, 230VAC for single phase	
		Efficiency	≥93%	
		Frequency	50Hz	
		Battery Voltage	48VDC	
		MPPT PV charge controller	Integrated MPPT PV charge controller	
		Battery type	Compatible with Lithium ion battery	
		Priority for configuration	Solar>battery>genset (if there is a Genset)	
		System Protection	Input reverse polarity, AC short circuit, AC overload, overcurrent, over/under voltage, over temperature	
		Scalability	Operation in parallel when there is need	
		Relative Humidity	5%-95% non-condensing	
		Operating temperature	-10°C to + 45°C	
		Total Harmonic Distortion	≤5%	
		Degree of Protection	IP55 (used outdoors)	
		Display	display showing current, voltage and power parameters	
		Data logging	Yes	
		Interface	Yes. Communication with Remote Monitoring System	
		Warranty	≥1 years	
5	Lithium battery	Test certificate results	Valid certificate and performance test results (series of product) that is conducted by an accredited testing laboratory	
		Standards	IEC 62109-2:2011, IEC 62109-1	
		Certification	ISO 9001. Provide copy of ISO from manufacturer	
		Battery capacity	57.6KWh@C10	
		Technology	Lithium Iron Phosphate	
		Deployment mode	Lithium battery module should be put inside the cabinet.	
		lifecycle	6000 cycles @ 0.5C, 85% DOD, 70% EOL, 35°	
		Lithium battery module	4.8KWH, LFP	
		Nominal Battery Bank Voltage	48VDC	
		Interface	The unit lithium battery Communication interface should be CAN / RS485; 2 dry contacts	

		Protection	The unit lithium battery should have Over temperature, overcurrent, short circuit, overcharge, over discharge Protection & alarm	
		Design life	≥15 years	
		Self-discharge	The unit lithium battery Self discharge @ 25°C should be Less than 5% after 90 days storage	
		Degree of Protection	IP55 (used outdoors)	
		Warranty	≥1 year	
		Certification	The unit lithium battery should have CE, UN38.3 certification; SO 9002 and ISO 14001 from manufacturer	
		Test result	Valid certificate or test results (one series of product) from an accredited independent testing laboratory.	
6	Remote Monitoring System	Mode of operation	The Remote Monitoring System shall adopt complete B/S, web-based management structure and should incorporate the anti-theft function as described under modular supply.	
			Network Management Interface should support intuitive display of all the equipment in the site through device model. User can quickly obtain site equipment data (configuration information, current alarm data and historical alarm data) through clicking the device model.	
			The Remote Monitoring System should supports GIS (Geographic Information System, based on Open Street Map), including intuitive site display, site filtering according O&M needs, like filtering sites by lack of fuel, Mains outage and DC low voltage.	

TECHNICAL REQUIREMENTS TABLE-The 15KW mini grid solar system should meet the follow requirements:

No.	Component	Parameter	Value	Bidders must state their product components in this column without fail
1	General	Type	15KW mini grid solar system	
		Documents list	Original brochures or catalogue including the datasheet of all components Detailed Single line diagram of the solar system Electrical connection/wiring drawings Bill of Material Solar array layout diagram Energy Storage Module Assembly diagram Inverter module assembly diagram Operation and Maintenance manual: *Installation manual *User manual *Maintenance manual	
2	PV Module	PV Capacity	the PV capacity should be not less than 15KWp	
		Type of PV module	Mono crystalline	
		Nominal Power of PV module	≥375Wp at STC	
		Efficiency of PV module	≥19.3%. Label of performance rating should be attached at the back of PV module	
		interconnection	Plug-in socket and extensions should be rated at minimum of 1000 VDC. All strings shall be connected to a junction/combiner box. The photovoltaic panels shall be installed in a series/parallel configuration as required to meet the proper voltage and current requirements.	
		Performance warranty	20 years with maximum degradation of 1% per year and maximum of 20% at the end of the warranty period	
		Product Warranty	Suppliers shall provide a minimum of 10-year warranty for PV modules for workmanship and manufacturing related defects.	
		Certification	ISO 9002 and ISO 14001 from manufacturer	
		Standards	The photovoltaic panel shall meet IEC 61215 standards.	
		Test results	Valid certificate and performance test results (series of product) that is conducted by an accredited testing laboratory	
		Product source	Manufacture's authorization letter should be provided for the PV modules	
		Anti-theft	The PV array should have anti-theft feature, once the PV module is lost, system can give warning.	
3	PV Array Support	Size	The PV array structure shall be designed to support the proposed photovoltaic modules.	

