

Request for Bids Goods

(One-Envelope Bidding Process)

TENDER: AO-MINEA-GEPE-210044-GO-RFB

**Supply, Installation & Commissioning of Meters
and Meter Control Center for the RPP (Revenue
Protection Program)**

Request for Bids

Goods

(One-Envelope Bidding Process)

Country: Angola

Name of Project: Electricity Sector Improvement and Access Project (ESIAP)

Contract Title: Supply and Installation of meters and meter control center for the Revenue Protection Program

Loan No.: IBRD 9204-AO

RFB Reference No.: AO-MINEA-GEPE-210044-GO-RFB

1. The Government of Angola has received financing from the World Bank toward the cost of the **Electricity Sector Improvement and Access Project (ESIAP)**, and intends to apply part of the proceeds toward payments under the contract for **Supply and Installation of meters and meter control center for the Revenue Protection Program**. For this contract, the Borrower shall process the payments using the Direct Payment disbursement method, as defined in the World Bank's Disbursement Guidelines for Investment Project Financing, except for those payments, which the contract provides to be made through letter of credit.
2. The **Project Coordination Unit of the Ministry of Energy and Water (MINEA)** now invites sealed Bids from eligible Bidders for the **Supply and Installation of meters and meter control center for the Revenue Protection Program (approximately 16.000 meters)**.
3. Bidding will be conducted through international competitive procurement using a Request for Bids (RFB) as specified in the World Bank's "Procurement Regulations for IPF Borrowers", November 2020 ("Procurement Regulations"), and is open to all eligible Bidders as defined in the Procurement Regulations.
4. Interested eligible Bidders may obtain further information from the Project Coordination Unit of the Electric Sector Expansion and Improvement Project, Attn.: Mr. João Moreira Pinto Saraiva, Project Coordinator and inspect the bidding document during office hours (8:30 to 15:00 hours) at the address:
Electricity Sector improvement and Access Project
Project Coordination Unit
Attn: Mr. João Moreira Pinto Saraiva
Project Coordinator
Condomínio Astros
Prédio Aquário, Apto 120-D
Rua do MAT - Talatona
Luanda – Angola

E-mail: esiap.ucp.minea@gmail.com

Phone: +244 947 913 331

5. The bidding document in English may be obtained by interested Bidders upon the submission of a written application (or via email) to the address below. The document will be sent by email.
6. Bids must be delivered to the address below on or before **16 December 2022** at 14:30 min. Late Bids will be rejected. Bids will be publicly opened in the presence of the Bidders' designated representatives and anyone who chooses to attend at the address below on **16 December 2022** – 14:35 min (local time). Electronic bidding will not be permitted.
7. All Bids must be accompanied by a Bid Security in the amount of US\$ 70.000,00 (Seventy thousand US Dollars)
8. Attention is drawn to the Procurement Regulations requiring the Borrower to disclose information on the successful bidder's beneficial ownership, as part of the Contract Award Notice, using the Beneficial Ownership Disclosure Form as included in the bidding document.
9. The address referred to above is:

ENDE – Empresa Nacional de Distribuição de Electricidade

Attn. Mr. João Moreira Pinto Saraiva - Project Coordinator

Address: Avenida Cónego Manuel das Neves. 234 r/c Meeting Room No. 2

Luanda-Angola

Request for Bids Goods

(One-Envelope Bidding Process)

Procurement of:

RFB No: AO-MINEA-GEPE-210044-GO-RFB

Project: Electricity Sector Improvement and Access Project

Purchaser: MINISTRY OF ENERGY AND WATER (MINEA)

Country: ANGOLA

Issued on: 01 November 2022

Standard Procurement Document

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PART 1 – Bidding Procedures

Section I - Instructions to Bidders

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Section I. Instructions to Bidders

A. General

- 1. Scope of Bid**

 - 1.1 In connection with the Specific Procurement Notice, Request for Bids (RFB), specified **in the Bid Data Sheet (BDS)**, the Purchaser, as specified **in the BDS**, issues this bidding document for the supply of Goods and, if applicable, any Related Services incidental thereto, as specified in Section VII, Schedule of Requirements. The name, identification and number of lots (contracts) of this RFB are **specified in the BDS**.
 - 1.2 Throughout this bidding document:

 - (a) the term “in writing” means communicated in written form (e.g. by mail, e-mail, fax, including if **specified in the BDS**, distributed or received through the electronic-procurement system used by the Purchaser) with proof of receipt;
 - (b) if the context so requires, “singular” means “plural” and vice versa; and
 - (c) “Day” means calendar day, unless otherwise specified as “Business Day”. A Business Day is any day that is an official working day of the Borrower. It excludes the Borrower’s official public holidays.
- 2. Source of Funds**

 - 2.1 The Borrower or Recipient (hereinafter called “Borrower”) **specified in the BDS** has applied for or received financing (hereinafter called “funds”) from the International Bank for Reconstruction and Development or the International Development Association (hereinafter called “the Bank”) in an amount **specified in the BDS**, toward the project named **in the BDS**. The Borrower intends to apply a portion of the funds to eligible payments under the contract for which this bidding document is issued.
 - 2.2 Payment by the Bank will be made only at the request of the Borrower and upon approval by the Bank in accordance with the terms and conditions of the Loan (or other financing) Agreement. The Loan (or other financing) Agreement prohibits a withdrawal from the Loan account for the purpose of any payment to persons or entities, or for

any import of goods, if such payment or import is prohibited by decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations. No party other than the Borrower shall derive any rights from the Loan (or other financing) Agreement or have any claim to the proceeds of the Loan (or other financing).

3. Fraud and Corruption

- 3.1 The Bank requires compliance with the Bank's Anti-Corruption Guidelines and its prevailing sanctions policies and procedures as set forth in the WBG's Sanctions Framework, as set forth in Section VI.
- 3.2 In further pursuance of this policy, Bidders shall permit and shall cause their agents (where declared or not), subcontractors, subconsultants, service providers, suppliers, and personnel, to permit the Bank to inspect all accounts, records and other documents relating to any initial selection process, prequalification process, bid submission, proposal submission, and contract performance (in the case of award), and to have them audited by auditors appointed by the Bank.

4. Eligible Bidders

- 4.1 A Bidder may be a firm that is a private entity, a state-owned enterprise or institution subject to ITB 4.6, or any combination of such entities in the form of a joint venture (JV) under an existing agreement or with the intent to enter into such an agreement supported by a letter of intent. In the case of a joint venture, all members shall be jointly and severally liable for the execution of the entire Contract in accordance with the Contract terms. The JV shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the members of the JV during the Bidding process and, in the event the JV is awarded the Contract, during contract execution. Unless specified **in the BDS**, there is no limit on the number of members in a JV.
- 4.2 A Bidder shall not have a conflict of interest. Any Bidder found to have a conflict of interest shall be disqualified. A Bidder may be considered to have a conflict of interest for the purpose of this Bidding process, if the Bidder:
 - (a) directly or indirectly controls, is controlled by or is under common control with another Bidder; or

- (b) receives or has received any direct or indirect subsidy from another Bidder; or
- (c) has the same legal representative as another Bidder; or
- (d) has a relationship with another Bidder, directly or through common third parties, that puts it in a position to influence the Bid of another Bidder, or influence the decisions of the Purchaser regarding this Bidding process; or
- (e) or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the works that are the subject of the Bid; or
- (f) or any of its affiliates has been hired (or is proposed to be hired) by the Purchaser or Borrower for the Contract implementation; or
- (g) would be providing goods, works, or non-consulting services resulting from or directly related to consulting services for the preparation or implementation of the project specified in the BDS ITB 2.1 that it provided or were provided by any affiliate that directly or indirectly controls, is controlled by, or is under common control with that firm; or
- (h) has a close business or family relationship with a professional staff of the Borrower (or of the project implementing agency, or of a recipient of a part of the loan) who: (i) are directly or indirectly involved in the preparation of the bidding document or specifications of the Contract, and/or the Bid evaluation process of such Contract; or (ii) would be involved in the implementation or supervision of such Contract unless the conflict stemming from such relationship has been resolved in a manner acceptable to the Bank throughout the Bidding process and execution of the Contract.

4.3 A firm that is a Bidder (either individually or as a JV member) shall not participate in more than one Bid, except for permitted alternative Bids. This includes participation as a subcontractor. Such participation shall result in the disqualification of all Bids in which the firm is involved. A firm that is not a Bidder or a JV member, may participate as a subcontractor in more than one Bid.

- 4.4 A Bidder may have the nationality of any country, subject to the restrictions pursuant to ITB 4.8. A Bidder shall be deemed to have the nationality of a country if the Bidder is constituted, incorporated or registered in and operates in conformity with the provisions of the laws of that country, as evidenced by its articles of incorporation (or equivalent documents of constitution or association) and its registration documents, as the case may be. This criterion also shall apply to the determination of the nationality of proposed subcontractors or subconsultants for any part of the Contract including related Services.
- 4.5 A Bidder that has been sanctioned by the Bank, pursuant to the Bank's Anti-Corruption Guidelines, in accordance with its prevailing sanctions policies and procedures as set forth in the WBG's Sanctions Framework as described in Section VI paragraph 2.2 d., shall be ineligible to be prequalified for, initially selected for, bid for, propose for, or be awarded a Bank-financed contract or benefit from a Bank-financed contract, financially or otherwise, during such period of time as the Bank shall have determined. The list of debarred firms and individuals is available at the electronic address specified in the BDS.
- 4.6 Bidders that are state-owned enterprises or institutions in the Purchaser's Country may be eligible to compete and be awarded a Contract(s) only if they can establish, in a manner acceptable to the Bank, that they (i) are legally and financially autonomous (ii) operate under commercial law, and (iii) are not under supervision of the Purchaser.
- 4.7 A Bidder shall not be under suspension from Bidding by the Purchaser as the result of the operation of a Bid-Securing Declaration or Proposal-Securing Declaration.
- 4.8 Firms and individuals may be ineligible if so indicated in Section V and (a) as a matter of law or official regulations, the Borrower's country prohibits commercial relations with that country, provided that the Bank is satisfied that such exclusion does not preclude effective competition for the supply of goods or the contracting of works or services required; or (b) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of

the United Nations, the Borrower's country prohibits any import of goods or contracting of works or services from that country, or any payments to any country, person, or entity in that country.