	Structure	Type of mounting	Ground mounting, The photovoltaic module shall be mounted on a frame fixed on the ground by appropriate modern means.	
		PV module mounting	Rail and clip model made of aluminium properly secured and eliminating gaps	
		PV support tilt angle	Design according to the tilt angle of the PV module as per the latitude of the location	
		Height of PV module installation	≥70 cm between the lowest level of the module and ground	
		Warning sign	Electrical hazard sign should be attached on each array	
		Strength	The photovoltaic array shall be capable of resisting wind speed of 40m/s and the structure shall have required appropriate features to withstand storms.	
		Protection against weather elements	All steel parts and the accessories of any steel structure have to be hot dip galvanized. The hot dip galvanizing shall be executed in accordance with ISO 1461. All tubular bars must be galvanized from inside and outside. Minimum thickness of the zinc coat is 40µm	
		Structure assembly	The installation bolts of photovoltaic panels and junction boxes shall be designed to secure the system properly.	
4	Hybrid inverter (cabinet)	Certification	The manufacturer of photovoltaic structure shall have ISO9001 and other relevant manufacturing process certifications.	
		Type	AIO (All In One) inverter (cabinet)	
		System configuration	The AIO inverter power (cabinet) should be All-scenario and supports energy multiple inputs (solar, mains grid or D.G.)	
		Rated power	≥15KVA	
		Wave form	Pure sine wave	
		Nominal AC output Voltage	400Vac Three-phase, 230VAC for single phase	
		Efficiency	≥93%	
		Frequency	50Hz	
		Battery Voltage	48VDC	
		MPPT PV charge controller	Integrated MPPT PV charge controller	
		Battery type	Compatible with Lithium ion battery	
		Priority for configuration	Solar>battery>gen-set (if have)	
		System Protection	Input reverse polarity, AC short circuit, AC overload, overcurrent, over/under voltage, over temperature	
		Scalability	Operation in parallel when there is need	

		Relative Humidity	5%-95% non-condensing	
		Operating temperature	-10°C to + 45°C	
		Total Harmonic Distortion	≤5%	
		Degree of Protection	IP55 (used outdoors)	
		Display	display showing current, voltage and power parameters	
		Data logging	Yes	
		Interface	Yes. Communication with Remote Monitoring System	
		Warranty	≥1 year	
		Test certificate results	Valid certificate and performance test results (series of product) that is conducted by an accredited testing laboratory	
		Standards	IEC 62109-2:2011, IEC 62109-1	
		Certification	ISO 9001. Provide copy of ISO from manufacturer	
5	Lithium battery	Battery capacity	86.4KWh@C10	
		Technology	Lithium Iron Phosphate	
		Deployment mode	Lithium battery module should put in the outdoor type cabinet.	
		lifecycle	6000 cycles @ 0.5C, 85% DOD, 70% EOL, 35°	
		Lithium battery module	4.8KWH, LFP	
		Nominal Battery Bank Voltage	48VDC	
		Interface	The unit lithium battery Communication interface should be CAN / RS485; 2 dry contacts	
		Protection	The unit lithium battery should have Over temperature, overcurrent, short circuit, overcharge, over discharge Protection & alarm	
		Design life	≥15 years	
		Self-discharge	The unit lithium battery Self discharge @ 25°C should be Less than 5% after 90 days storage	
		Degree of Protection	IP55 (used outdoors)	
		Warranty	≥1 years	
		Certification	The unit lithium battery should have CE, UN38.3 certification; SO 9002 and ISO 14001 from manufacturer	
		Test result	Valid certificate or test results (one series of product) from an accredited independent testing laboratory.	
6	Remote Monitoring System	Mode of operation	The Remote Monitoring System shall adopt complete B/S, web-based management structure.	

			Network Management Interface should support intuitive display of all the equipment in the site through device model. User can quickly obtain site equipment data (configuration information, current alarm data and historical alarm data) through clicking the device model.	
			The Remote Monitoring System should supports GIS (Geographic Information System, based on Open Street Map), including intuitive site display, site filtering according O&M needs, like filtering sites by lack of fuel, Mains outage and DC low voltage.	

TECHNICAL REQUIREMENTS TABLE-Cable requirements

REQ_ID	Requirement	Bidder's values/comment. Bidders must state their values in this column without fail
Cable and Bus-bar Requirements		
	The bidder shall supply all distribution interface specifications and associated cables and bus-bars for the mini-grid system, including solar panel connecting cable, inverter cable junction cable, battery cable/bus-bar, power distribution cable/bus-bar and earth grounding cable	
	Positive (+) and Negative (-) terminals for DC power cables and bus-bars shall be clearly labelled with red color for (+) and black color for (-).	
	Positive (+) and Negative (-) terminals for DC power cables and bus-bars shall have matched diameters.	
	All load cables shall be tagged and labelled properly with appropriate load power, electrical voltage, electrical current and electrical frequency; tags and labels shall be easily recognizable.	
	All cables, bus-bars and current carrying conductors shall be de-rated and sized to meet the National Electric Code (NEC) cable and wire sizing codes. Bidders shall provide a detailed design document indicating electrical power requirements and associated cables sizes.	
	All cable and bus-bar layouts shall be specifically designed to meet appropriate local and/or international standards.	
	All buried cables shall be extended in a PVC pipe of suitable diameter and buried at least 0.3m depth for protection against rodents and physical damage (maximum distance 15m).	
	The conductor material of cable core must be copper	

Important notice: REF has acquired equipment for Remote monitoring system for solar mini grid project that will be installed soon and if bidders supply equipment that is compatible with the Remote monitoring system in place, such

equipment will be removed from the scope of supply for saving costs by using the available monitoring system.