4.9 A Bidder shall provide such documentary evidence of eligibility satisfactory to the Purchaser, as the Purchaser shall reasonably request.

4.10 A firm that is under a sanction of debarment by the Borrower from being awarded a contract is eligible to participate in this procurement, unless the Bank, at the Borrower's request, is satisfied that the debarment;

(a) relates to fraud or corruption; and

(b) followed a judicial or administrative proceeding that afforded the firm adequate due process.

5. Eligible Goods and Related Services

5.1 All the Goods and Related Services to be supplied under the Contract and financed by the Bank may have their origin in any country in accordance with Section V, Eligible Countries.

5.2 For purposes of this ITB, the term "goods" includes commodities, raw material, machinery, equipment, and industrial plants; and "related services" includes services such as insurance, installation, training, and initial maintenance.

5.3 The term "origin" means the country where the goods have been mined, grown, cultivated, produced, manufactured or processed; or, through manufacture, processing, or assembly, another commercially recognized article results that differs substantially in its basic characteristics from its components.

B. Contents of Request for Bids Document

6. Sections of Bidding Document

6.1 The bidding document consist of Parts 1, 2, and 3, which include all the sections indicated below, and should be read in conjunction with any Addenda issued in accordance with ITB 8.

PART 1 Bidding Procedures

- Section I - Instructions to Bidders (ITB)

- Section II - Bidding Data Sheet (BDS)
- Section III - Evaluation and Qualification Criteria
- Section IV - Bidding Forms
- Section V - Eligible Countries
- Section VI - Fraud and Corruption

PART 2 Supply Requirements

- Section VII - Schedule of Requirements

PART 3 Contract

- Section VIII - General Conditions of Contract (GCC)
- Section IX - Special Conditions of Contract (SCC)
- Section X - Contract Forms

- 6.2 The Specific Procurement Notice, Request for Bids (RFB), issued by the Purchaser is not part of this bidding document.
- 6.3 Unless obtained directly from the Purchaser, the Purchaser is not responsible for the completeness of the document, responses to requests for clarification, the Minutes of the pre-Bid meeting (if any), or Addenda to the bidding document in accordance with ITB 8. In case of any contradiction, documents obtained directly from the Purchaser shall prevail.
- 6.4 The Bidder is expected to examine all instructions, forms, terms, and specifications in the bidding document and to furnish with its Bid all information or documentation as is required by the bidding document.

7. Clarification of Bidding Document

- 7.1 A Bidder requiring any clarification of the bidding document shall contact the Purchaser in writing at the Purchaser's address specified **in the BDS**. The Purchaser will respond in writing to any request for clarification, provided that such request is received prior to the deadline for submission of Bids within a period specified **in the BDS**. The Purchaser shall forward copies of its response to all Bidders who have acquired the bidding document in accordance with ITB 6.3, including a description of the inquiry but without identifying its source. If so specified **in**

the BDS, the Purchaser shall also promptly publish its response at the web page identified **in the BDS**. Should the clarification result in changes to the essential elements of the bidding document, the Purchaser shall amend the bidding document following the procedure under ITB 8 and ITB 22.2.

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| 8. Amendment of Bidding Document | <p>8.1 At any time prior to the deadline for submission of Bids, the Purchaser may amend the bidding document by issuing addenda.</p> <p>8.2 Any addendum issued shall be part of the bidding document and shall be communicated in writing to all who have obtained the bidding document from the Purchaser in accordance with ITB 6.3. The Purchaser shall also promptly publish the addendum on the Purchaser's web page in accordance with ITB 7.1.</p> <p>8.3 To give prospective Bidders reasonable time in which to take an addendum into account in preparing their Bids, the Purchaser may, at its discretion, extend the deadline for the submission of Bids, pursuant to ITB 22.2.</p> |
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C. Preparation of Bids

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| 9. Cost of Bidding | <p>9.1 The Bidder shall bear all costs associated with the preparation and submission of its Bid, and the Purchaser shall not be responsible or liable for those costs, regardless of the conduct or outcome of the Bidding process.</p> |
| 10. Language of Bid | <p>10.1 The Bid, as well as all correspondence and documents relating to the Bid exchanged by the Bidder and the Purchaser, shall be written in the language specified in the BDS. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages into the language specified in the BDS, in which case, for purposes of interpretation of the Bid, such translation shall govern.</p> |
| 11. Documents Comprising the Bid | <p>11.1 The Bid shall comprise the following:</p> <ul style="list-style-type: none"> (a) Letter of Bid prepared in accordance with ITB 12; (b) Price Schedules: completed in accordance with ITB 12 and ITB 14; |

- (c) **Bid Security or Bid-Securing Declaration**, in accordance with ITB 19.1;
- (d) **Alternative Bid**: if permissible, in accordance with ITB 13;
- (e) **Authorization**: written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ITB 20.3;
- (f) **Qualifications**: documentary evidence in accordance with ITB 17 establishing the Bidder's qualifications to perform the Contract if its Bid is accepted;
- (g) **Bidder's Eligibility**: documentary evidence in accordance with ITB 17 establishing the Bidder's eligibility to bid;
- (h) **Eligibility of Goods and Related Services**: documentary evidence in accordance with ITB 16, establishing the eligibility of the Goods and Related Services to be supplied by the Bidder;
- (i) **Conformity**: documentary evidence in accordance with ITB 16 and 30, that the Goods and Related Services conform to the bidding document; and
- (j) any other document required **in the BDS**.

11.2 In addition to the requirements under ITB 11.1, Bids submitted by a JV shall include a copy of the Joint Venture Agreement entered into by all members. Alternatively, a letter of intent to execute a Joint Venture Agreement in the event of a successful Bid shall be signed by all members and submitted with the Bid, together with a copy of the proposed Agreement.

11.3 The Bidder shall furnish in the Letter of Bid information on commissions and gratuities, if any, paid or to be paid to agents or any other party relating to this Bid.

12. Letter of Bid and Price Schedules

12.1. The Letter of Bid and Price Schedules shall be prepared using the relevant forms furnished in Section IV, Bidding Forms. The forms must be completed without any alterations to the text, and no substitutes shall be accepted except as provided under ITB 20.3. All blank spaces shall be filled in with the information requested.

13. Alternative Bids

13.1. Unless otherwise specified **in the BDS**, alternative Bids shall not be considered.

14. Bid Prices and Discounts

- 14.1 The prices and discounts quoted by the Bidder in the Letter of Bid and in the Price Schedules shall conform to the requirements specified below.
- 14.2 All lots (contracts) and items must be listed and priced separately in the Price Schedules.
- 14.3 The price to be quoted in the Letter of Bid in accordance with ITB 12.1 shall be the total price of the Bid, excluding any discounts offered.
- 14.4 The Bidder shall quote any discounts and indicate the methodology for their application in the Letter of Bid, in accordance with ITB 12.1.
- 14.5 Prices quoted by the Bidder shall be fixed during the Bidder's performance of the Contract and not subject to variation on any account, unless otherwise specified **in the BDS**. A Bid submitted with an adjustable price quotation shall be treated as nonresponsive and shall be rejected, pursuant to ITB 29. However, if in accordance with **the BDS**, prices quoted by the Bidder shall be subject to adjustment during the performance of the Contract, a Bid submitted with a fixed price quotation shall not be rejected, but the price adjustment shall be treated as zero.
- 14.6 If so specified in ITB 1.1, Bids are being invited for individual lots (contracts) or for any combination of lots (packages). Unless otherwise specified **in the BDS**, prices quoted shall correspond to 100 % of the items specified for each lot and to 100% of the quantities specified for each item of a lot. Bidders wishing to offer discounts for the award of more than one Contract shall specify in their Bid the price reductions applicable to each package, or alternatively, to individual Contracts within the package. Discounts shall be submitted in accordance with ITB 14.4 provided the Bids for all lots (contracts) are opened at the same time.
- 14.7 The terms EXW, CIP, and other similar terms shall be governed by the rules prescribed in the current edition of Incoterms, published by the International Chamber of Commerce, as specified **in the BDS**.

14.8 Prices shall be quoted as specified in each Price Schedule included in Section IV, Bidding Forms. The disaggregation of price components is required solely for the purpose of facilitating the comparison of Bids by the Purchaser. This shall not in any way limit the Purchaser's right to contract on any of the terms offered. In quoting prices, the Bidder shall be free to use transportation through carriers registered in any eligible country, in accordance with Section V, Eligible Countries. Similarly, the Bidder may obtain insurance services from any eligible country in accordance with Section V, Eligible Countries. Prices shall be entered in the following manner:

- (a) For Goods manufactured in the Purchaser's Country:
 - (i) the price of the Goods quoted EXW (ex-works, ex-factory, ex warehouse, ex showroom, or off-the-shelf, as applicable), including all customs duties and sales and other taxes already paid or payable on the components and raw material used in the manufacture or assembly of the Goods;
 - (ii) any Purchaser's Country sales tax and other taxes which will be payable on the Goods if the Contract is awarded to the Bidder; and
 - (iii) the price for inland transportation, insurance, and other local services required to convey the Goods to their final destination (Project Site) specified **in the BDS.**
- (b) For Goods manufactured outside the Purchaser's Country, to be imported:
 - (i) the price of the Goods, quoted CIP named place of destination, in the Purchaser's Country, as specified **in the BDS;**
 - (ii) the price for inland transportation, insurance, and other local services required to convey the Goods from the named place of destination to their final destination (Project Site) specified **in the BDS;**
- (c) For Goods manufactured outside the Purchaser's Country, already imported:

- (i) the price of the Goods, including the original import value of the Goods; plus any mark-up (or rebate); plus any other related local cost, and custom duties and other import taxes already paid or to be paid on the Goods already imported;
- (ii) the custom duties and other import taxes already paid (need to be supported with documentary evidence) or to be paid on the Goods already imported;
- (iii) the price of the Goods, obtained as the difference between (i) and (ii) above;
- (iv) any Purchaser's Country sales and other taxes which will be payable on the Goods if the Contract is awarded to the Bidder; and
- (v) the price for inland transportation, insurance, and other local services required to convey the Goods to their final destination (Project Site) specified **in the BDS**.

- (d) for Related Services, other than inland transportation and other services required to convey the Goods to their final destination, whenever such Related Services are specified in the Schedule of Requirements, the price of each item comprising the Related Services (inclusive of any applicable taxes).

15. Currencies of Bid and Payment

15.1 The currency(ies) of the Bid and the currency(ies) of payments shall be the same. The Bidder shall quote in the currency of the Purchaser's Country the portion of the Bid price that corresponds to expenditures incurred in the currency of the Purchaser's Country, unless otherwise specified **in the BDS**.

15.2 The Bidder may express the Bid price in any currency. If the Bidder wishes to be paid in a combination of amounts in different currencies, it may quote its price accordingly but shall use no more than three foreign currencies in addition to the currency of the Purchaser's Country.

16. Documents Establishing the Eligibility

16.1 To establish the eligibility of the Goods and Related Services in accordance with ITB 5, Bidders shall complete

**and
Conformity of
the Goods and
Related
Services**

the country of origin declarations in the Price Schedule Forms, included in Section IV, Bidding Forms.

- 16.2 To establish the conformity of the Goods and Related Services to the bidding document, the Bidder shall furnish as part of its Bid the documentary evidence that the Goods conform to the technical specifications and standards specified in Section VII, Schedule of Requirements.
- 16.3 The documentary evidence may be in the form of literature, drawings or data, and shall consist of a detailed item by item description of the essential technical and performance characteristics of the Goods and Related Services, demonstrating substantial responsiveness of the Goods and Related Services to the technical specification, and if applicable, a statement of deviations and exceptions to the provisions of the Section VII, Schedule of Requirements.
- 16.4 The Bidder shall also furnish a list giving full particulars, including available sources and current prices of spare parts, special tools, etc., necessary for the proper and continuing functioning of the Goods during the period **specified in the BDS** following commencement of the use of the goods by the Purchaser.
- 16.5 Standards for workmanship, process, material, and equipment, as well as references to brand names or catalogue numbers specified by the Purchaser in the Schedule of Requirements, are intended to be descriptive only and not restrictive. The Bidder may offer other standards of quality, brand names, and/or catalogue numbers, provided that it demonstrates, to the Purchaser's satisfaction, that the substitutions ensure substantial equivalence or are superior to those specified in the Section VII, Schedule of Requirements.

**17. Documents
Establishing
the Eligibility
and
Qualifications
of the Bidder**

- 17.1 To establish Bidder's eligibility in accordance with ITB 4, Bidders shall complete the Letter of Bid, included in Section IV, Bidding Forms.
- 17.2 The documentary evidence of the Bidder's qualifications to perform the Contract if its Bid is accepted shall establish to the Purchaser's satisfaction:

- (a) that, if required **in the BDS**, a Bidder that does not manufacture or produce the Goods it offers to supply shall submit the Manufacturer's Authorization using the form included in Section IV, Bidding Forms to demonstrate that it has been duly authorized by the manufacturer or producer of the Goods to supply these Goods in the Purchaser's Country;
- (b) that, if required **in the BDS**, in case of a Bidder not doing business within the Purchaser's Country, the Bidder is or will be (if awarded the Contract) represented by an Agent in the country equipped and able to carry out the Supplier's maintenance, repair and spare parts-stocking obligations prescribed in the Conditions of Contract and/or Technical Specifications; and
- (c) that the Bidder meets each of the qualification criterion specified in Section III, Evaluation and Qualification Criteria.

18. Period of Validity of Bids

- 18.1. Bids shall remain valid until the date **specified in the BDS** or any extended date if amended by the Purchaser in accordance with ITP 8. A Bid that is not valid until the date **specified in the BDS**, or any extended date if amended by the Purchaser in accordance with ITP 8, shall be rejected by the Purchaser as nonresponsive.
- 18.2. In exceptional circumstances, prior to the expiry of the Bid validity, the Purchaser may request Bidders to extend the period of validity of their Bids. The request and the responses shall be made in writing. If a Bid Security is requested in accordance with ITB 19, it shall also be extended for a corresponding period. A Bidder may refuse the request without forfeiting its Bid Security. A Bidder granting the request shall not be required or permitted to modify its Bid, except as provided in ITB 18.3.
- 18.3. If the award is delayed by a period exceeding fifty-six (56) days beyond the expiry of the initial Bid validity period, the Contract price shall be determined as follows:
 - (a) in the case of fixed price contracts, the Contract price shall be the Bid price adjusted by the factor specified **in the BDS**;

- (b) in the case of adjustable price contracts, no adjustment shall be made;
- (c) in any case, Bid evaluation shall be based on the Bid price without taking into consideration the applicable correction from those indicated above.

19. Bid Security

19.1. The Bidder shall furnish as part of its Bid, either a Bid-Securing Declaration or a Bid Security, as specified **in the BDS**, in original form and, in the case of a Bid Security, in the amount and currency specified **in the BDS**.

19.2. A Bid Securing Declaration shall use the form included in Section IV, Bidding Forms.

19.3. If a Bid Security is specified pursuant to ITB 19.1, the Bid Security shall be a demand guarantee in any of the following forms at the Bidder's option:

- (a) an unconditional guarantee issued by a bank or non-bank financial institution (such as an insurance, bonding or surety company);
- (b) an irrevocable letter of credit;
- (c) a cashier's or certified check; or
- (d) another security specified **in the BDS**,

from a reputable source, and an eligible country. If an unconditional guarantee is issued by a non-bank financial institution located outside the Purchaser's Country, the issuing non-bank financial institution shall have a correspondent financial institution located in the Purchaser's Country to make it enforceable unless the Purchaser has agreed in writing, prior to Bid submission, that a correspondent financial institution is not required. In the case of a bank guarantee, the Bid Security shall be submitted either using the Bid Security Form included in Section IV, Bidding Forms, or in another substantially similar format approved by the Purchaser prior to Bid submission. The Bid Security shall be valid for twenty-eight (28) days beyond the original date of expiry of the Bid validity, or beyond any extended date if requested under ITB 18.2.

19.4. If a Bid Security is specified pursuant to ITB 19.1, any Bid not accompanied by a substantially responsive Bid Security shall be rejected by the Purchaser as non-responsive.

- 19.5. If a Bid Security is specified pursuant to ITB 19.1, the Bid Security of unsuccessful Bidders shall be returned as promptly as possible upon the successful Bidder's signing the Contract and furnishing the Performance Security pursuant to ITB 46.
- 19.6. The Bid Security of the successful Bidder shall be returned as promptly as possible once the successful Bidder has signed the Contract and furnished the required Performance Security.
- 19.7. The Bid Security may be forfeited:
- (a) if a Bidder withdraws its Bid prior to the expiry date of Bid validity specified by the Bidder on the Letter of Bid or any extended date provided by the Bidder; or
 - (b) if the successful Bidder fails to:
 - (i) sign the Contract in accordance with ITB 45; or
 - (ii) furnish a Performance Security in accordance with ITB 46.
- 19.8. The Bid Security or Bid- Securing Declaration of a JV must be in the name of the JV that submits the Bid. If the JV has not been legally constituted into a legally enforceable JV at the time of Bidding, the Bid Security or Bid-Securing Declaration shall be in the names of all future members as named in the letter of intent referred to in ITB 4.1 and ITB 11.2.
- 19.9. If a Bid Security is not required **in the BDS**, pursuant to ITB 19.1, and
- (a) if a Bidder withdraws its Bid during the period of Bid validity specified by the Bidder on the Letter of Bid, or any extended date provided by the Bidder; or
 - (b) if the successful Bidder fails to: sign the Contract in accordance with ITB 45; or furnish a performance security in accordance with ITB 46;
- the Borrower may, if provided for **in the BDS**, declare the Bidder ineligible to be awarded a contract by the Purchaser for a period of time as stated **in the BDS**.

20. Format and Signing of Bid

- 20.1 The Bidder shall prepare one original of the documents comprising the Bid as described in ITB 11 and clearly mark it "ORIGINAL." Alternative Bids, if permitted in accordance with ITB 13, shall be clearly marked "ALTERNATIVE." In addition, the Bidder shall submit copies of the Bid, in the number **specified in the BDS** and clearly mark them "COPY." In the event of any discrepancy between the original and the copies, the original shall prevail.
- 20.2 Bidders shall mark as "CONFIDENTIAL" information in their Bids which is confidential to their business. This may include proprietary information, trade secrets, or commercial or financially sensitive information.
- 20.3 The original and all copies of the Bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation as specified **in the BDS** and shall be attached to the Bid. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the Bid where entries or amendments have been made shall be signed or initialed by the person signing the Bid.
- 20.4 In case the Bidder is a JV, the Bid shall be signed by an authorized representative of the JV on behalf of the JV, and so as to be legally binding on all the members as evidenced by a power of attorney signed by their legally authorized representatives.
- 20.5 Any inter-lineation, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the Bid.

D. Submission and Opening of Bids

21. Sealing and Marking of Bids

- 21.1. The Bidder shall deliver the Bid in a single, sealed envelope (one-envelope Bidding process). Within the single envelope the Bidder shall place the following separate, sealed envelopes:
- (a) in an envelope marked "ORIGINAL", all documents comprising the Bid, as described in ITB 11; and
 - (b) in an envelope marked "COPIES", all required copies of the Bid; and,

- (c) if alternative Bids are permitted in accordance with ITB 13, and if relevant:
 - i. in an envelope marked “ORIGINAL -ALTERNATIVE”, the alternative Bid; and
 - ii. in the envelope marked “COPIES – ALTERNATIVE BID” all required copies of the alternative Bid.