METERING SYSTEM

	Energy meter	prepaid meter	Energy Meter,240V,50Hz,Single Phase/ Energy Meter,400V,50Hz,three Phase	pcs	16
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NOTE: All the solar systems should incorporate an energy meter for recording power consumption by all users connected to the system. One meter is required for each solar system.

SOLAR PROJECTS REQUIREMENTS AND SITES				
SITES	Project Name	PROVINCE	DISTRICT	SIZE OF PLANT
1	Chikwizi Primary School	Manicaland	Chimanimani	10kW
2	Musiyabako Primary School	Manicaland	Mutare	10kW
3	Chibeta Prim, Sec	Mashonaland East	Mutoko	15kW
4	Chidyed Prim, Sec, Clinic	Mashonaland East	Mutoko	15KW
5	Moyomusande Primary School	Mashonaland West	Sanyati	10kW
6	Kuwirirana Primary School	Mashonaland West	Mhondoro	10kW
7	Ganganyama Primary School	Mashonaland Central	Rushinga	10kw
8	Maparepare Prim Sc	Mashonaland Central	Rushinga	10kw
9	Dende Primary and Secondary	Midlands	Gokwe North	15kW
10	Manyoni Prim and Secondary School	Midlands	Gokwe South	15kW
11	Davhata Prim, Sec, Clinic	Masvingo	Chiredzi	15kw
12	Chinyika Prim, Sec, Clinic	Masvingo	Bikita	15kw
13	Zindele Primary School	Matebeleland South	Gwanda	10kW
14	Mthangala Primary School	Matebeleland South	Insiza	10kW
15	Siamupa Primary School	Matebeleland North	Binga	10kW
16	Sebhewule Primary School	Matebeleland North	Tsholotsho	10kW

APPENDIX 1

DECLARATION ON NON-ENGAGEMENT IN CORRUPT OR FRAUDULENT PRACTICES FORM

The Chief Executive
Rural Electrification Fund
6th Floor Megawatt House
44 Samora Machel Ave
P. Bag A250
Avondale
Harare
Zimbabwe

TENDER NUMBER: _____

TENDER DESCRIPTION: _____

I _____ the undersigned (*Director of Company*) on behalf of
_____ (*Name of Organisation*), do hereby declare that our
organization has not been engaged in any corrupt or unethical practices during the subsistence of our
organisation.

Name in Full _____

I. D. Number _____

Signature _____

Annexure 2

LETTER OF TENDER (TENDER FORM)

NAME OF TENDER: Supply & Delivery of

Tender Number REF/...../...../2022

TO: The Chief Executive
Rural Electrification Fund (REF)
6th Megawatt House, 44 Samora Machel Avenue,
Harare, Zimbabwe

We, [*insert name of Tenderer*], herewith enclose a Tender for selection of our firm as Contractor/Supplier for

We have examined the Conditions of Contract, Employer's Requirements, Schedules, the attached. Appendix and Addenda Nos ___ of the above-named Works. We have examined, understood and checked these documents and have ascertained that they contain no errors or other defects. We accordingly offer to design, execute and complete the Works and remedy any defects therein, in conformity with this Tender which includes all these documents and the enclosed Proposal, for the lump tender sum of: USD _____

We agree to abide by this Tender until _date_ / _month_ / _year_ [i.e. _____ days from the tender opening date] and it shall remain binding upon us and may be accepted at any time before that date. We acknowledge that the Appendix to Tender forms part of this Letter of Tender.

If this offer is accepted, we will provide the specified Performance Security, commence the Works as soon as is reasonably practicable after the Commencement Date, and complete the Works in accordance with the above-named documents within the Time for Completion. We guarantee that the Works will then conform to the Schedule of Guarantees.

Unless and until a formal Agreement is prepared and executed, this Letter of Tender, together with your written acceptance thereof, shall constitute a binding contract between us. Our Tender is binding upon us and subject to the modifications resulting from pre-award contract negotiations.

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

Signature _____ in the capacity of _____

Duly authorized to sign tenders for and on behalf of _____

Address: _____

Date: _____

Date _____