21.2. The inner and outer envelopes, shall:

- (a) bear the name and address of the Bidder;
- (b) be addressed to the Purchaser in accordance with ITB 22.1;
- (c) bear the specific identification of this Bidding process indicated in ITB 1.1; and
- (d) bear a warning not to open before the time and date for Bid opening.

21.3 If all envelopes are not sealed and marked as required, the Purchaser will assume no responsibility for the misplacement or premature opening of the Bid.

22. Deadline for Submission of Bids

22.1. Bids must be received by the Purchaser at the address and no later than the date and time specified **in the BDS**. When so specified **in the BDS**, Bidders shall have the option of submitting their Bids electronically. Bidders submitting Bids electronically shall follow the electronic Bid submission procedures specified **in the BDS**.

22.2. The Purchaser may, at its discretion, extend the deadline for the submission of Bids by amending the bidding document in accordance with ITB 8, in which case all rights and obligations of the Purchaser and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.

23. Late Bids

23.1. The Purchaser shall not consider any Bid that arrives after the deadline for submission of Bids, in accordance with ITB 22. Any Bid received by the Purchaser after the deadline for submission of Bids shall be declared late, rejected, and returned unopened to the Bidder.

24. Withdrawal, Substitution, and

24.1. A Bidder may withdraw, substitute, or modify its Bid after it has been submitted by sending a written notice, duly signed by an authorized representative, and shall include a

Modification of Bids

copy of the authorization (the power of attorney) in accordance with ITB 20.3, (except that withdrawal notices do not require copies). The corresponding substitution or modification of the Bid must accompany the respective written notice. All notices must be:

- (a) prepared and submitted in accordance with ITB 20 and 21 (except that withdrawal notices do not require copies), and in addition, the respective envelopes shall be clearly marked “WITHDRAWAL,” “SUBSTITUTION,” or “MODIFICATION;” and
- (b) received by the Purchaser prior to the deadline prescribed for submission of Bids, in accordance with ITB 22.

24.2. Bids requested to be withdrawn in accordance with ITB 24.1 shall be returned unopened to the Bidders.

24.3. No Bid may be withdrawn, substituted, or modified in the interval between the deadline for submission of Bids and the expiration of the period of Bid validity specified by the Bidder on the Letter of Bid or any extension thereof.

25. Bid Opening

25.1. Except as in the cases specified in ITB 23 and ITB 24.2, the Purchaser shall, at the Bid opening, publicly open and read out all Bids received by the deadline at the date, time and place specified **in the BDS** in the presence of Bidders’ designated representatives and anyone who chooses to attend. Any specific electronic Bid opening procedures required if electronic bidding is permitted in accordance with ITB 22.1, shall be as specified **in the BDS**.

25.2. First, envelopes marked “WITHDRAWAL” shall be opened and read out and the envelope with the corresponding Bid shall not be opened, but returned to the Bidder. If the withdrawal envelope does not contain a copy of the “power of attorney” confirming the signature as a person duly authorized to sign on behalf of the Bidder, the corresponding Bid will be opened. No Bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at Bid opening.

- 25.3. Next, envelopes marked “SUBSTITUTION” shall be opened and read out and exchanged with the corresponding Bid being substituted, and the substituted Bid shall not be opened, but returned to the Bidder. No Bid substitution shall be permitted unless the corresponding substitution notice contains a valid authorization to request the substitution and is read out at Bid opening.
- 25.4. Next, envelopes marked “MODIFICATION” shall be opened and read out with the corresponding Bid. No Bid modification shall be permitted unless the corresponding modification notice contains a valid authorization to request the modification and is read out at Bid opening.
- 25.5. Next, all remaining envelopes shall be opened one at a time, reading out: the name of the Bidder and whether there is a modification; the total Bid Prices, per lot (contract) if applicable, including any discounts and alternative Bids; the presence or absence of a Bid Security, if required; and any other details as the Purchaser may consider appropriate.
- 25.6. Only Bids, alternative Bids and discounts that are opened and read out at Bid opening shall be considered further in the evaluation. The Letter of Bid and the Price Schedules are to be initialed by representatives of the Purchaser attending Bid opening in the manner specified **in the BDS**.
- 25.7. The Purchaser shall neither discuss the merits of any Bid nor reject any Bid (except for late Bids, in accordance with ITB 23.1).
- 25.8. The Purchaser shall prepare a record of the Bid opening that shall include, as a minimum:
- (a) the name of the Bidder and whether there is a withdrawal, substitution, or modification;
 - (b) the Bid Price, per lot (contract) if applicable, including any discounts;
 - (c) any alternative Bids;
 - (d) the presence or absence of a Bid Security or Bid-Securing Declaration, if one was required.
- 25.9. The Bidders’ representatives who are present shall be requested to sign the record. The omission of a Bidder’s

signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders.

E. Evaluation and Comparison of Bids

- 26. Confidentiality**
- 26.1 Information relating to the evaluation of Bids and recommendation of contract award, shall not be disclosed to Bidders or any other persons not officially concerned with the Bidding process until the information on Intention to Award the Contract is transmitted to all Bidders in accordance with ITB 40.
- 26.2 Any effort by a Bidder to influence the Purchaser in the evaluation or contract award decisions may result in the rejection of its Bid.
- 26.3 Notwithstanding ITB 26.2, from the time of Bid opening to the time of Contract Award, if any Bidder wishes to contact the Purchaser on any matter related to the Bidding process, it should do so in writing.
- 27. Clarification of Bids**
- 27.1 To assist in the examination, evaluation, comparison of the Bids, and qualification of the Bidders, the Purchaser may, at its discretion, ask any Bidder for a clarification of its Bid. Any clarification submitted by a Bidder in respect to its Bid and that is not in response to a request by the Purchaser shall not be considered. The Purchaser's request for clarification and the response shall be in writing. No change, including any voluntary increase or decrease, in the prices or substance of the Bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Purchaser in the Evaluation of the Bids, in accordance with ITB 31.
- 27.2 If a Bidder does not provide clarifications of its Bid by the date and time set in the Purchaser's request for clarification, its Bid may be rejected.
- 28. Deviations, Reservations, and Omissions**
- 28.1 During the evaluation of Bids, the following definitions apply:
- (a) "Deviation" is a departure from the requirements specified in the bidding document;

- (b) “Reservation” is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the bidding document; and
- (c) “Omission” is the failure to submit part or all of the information or documentation required in the bidding document.

29. Determination of Responsiveness

- 29.1 The Purchaser’s determination of a Bid’s responsiveness is to be based on the contents of the Bid itself, as defined in ITB 11.
- 29.2 A substantially responsive Bid is one that meets the requirements of the bidding document without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that:
 - (a) if accepted, would:
 - (i) affect in any substantial way the scope, quality, or performance of the Goods and Related Services specified in the Contract; or
 - (ii) limit in any substantial way, inconsistent with the bidding document, the Purchaser’s rights or the Bidder’s obligations under the Contract; or
 - (b) if rectified, would unfairly affect the competitive position of other Bidders presenting substantially responsive Bids.
- 29.3 The Purchaser shall examine the technical aspects of the Bid submitted in accordance with ITB 16 and ITB 17, in particular, to confirm that all requirements of Section VII, Schedule of Requirements have been met without any material deviation or reservation, or omission.
- 29.4 If a Bid is not substantially responsive to the requirements of bidding document, it shall be rejected by the Purchaser and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.

30. Nonconformities, Errors and Omissions

- 30.1 Provided that a Bid is substantially responsive, the Purchaser may waive any nonconformities in the Bid.
- 30.2 Provided that a Bid is substantially responsive, the Purchaser may request that the Bidder submit the necessary

information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities or omissions in the Bid related to documentation requirements. Such omission shall not be related to any aspect of the price of the Bid. Failure of the Bidder to comply with the request may result in the rejection of its Bid.

- 30.3 Provided that a Bid is substantially responsive, the Purchaser shall rectify quantifiable nonmaterial nonconformities related to the Bid Price. To this effect, the Bid Price shall be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component, by adding the average price of the item or component quoted by substantially responsive Bidders. If the price of the item or component cannot be derived from the price of other substantially responsive Bids, the Purchaser shall use its best estimate.

31. Correction of Arithmetical Errors

- 31.1 Provided that the Bid is substantially responsive, the Purchaser shall correct arithmetical errors on the following basis:
- (a) if there is a discrepancy between the unit price and the line item total that is obtained by multiplying the unit price by the quantity, the unit price shall prevail and the line item total shall be corrected, unless in the opinion of the Purchaser there is an obvious misplacement of the decimal point in the unit price, in which case the line item total as quoted shall govern and the unit price shall be corrected;
 - (b) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and
 - (c) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a) and (b) above.
- 31.2 Bidders shall be requested to accept correction of arithmetical errors. Failure to accept the correction in accordance with ITB 31.1, shall result in the rejection of the Bid.

- 32. Conversion to Single Currency** 32.1 For evaluation and comparison purposes, the currency(ies) of the Bid shall be converted in a single currency as specified **in the BDS**.
- 33. Margin of Preference** 33.1 Unless otherwise specified **in the BDS**, a margin of preference shall not apply.
- 34. Evaluation of Bids** 34.1 The Purchaser shall use the criteria and methodologies listed in this ITB and Section III, Evaluation and Qualification criteria. No other evaluation criteria or methodologies shall be permitted. By applying the criteria and methodologies, the Purchaser shall determine the Most Advantageous Bid. This is the Bid of the Bidder that meets the qualification criteria and whose Bid has been determined to be:
- (a) substantially responsive to the bidding document; and
 - (b) the lowest evaluated cost.
- 34.2 To evaluate a Bid, the Purchaser shall consider the following:
- (a) evaluation will be done for Items or Lots (contracts), as specified **in the BDS**; and the Bid Price as quoted in accordance with ITB 14;
 - (b) price adjustment for correction of arithmetic errors in accordance with ITB 31.1;
 - (c) price adjustment due to discounts offered in accordance with ITB 14.4;
 - (d) converting the amount resulting from applying (a) to (c) above, if relevant, to a single currency in accordance with ITB 32;
 - (e) price adjustment due to quantifiable nonmaterial nonconformities in accordance with ITB 30.3; and
 - (f) the additional evaluation factors are specified in Section III, Evaluation and Qualification Criteria.
- 34.3 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in Bid evaluation.
- 34.4 If this bidding document allows Bidders to quote separate prices for different lots (contracts), the methodology to determine the lowest evaluated cost of the lot (contract)

combinations, including any discounts offered in the Letter of Bid, is specified in Section III, Evaluation and Qualification Criteria.

34.5 The Purchaser's evaluation of a Bid will exclude and not take into account:

- (a) in the case of Goods manufactured in the Purchaser's Country, sales and other similar taxes, which will be payable on the goods if a contract is awarded to the Bidder;
- (b) in the case of Goods manufactured outside the Purchaser's Country, already imported or to be imported, customs duties and other import taxes levied on the imported Good, sales and other similar taxes, which will be payable on the Goods if the contract is awarded to the Bidder;
- (c) any allowance for price adjustment during the period of execution of the contract, if provided in the Bid.

34.6 The Purchaser's evaluation of a Bid may require the consideration of other factors, in addition to the Bid Price quoted in accordance with ITB 14. These factors may be related to the characteristics, performance, and terms and conditions of purchase of the Goods and Related Services. The effect of the factors selected, if any, shall be expressed in monetary terms to facilitate comparison of Bids, unless otherwise specified **in the BDS** from amongst those set out in Section III, Evaluation and Qualification Criteria. The criteria and methodologies to be used shall be as specified in ITB 34.2(f).

35. Comparison of Bids

35.1 The Purchaser shall compare the evaluated costs of all substantially responsive Bids established in accordance with ITB 34.2 to determine the Bid that has the lowest evaluated cost. The comparison shall be on the basis of CIP (place of final destination) prices for imported goods and EXW prices, plus cost of inland transportation and insurance to place of destination, for goods manufactured within the Borrower's country, together with prices for any required installation, training, commissioning and other services. The evaluation of prices shall not take into account custom duties and other taxes levied on imported

goods quoted CIP and sales and similar taxes levied in connection with the sale or delivery of goods.

36. Abnormally Low Bids

- 36.1 An Abnormally Low Bid is one where the Bid price, in combination with other constituent elements of the Bid, appears unreasonably low to the extent that the Bid price raises material concerns with the Purchaser as to the capability of the Bidder to perform the Contract for the offered Bid price.
- 36.2 In the event of identification of a potentially Abnormally Low Bid, the Purchaser shall seek written clarification from the Bidder, including a detailed price analyses of its Bid price in relation to the subject matter of the contract, scope, delivery schedule, allocation of risks and responsibilities and any other requirements of the bidding document.
- 36.3 After evaluation of the price analyses, in the event that the Purchaser determines that the Bidder has failed to demonstrate its capability to perform the contract for the offered Bid price, the Purchaser shall reject the Bid.

37. Qualification of the Bidder

- 37.1 The Purchaser shall determine, to its satisfaction, whether the eligible Bidder that is selected as having submitted the lowest evaluated cost and substantially responsive Bid, meets the qualifying criteria specified in Section III, Evaluation and Qualification Criteria.
- 37.2 The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to ITB 17. The determination shall not take into consideration the qualifications of other firms such as the Bidder's subsidiaries, parent entities, affiliates, subcontractors (other than specialized subcontractors if permitted in the bidding document), or any other firm(s) different from the Bidder.
- 37.3 Prior to Contract award, the Purchaser will verify that the successful Bidder (including each member of a JV) is not disqualified by the Bank due to noncompliance with contractual SEA/SH prevention and response obligations. The Purchaser will conduct the same verification for each subcontractor proposed by the successful Bidder. If any

proposed subcontractor does not meet the requirement, the Purchaser will require the Bidder to propose a replacement subcontractor.

- 37.4 An affirmative determination shall be a prerequisite for award of the Contract to the Bidder. A negative determination shall result in disqualification of the Bid, in which event the Purchaser shall proceed to the Bidder who offers a substantially responsive Bid with the next lowest evaluated cost to make a similar determination of that Bidder's qualifications to perform satisfactorily.

38. Purchaser's Right to Accept Any Bid, and to Reject Any or All Bids

- 38.1 The Purchaser reserves the right to accept or reject any Bid, and to annul the Bidding process and reject all Bids at any time prior to Contract Award, without thereby incurring any liability to Bidders. In case of annulment, all Bids submitted and specifically, bid securities, shall be promptly returned to the Bidders.

39. Standstill Period

- 39.1 The Contract shall not be awarded earlier than the expiry of the Standstill Period. The Standstill Period shall be ten (10) Business Days unless extended in accordance with ITB 44. The Standstill Period commences the day after the date the Purchaser has transmitted to each Bidder the Notification of Intention to Award the Contract. Where only one Bid is submitted, or if this contract is in response to an emergency situation recognized by the Bank, the Standstill Period shall not apply.

40. Notification of Intention to Award

- 40.1 The Purchaser shall send to each Bidder the Notification of Intention to Award the Contract to the successful Bidder. The Notification of Intention to Award shall contain, at a minimum, the following information:
- (a) the name and address of the Bidder submitting the successful Bid;
 - (b) the Contract price of the successful Bid;
 - (c) the names of all Bidders who submitted Bids, and their Bid prices as readout, and as evaluated;
 - (d) a statement of the reason(s) the Bid (of the unsuccessful Bidder to whom the notification is addressed) was unsuccessful, unless the price information in c) above already reveals the reason;
 - (e) the expiry date of the Standstill Period;

- (f) instructions on how to request a debriefing and/or submit a complaint during the standstill period.

F. Award of Contract

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| 41. Award Criteria | 41.1 Subject to ITB 38, the Purchaser shall award the Contract to the Bidder offering the Most Advantageous Bid. The Most Advantageous Bid is the Bid of the Bidder that meets the qualification criteria and whose Bid has been determined to be: <ul style="list-style-type: none">(a) substantially responsive to the bidding document; and(b) the lowest evaluated cost. |
| 42. Purchaser's Right to Vary Quantities at Time of Award | 42.1 At the time the Contract is awarded, the Purchaser reserves the right to increase or decrease the quantity of Goods and Related Services originally specified in Section VII, Schedule of Requirements, provided this does not exceed the percentages specified in the BDS , and without any change in the unit prices or other terms and conditions of the Bid and the bidding document. |
| 43. Notification of Award | <div>43.1 Prior to the date of expiry of the Bid validity and upon expiry of the Standstill Period, specified in ITB 39.1 or any extension thereof, and upon satisfactorily addressing any complaint that has been filed within the Standstill Period, the Purchaser shall notify the successful Bidder, in writing, that its Bid has been accepted. The notification of award (hereinafter and in the Contract Forms called the "Letter of Acceptance") shall specify the sum that the Purchaser will pay the Supplier in consideration of the execution of the Contract (hereinafter and in the Conditions of Contract and Contract Forms called "the Contract Price").</div> <div>43.2 Within ten (10) Business Days after the date of transmission of the Letter of Acceptance, the Purchaser shall publish the Contract Award Notice which shall contain, at a minimum, the following information:<ul style="list-style-type: none">(a) name and address of the Purchaser;(b) name and reference number of the contract being awarded, and the selection method used;(c) names of all Bidders that submitted Bids, and their Bid prices as read out at Bid opening, and as evaluated;</div> |

- (d) names of all Bidders whose Bids were rejected either as nonresponsive or as not meeting qualification criteria, or were not evaluated, with the reasons therefor;
- (e) the name of the successful Bidder, the final total contract price, the contract duration and a summary of its scope; and
- (f) successful Bidder's Beneficial Ownership Disclosure Form, if specified in BDS ITB 45.1.

43.2 The Contract Award Notice shall be published on the Purchaser's website with free access if available, or in at least one newspaper of national circulation in the Purchaser's Country, or in the official gazette. The Purchaser shall also publish the contract award notice in UNDB online.

43.3 Until a formal Contract is prepared and executed, the Letter of Acceptance shall constitute a binding Contract.

44. Debriefing by the Purchaser

44.2 On receipt of the Purchaser's Notification of Intention to Award referred to in ITB 40.1, an unsuccessful Bidder has three (3) Business Days to make a written request to the Purchaser for a debriefing. The Purchaser shall provide a debriefing to all unsuccessful Bidders whose request is received within this deadline.

44.3 Where a request for debriefing is received within the deadline, the Purchaser shall provide a debriefing within five (5) Business Days, unless the Purchaser decides, for justifiable reasons, to provide the debriefing outside this timeframe. In that case, the standstill period shall automatically be extended until five (5) Business Days after such debriefing is provided. If more than one debriefing is so delayed, the standstill period shall not end earlier than five (5) Business Days after the last debriefing takes place. The Purchaser shall promptly inform, by the quickest means available, all Bidders of the extended standstill period.

44.4 Where a request for debriefing is received by the Purchaser later than the three (3)-Business Day deadline, the Purchaser should provide the debriefing as soon as

practicable, and normally no later than fifteen (15) Business Days from the date of publication of Public Notice of Award of contract. Requests for debriefing received outside the three (3)-day deadline shall not lead to extension of the standstill period.

- 44.5 Debriefings of unsuccessful Bidders may be done in writing or verbally. The Bidders shall bear their own costs of attending such a debriefing meeting.

45. Signing of Contract

- 45.1 The Purchaser shall send to the successful Bidder the Letter of Acceptance including the Contract Agreement, and, if specified in the BDS, a request to submit the Beneficial Ownership Disclosure Form providing additional information on its beneficial ownership. The Beneficial Ownership Disclosure Form, if so requested, shall be submitted within eight (8) Business Days of receiving this request.
- 45.2 The successful Bidder shall sign, date and return to the Purchaser, the Contract Agreement within twenty-eight (28) days of its receipt.
- 45.3 Notwithstanding ITB 45.2 above, in case signing of the Contract Agreement is prevented by any export restrictions attributable to the Purchaser, to the country of the Purchaser, or to the use of the products/goods, systems or services to be supplied, where such export restrictions arise from trade regulations from a country supplying those products/goods, systems or services, the Bidder shall not be bound by its Bid, always provided however, that the Bidder can demonstrate to the satisfaction of the Purchaser and of the Bank that signing of the Contract Agreement has not been prevented by any lack of diligence on the part of the Bidder in completing any formalities, including applying for permits, authorizations and licenses necessary for the export of the products/goods, systems or services under the terms of the Contract.

46. Performance Security

- 46.1 Within twenty-eight (28) days of the receipt of Letter of Acceptance from the Purchaser, the successful Bidder, if required, shall furnish the Performance Security in accordance with the GCC 18, using for that purpose the

Performance Security Form included in Section X, Contract Forms, or another Form acceptable to the Purchaser. If the Performance Security furnished by the successful Bidder is in the form of a bond, it shall be issued by a bonding or insurance company that has been determined by the successful Bidder to be acceptable to the Purchaser. A foreign institution providing a bond shall have a correspondent financial institution located in the Purchaser's Country, unless the Purchaser has agreed in writing that a correspondent financial institution is not required.

- 46.2 Failure of the successful Bidder to submit the above-mentioned Performance Security or sign the Contract shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Security. In that event the Purchaser may award the Contract to the Bidder offering the next Most Advantageous Bid.

**47. Procurement
Related
Complaint**

- 47.1 The procedures for making a Procurement-related Complaint are as specified in the BDS.

Section II - Bid Data Sheet (BDS)

The following specific data for the goods to be procured shall complement, supplement, or amend the provisions in the Instructions to Bidders (ITB). Whenever there is a conflict, the provisions herein shall prevail over those in ITB.

ITB Reference	A. General
ITB 1.1	<p>The reference number of the Request for Bids (RFB) is: AO-MINEA-GEPE-210044-GO-RFB</p> <p>The Purchaser is: Ministry of Energy and Water/ Electricity Sector Improvement and Access Project</p> <p>The name of the RFB is: Supply and Installation of meters and meter control center for the Revenue Protection Program</p> <p>The number and identification of lots (contracts) comprising this RFB is: Supply and Installation of meters and meter control center for the Revenue Protection Program</p> <p><i>The RFB comprises one (1) single lot.</i></p> <p>Notes:</p> <ul style="list-style-type: none"> i. This Contract includes among others: <ul style="list-style-type: none"> (a) supply of hardware and software, (b) system installation, (c) training, and (d) on-site maintenance support services during the first year of live operation. ii. Bidders are required to additionally quote costs for maintenance of the software packages (MRS/MDM and other secondary) that are part of the RPP, for the first 3 years of operation for the time the items are expected to function.
ITB 1.2(a)	N/A
ITB 2.1	<p>The Borrower is: Government of Angola</p> <p>Loan or Financing Agreement amount: US\$ 417.00 million</p> <p>The name of the Project is: Electricity Sector Improvement and Access Project.</p>
ITB 4.1	<p>Maximum number of members in the Joint Venture (JV) shall be: 04 (Four).</p>

ITB 4.5	A list of debarred firms and individuals is available on the Bank's external website: http://www.worldbank.org/debarr .
	B. Contents of Bidding Document
ITB 7.1	<p>For <u>Clarification of Bid purposes</u> only, the Purchaser's address is:</p> <p>Electricity Sector improvement and Access Project Project Coordination Unit Attn: Mr. João Moreira Pinto Saraiva Project Coordinator Condomínio Astros Prédio Aquário, Apto 120-D Rua do MAT - Talatona Luanda - Angola Tel.: +244 947 913 331 E-mail: esiap.ucp.minea@gmail.com Electronic mail address: esiap.ucp.minea@gmail.com Requests for clarification should be received by the Purchaser no later than: 15 days prior to the deadline for submission of Bids.</p>
	C. Preparation of Bids
ITB 10.1	<p>The language of the Bid is: English.</p> <p>All correspondence exchange shall be in English language.</p> <p>Language for translation of supporting documents and printed literature is English.</p>
ITB 11.1 (j)	<p>The Bidder shall submit the following additional documents in its Bid:</p> <ol style="list-style-type: none"> 1. A statement demonstrating your understanding of the work to be performed under this contract (approach and methodology) 2. Technical Proposal <ol style="list-style-type: none"> i. Complete and detailed technical and functional description of the equipment and services proposed. ii. A general description of the system architecture, and a detailed explanation of the system as designed and configured. iii. Diagrams of the systems that illustrate the components to be installed at each facility, and a complete listing of components by facility shall be included. iv. The Specifications of the IT to support the AMI System components including software. v. Proposed Quality Assurance Program. vi. Strategy and plan for training of system users and operators. vii. Support services for 36 months of operation of system.

	<p>viii. Strategy for System Maintenance, Evolution and Update Support Program.</p> <p>ix. Submit Management Strategies and Implementation Plans (MSIPs) to manage the key ES risks.</p>
ITB 13.1	Alternative Bids shall not be considered.
ITB 14.5	The prices quoted by the Bidder shall be subject to adjustment during the performance of the Contract.
ITB 14.6	<p>Prices quoted for each lot (contract) shall correspond at least to 100 percent of the items specified for each lot (contract).</p> <p>Prices quoted for each item of a lot shall correspond at least to 100 percent of the quantities specified for this item of a lot.</p>
ITB 14.7	The Incoterms edition is: 2020
ITB 14.8 (b)(i)	<p>Place of destination:</p> <p>For software deployment: ENDE office in the city of Luanda</p> <p>For goods delivery: City of Luanda and at all locations where the meters are installed.</p> <p>For ICT equipment Installation: City of Luanda and eventually in other places found necessary.</p> <p>For measurement equipment Installation: In the 18 Provinces of Angola to AT, MT and BT customers (high consumption), according to the installation plan.</p>
ITB 14.8 (a)(iii), (b)(ii) and (c)(v)	<p>Final Destination (Project Site): Central warehouse of ENDE in Luanda, Angola</p> <p>For software deployment: ENDE office in city of Luanda</p> <p>For goods delivery: City of Luanda and at all locations where the meters are installed.</p> <p>For ICT equipment Installation: City of Luanda and eventually in other places found necessary.</p> <p>For measurement equipment Installation: In the 18 Provinces of Angola to AT, MT and BT customers (high consumption), according to the installation plan.</p>
ITB 15.1	The Bidder is not required to quote in the currency of the Purchaser's Country the portion of the Bid price that corresponds to expenditures incurred in that currency.

ITB 17.2 (a)	Manufacturer's authorization: is required.
ITB 17.2 (b)	After sales service is: not required.
ITB 18.1	The Bid shall be valid until: 120 days after bid opening.
ITB 18.3 (a)	The Bid price shall be adjusted by the following factor(s): N/A
ITB 19.1	A <i>Bid Security</i> shall be required. If a Bid Security shall be required, the amount and currency of the Bid Security shall be: US\$ 70.000,00
ITB 19.3 (d)	Other types of acceptable securities: None
ITB 20.1	In addition to the original of the Bid, the number of copies is: 03 (three) originals, 3 (three) copies (two) as well as a digital copy submitted in a USB drive.
ITB 20.3	The written confirmation of authorization to sign on behalf of the Bidder shall consist of: Power of Attorney.
	D. Submission and Opening of Bids
ITB 22.1	For <u>Bid submission purposes</u> only, the Purchaser's address is: Attention: Project Coordinator - Mr. João Moreira Pinto Saraiva Address: Avenida Cónego Manuel das Neves, 234 – R/C City: Luanda Country: Angola The deadline for Bid submission is: Date: 06 December 2022 Time: 14:30min Floor: r/c Room: ENDE Meeting Room No. 2 In addition to the regular method of Bid Submission as detailed in the ITB, the following additional option for submission of Bids is available in view of COVID 19: Not Applicable.
ITB 25.1	The Bid opening shall take place at: Address: ENDE-EP Avenida Cónego Manuel das Neves, 234 – R/C City: Luanda; Country: Angola Date: 16 December 2022

	Time: 14:35 min Floor: r/c Room: ENDE Meeting Room No. 2
ITB 25.6	The Letter of Bid and Price Schedules shall be initialed by all the representatives of the Purchaser conducting Bid opening. Each Bid shall be initialed by all 3 representatives of the purchaser
E. Evaluation and Comparison of Bids	
ITB 30.3	The adjustment shall be based on the <i>“highest”</i> price of the item or component as quoted in other substantially responsive Bids. If the price of the item or component cannot be derived from the price of other substantially responsive Bids, the Purchaser shall use its best estimate.
ITB 32.1	The currency that shall be used for Bid evaluation and comparison purposes to convert at the selling exchange rate all Bid prices expressed in various currencies into a single currency is: USD The source of exchange rate shall be: National Bank of Angola (Banco Nacional de Angola). The date for the exchange rate shall be: 01 December 2022
ITB 33.1	A margin of domestic preference <i>shall not</i> apply.
ITB 34.2(a)	Evaluation will be done for Lot (contract) Note: Bids will be evaluated lot by lot. If a Price Schedule shows items listed but not priced, their prices shall be assumed to be included in the prices of other items. An item not listed in the Price Schedule shall be assumed to be not included in the Bid, and provided that the Bid is substantially responsive, the average or highest price (as specified in the BDS) of the item quoted by substantially responsive Bidders will be added to the Bid price and the equivalent total cost of the Bid so determined will be used for price comparison.
ITB 34.6	The adjustments shall be determined using the following criteria, from amongst those set out in Section III, Evaluation and Qualification Criteria: <ul style="list-style-type: none"> (a) Deviation in Delivery schedule: No. (b) Deviation in payment schedule: No. (c) the cost of major replacement component, mandatory spare parts, and service: No. (d) the availability in the Purchaser’s Country of spare parts and after-sales services for the equipment offered in the Bid: No

	<p>(e) Life cycle costs: the costs during the life of the goods or equipment No</p> <p>(f) the performance and productivity of the equipment offered: No</p>
	F. Award of Contract
ITB 42	<p>The maximum percentage by which quantities may be increased is: 10%</p> <p>The maximum percentage by which quantities may be decreased is: 10%</p>
ITB 45. 1	The successful Bidder shall submit the Beneficial Ownership Disclosure Form.
ITB 47.1	<p>The procedures for making a Procurement-related Complaint are detailed in the “Procurement Regulations for IPF Borrowers (Annex III).” If a Bidder wishes to make a Procurement-related Complaint, the Bidder should submit its complaint following these procedures, in writing (by the quickest means available, that is either by email or fax), to:</p> <p>For the attention: Mr. João Moreira Pinto Saraiva</p> <p>Title/position: Project Coordinator</p> <p>Purchaser: Ministry of Energy and Water</p> <p>Email address: jmpsaraiva@gmail.com</p> <p>In summary, a Procurement-related Complaint may challenge any of the following:</p> <ol style="list-style-type: none"> 1. the terms of the Bidding Documents; and 2. the Purchaser’s decision to award the contract.

Section III - Evaluation and Qualification Criteria

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1. Margin of Preference (ITB 33) Not Applicable

Most Advantageous Bid

The Purchaser shall use the criteria and methodologies listed in Section 2 and 3 below to determine the Most Advantageous Bid. The Most Advantageous Bid is the Bid of the Bidder that meets the qualification criteria and whose Bid has been determined to be:

- (a) substantially responsive to the bidding document; and
- (b) the lowest evaluated cost.

2. Evaluation (ITB 34)

2.1. Evaluation Criteria (ITB 34.6)

The Purchaser's evaluation of a Bid may take into account, in addition to the Bid Price quoted in accordance with ITB 14.8, one or more of the following factors as specified in ITB 34.2(f) and in BDS referring to ITB 34.6, using the following criteria and methodologies.

- (a) Delivery schedule. (As per Incoterms specified in the BDS)
Not Applicable
- (b) Deviation in payment schedule.
Not Applicable
- (d) Cost of major replacement components, mandatory spare parts, and service.
Not Applicable
- (d) Availability in the Purchaser's Country of spare parts and after sales services for equipment offered in the Bid.
Not Applicable
- (e) Life Cycle Costs
If specified in BDS 34.6, an adjustment to take into account the additional life cycle costs for the period specified below, such as the operating and maintenance costs of the Goods, will be added to the Bid price, for evaluation purposes only. The adjustment will be evaluated in accordance with the methodology specified below and the following information:
- (f) Missing Items
If specified in **BDS 30.3**, an adjustment to take into account is the missing items founded in the proposal will be added to the Bid price, for evaluation purposes only. The adjustment will be evaluated in accordance with the methodology specified below and the following information:
 - (i) for the missing item will be took the highest price of the same item from all other bid proposal.
- (g) Performance and productivity of the equipment:
Not Applicable
- (h) Specific additional criteria
Pass/fail technical requirements will be evaluated on a pass/fail (Compliance basis)

2.2. Multiple Contracts (ITB 34.4) Not Applicable

2.3. Alternative Bids (ITB 13.1) Not Applicable

3. Qualification (ITB 37)

3.1 Qualification Criteria (ITB 37.1)

After determining the substantially responsive Bid which offers the lowest-evaluated cost in accordance with ITB 34, and, if applicable, the assessment of any Abnormally Low Bid (in accordance with ITB 36) the Purchaser shall carry out the post-qualification of the Bidder in accordance with ITB 37, using only the requirements specified. Requirements not included in the text below shall not be used in the evaluation of the Bidder's qualifications.

(a) **Documentary Evidence:** The Bidder shall furnish documentary evidence to demonstrate that the goods it offers meet the following usage requirement:

The Bidder shall furnish documentary evidence to demonstrate that the Goods it offers meet the following usage requirement:

- i. Declarations of conformity with the applicable IEC Standards (meters) as was specified in the Technical Specification.
- ii. DLMS-COSEM Compatibility Certificate for all meters and the software proposed.
- iii. Quality Assurance Certificates ISO-9001:2008 of the manufacturers of the offered goods
- iv. The make and model of the goods offered should have been in usage and performing satisfactorily over at least the last five years.

(b) **Bidder References:** The Bidder must be able to demonstrate experience and capability in installation and maintenance of the proposed system, by providing evidence of successfully completing projects of similar size and scope. The Bidder shall provide a list of customer references, with the following information:

- Customer name and location
- Contact person(s): name, title and telephone number
- Bidder's project manager for the engagement
- System size (agents, trunks, etc.)
- System model number and software generic version in use at present
- System installation date and maintenance support services (by the Bidder)
- Years system being maintained by the Bidder

The Purchaser may make any background checks, as deemed necessary, to determine the ability of Bidders to perform the work, and Bidders shall furnish the Purchaser all such information and data for this purpose as the Purchaser may request.

(c) **Manufacturer's authorization:** A Bidder who does not manufacture an item/s where a manufacturer authorization is required in accordance with BDS ITB 17.2 (a), the Bidder shall provide evidence of being duly authorized by a manufacturer (Manufacturer's Authorization Form, Section IV, Bidding Forms), meeting the criteria in (d) (i) and (ii) above, to supply the Goods;

(d) A bidder who does who does not manufacture an item/s where a manufacturer authorization is not required in accordance with BDS ITB 17.2 (a), the bidder shall submit documentation on, its status as a supplier, to the satisfaction of the Purchaser (e.g. authorized dealer/ distributor of the items).

At the time of Contract Award, the Bidder (including each subcontractor proposed by the Bidder) shall not be subject to disqualification by the Bank for non-compliance with SEA/SH obligations.

- 3.2: History of Contract Non/Performance;
- 3.3: Financial situation and performance;
- 3.4: Systems Experience;
- 3.5: Bidder's Specific Experience;
- 3.6: Bidder's Personnel and Project Team;

Factor	3.2 Historical Contract Non-Performance					
Sub-Factor	Criteria					Documentation Required
	Requirement	Bidder				
		Single Entity	Joint Venture, Consortium or Association			
			All partners combined	Each partner	At least one partner	
3.2.1 History of non-performing contracts	Non-performance of a contract did not occur within the last five (05) years prior to the deadline for bid submission, based on all information on fully settled disputes or litigation. A fully settled dispute or litigation is one that has been resolved in accordance with the Dispute Resolution Mechanism under the respective contract, and where all appeal instances available to the bidder have been exhausted.	Must meet requirement by itself or as partner to past or existing JVA	N / A	Must meet requirement by itself or as partner to past or existing JVA	N / A	Form CON – 1
3.2.2 Suspension Based on Execution of Bid Securing Declaration by the Employer or withdrawal of the Bid within Bid validity	Not under suspension based on execution of a Bid Securing Declaration pursuant to ITB 4.6 or withdrawal of the Bid pursuant ITB 19.9.	Must meet requirement	N/A	Must meet requirement	N/A	Bid Submission Form
3.2.3 Pending Litigation	All pending litigation shall in total not represent more than fifty percent (50%) of the Bidder’s net worth and shall be treated as resolved against the Bidder.	Must meet requirement by itself or as partner to past or existing JVA	N / A	Must meet requirement by itself or as partner to past or existing JVA	N / A	Form CON – 1

Factor	3.2 Historical Contract Non-Performance					
Sub-Factor	Criteria					Documentation Required
	Requirement	Bidder				
		Single Entity	Joint Venture, Consortium or Association			
			All partners combined	Each partner	At least one partner	
3.2.4 Litigation History	No consistent history of court/arbitral award decisions against the Bidder ¹ since 1 st January 2015	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Form CON – 1
3.2.5 Declaration: Environmental and Social (ES) past performance	Declare any civil work contracts that have been suspended or terminated and/or performance security called by an employer for reasons of breach of environmental, or social (including Sexual Exploitation, and Assault) contractual obligations in the past five years. ²	Must make the declaration. Where there are Specialized Sub-contractor/s, the Specialized Sub-contractor/s must also make the declaration.	N/A	Each must make the declaration. Where there are Specialized Sub-contractor/s, the Specialized Sub-contractor/s must also make the declaration.	N/A	Form CON-2 Performance Declaration

¹ The Bidder shall provide accurate information on the letter of Bid about any litigation or arbitration resulting from contracts completed or ongoing under its execution over the last five years. A consistent history of court/arbitral awards against the Bidder or any member of a joint venture may result in disqualifying the Bidder.

² The Employer may use this information to seek further information or clarifications in carrying out its due diligence.

Factor	3.3 Financial Situation					
Sub-Factor	Criteria					Documentation Required
	Requirement	Bidder				
		Single Entity	Joint Venture, Consortium or Association			
			All partners combined	Each partner	At least one partner	
3.3.1 Historical Financial Performance	Submission of audited balance sheets, or if not required by the law of the applicant's country, other financial statements acceptable to the Bidder, for the last four (4) years (2018 – 2021) to demonstrate the current soundness of the applicant’s financial position and its prospective long-term profitability). The results should be annualized and accounting practices should follow international guidelines in force. The following financial ratios should be accomplished: • Current ratio (current assets / current liabilities) >= 1.0 • Debt Ratio (Total Debt / Total Assets) <= 0.85	Must meet requirement	N / A	Must meet requirement	N / A	Form FIN – 3.3.1 with attachments
3.3.2 Average Annual Turnover	Independently audited Financial Reports or Financial Reports confirmed by competent official tax departments (including consolidated balance sheets, profit & loss account, etc.) for four (04) recent years (2019 – 2022). The average annual revenue in the most recent years four (4) years (2018 – 2021) shall be at least US\$10,500,000.00 (Ten Million Five Hundred Thousand American Dollars).	Must meet requirement	Must meet requirement	N/A	Must meet eighty percent (80%) of the requirement	Form FIN –3.3.2

Factor	3.3 Financial Situation					
Sub-Factor	Criteria					Documentation Required
	Requirement	Bidder				
		Single Entity	Joint Venture, Consortium or Association			
			All partners combined	Each partner	At least one partner	
3.3.3 Financial Resources	The Bidder must demonstrate access to, or availability of, financial resources such as liquid assets, unencumbered real assets, lines of credit, and other financial means, other than any contractual advance payments to meet: (i) the following cash-flow requirement: cash flow amount of US\$ 2,000,000.00 (Two Million American Dollars) (ii) The overall cash flow requirements for this contract and its current commitments.	Must meet requirement	Must meet requirement	N/A	Must meet eighty percent (80%) of the requirement	Form FIN –3.3.3

Factor	3.4 System Experience			
Sub-Factor				
	Requirements	MDM	MRS	Documentation Required
3.4.1 General Experience	At least three (3) currently system running with daily read of register, events, alarms, 8 channels with interval data of at least 15 minutes for a total of 5,000 meters (3-phase) or more; Note: At least one (1) of this system must be already installed in a country outside of the country of manufacturer.	N / A	Must meet requirement	Form EXP-3.4.1(a)
A.	At least two (2) currently system acquiring data (register data and interval data) from more than 5,000 meters daily using Cellular Network as communication Link. Note: At least one (1) of this system must be already installed in a country outside of the country of manufacturer.	N / A	Must meet requirement	Form EXP-3.4.1(a)
B.	At least two (2) currently system integrated with one MRS that acquire data from more than 5,000 meters (Industrial and commercial) including Interval data collection; Note: At least one (1) of this system must be already installed in a country outside of the country of manufacturer	Must meet requirement	N / A	Form EXP-3.4.1(b)
C.	At least two (2) currently system integrated with an MRS system acquiring data from more than 100,000 meters (residential) daily. Note: At least one (1) of this system must be already installed in a country outside of the country of manufacturer.	Must meet requirement	N / A	Form EXP-3.4.1(b)
3.4.2 Specific Experience	The MRS system must support, at least, data acquisition from other meters which are from two different meter manufacturers. All meter in the List must be IEC 62056 Standard compliant and protocol DLMS/COSEM	N / A	Must meet requirement	List of meters supported
A.	At least two (2) MRS currently system running integrated with one (01) MDM and having more than 5,000 meters daily read and transferring data to MDM.	N / A	Must meet requirement	Form EXP 3.4.2(a)

Factor	3.4 System Experience			
Sub-Factor				
	Requirements	MDM	MRS	Documentation Required
B.	At least two (2) currently system running integrated at least with one (01) CIS/Billing System	Must meet requirement	N / A	Form EXP 3.4.2(b)
D.	Shall demonstrate proven scalability for 15 min or less interval read data, delivered daily, for at least 15,000 meters, in a production environment at a single utility.	Must meet requirement	N / A	Form EXP 3.4.2(c)
E.	Shall demonstrate that actually is installed and in production environment with a total quantity of meters over 100,000.	Must meet requirement	N / A	Form EXP 3.4.2(c)

Factor	3.5 Bidder Experience					
Sub-Factor	Criteria					Documentation Required
	Requirement	Bidder				
		Single Entity	Joint Venture, Consortium or Association			
			All partners combined	Each partner	At least one partner	
3.5.1 General Experience	Experience under MRS software implementation contracts in the role of main contractor, subcontractor or management contractor within the last 5 years (from 2017 to the deadline of bid submission)	Must meet requirement	N / A	N / A	Must meet requirement	Form EXP-3.5.1(a)
A	Experience under MDM software implementation contracts in the role of main contractor, subcontractor or management contractor within the last 5 years (from 2017 to the deadline of bid submission)	Must meet requirement	N / A	N / A	Must meet requirement	Form EXP-3.5.1(b)

Factor	3.5 Bidder Experience					
Sub-Factor	Criteria					Documentation Required
	Requirement	Bidder				
		Single Entity	Joint Venture, Consortium or Association All partners combined	Each partner	At least one partner	
B	Experience under MRS & MDM integration contracts in the role of main contractor, subcontractor or management contractor within the last 5 years (from 2017 to the deadline of bid submission)	Must meet requirement	N / A	N / A	Must meet requirement	Form EXP-3.5.1(c)
C	Experience under MDM & Billing System integration contracts in the role of main contractor, subcontractor or management contractor within the last 5 years (from 2017 to the deadline of bid submission)	Must meet requirement	N / A	N / A	Must meet requirement	Form EXP-3.5.1(d)
3.5.2 Specific Experience	The Bidder should be a single Bidder or Joint Venture (JV) that has one (1) MDMS contracts similar in scope to this one. The similar contract shall be inclusively (i) contract amount at least US\$ 5,600,000 (Five Million and Six Hundred Thousand American Dollars); (ii) the contract including design, supply, installation and commissioning of: equipment, software and services for AMI Infrastructure implementation, and maintenance support services.	Must meet requirement	N / A	N / A	Must meet requirement	Form EXP 3.5.2(a)
A	The Bidder shall demonstrate experience in two (2) project developments where has integrated MDM with at least two (2) CIS & Billing Systems.	Must meet requirement	Must meet requirement	N / A	Must meet requirement	Form EXP 2.5.2(b)
B	In case Bidder is the Meter Manufacturer then shall have the Quality Assurance Certificates ISO-9001:2008	Must meet requirement	N / A	Must meet requirement	N / A	Certificate

Factor	3.5 Bidder Experience					
Sub-Factor	Criteria					Documentation Required
	Requirement	Bidder				
		Single Entity	Joint Venture, Consortium or Association All partners combined	Each partner	At least one partner	
C	In case Bidder in the software manufacturer then shall have the CMMI - Capability Maturity Model Integration- Certificates level 3 (or similar) for software development and/or services	Must meet requirement for one characteristic	N / A	N / A	Must meet requirement for one characteristic	Certificate
D	Information on current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.	Must meet requirement for one characteristic	N / A	N / A	Must meet requirement for one characteristic	Form - CCC

3.6 Personnel and Project Team

A critical component of Purchaser's evaluation of the Bidder will be the team of individuals that the Bidder proposes. The Bidder shall identify and appoint a competent and experienced Project Manager to act as its resident representative, and to supervise its employees and subcontractors/third party providers during the installation and final testing of the system, and during the first year of maintenance support services. The resume of the proposed Project Manager, including references, and all other key point people, shall be submitted with the proposal. For a complete interaction with Purchaser and ENDE staff their spoken language must be English or Portuguese.

The Bidder must demonstrate that it will have the personnel for the key positions that meet at least the following requirements:

3.6.1 Project manager (1 position):

- Experience at least (3) three years relevant to the implementation of EPC Projects for MRS / MDMS for Energy distribution utility.
- Experience at least two (2) similar projects as a Team Leader/Project Director.
- Minimum education degrees: a bachelor in automation or electric/electronic or telecommunication or information technology engineering.

3.6.2 System manager (1 position):

- Experience at least (2) two years in construction and installation of MRS/MDMS for Energy Distribution utility projects.
- Experience at least two (2) similar projects as a System manager
- Experience at least one (1) project with the MDMS offered
- Minimum education degrees: a bachelor in automation or electric/electronic or telecommunication or information technology engineering.

3.6.3 Metering Specialist (1 position):

- Experience at least (5) five years as Metering Specialist in Energy Distribution utility.
- Experience at least two (2) in similar projects as a metering Engineer
- Experience at least one (1) project with the MDMS offered
- Minimum education degrees: graduation Electrical Engineering

No.	Position	Total Work Experience (years)	Similar Project Experience (quantity)	Specific Software Experience
1	Project manager	3	2	MRS/MDM
2	System Manager	2	2	MRS/MDM
3	Metering Specialist	5	2	Metering

The Bidder shall provide details of the proposed personnel and their experience records in the relevant Forms included in Section IV, Bidding Forms PER-1 and PER-2.

Any and all changes to Personnel and Project Team composition and qualification must be provided in writing and are subject to acceptance by ENDE.

Once the key project team members have been assigned and accepted by the Purchaser, the Purchaser will reserve the right to approve any proposed substitutions.

Section IV - Bidding Forms

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Letter of Bid

INSTRUCTIONS TO BIDDERS: DELETE THIS BOX ONCE YOU HAVE COMPLETED THE DOCUMENT

The Bidder must prepare this Letter of Bid on stationery with its letterhead clearly showing the Bidder's complete name and business address.

Note: All italicized text is to help Bidders in preparing this form.

Date of this Bid submission: *[insert date (as day, month and year) of Bid submission]*

RFB No.: *[insert number of RFB process]*

Request for Bid No.: *[insert identification]*

Alternative No.: *[insert identification No if this is a Bid for an alternative]*

To: *[insert complete name of Purchaser]*

- (a) **No reservations:** We have examined and have no reservations to the bidding document, including Addenda issued in accordance with Instructions to Bidders (ITB 8);
- (b) **Eligibility:** We meet the eligibility requirements and have no conflict of interest in accordance with ITB 4;
- (c) **Bid/Proposal-Securing Declaration:** We have not been suspended nor declared ineligible by the Purchaser based on execution of a Bid-Securing Declaration or Proposal-Securing Declaration in the Purchaser's Country in accordance with ITB 4.7;
- (d) **Sexual Exploitation and Abuse (SEA) and/or Sexual Harassment (SH):** *[select the appropriate option from (i) to (iii) below and delete the others. In case of JV members and/or subcontractors, indicate the status of disqualification by the Bank of each JV member and/or subcontractor].*

We, including any of our subcontractors:

- (i) *[have not been subject to disqualification by the Bank for non-compliance with SEA/ SH obligations.]*
 - (ii) *[are subject to disqualification by the Bank for non-compliance with SEA/ SH obligations.]*
 - (iii) *[had been subject to disqualification by the Bank for non-compliance with SEA/ SH obligations, and were removed from the disqualification list. An arbitral award on the disqualification case has been made in our favor.]*
- (e) **Conformity:** We offer to supply in conformity with the bidding document and in accordance with the Delivery Schedules specified in the Schedule of Requirements the following Goods: *[insert a brief description of the Goods and Related Services];*
 - (f) **Bid Price:** The total price of our Bid, excluding any discounts offered in item (f) below is:

Option 1, in case of one lot: Total price is: *[insert the total price of the Bid in words and figures, indicating the various amounts and the respective currencies];*

Or

Option 2, in case of multiple lots: (a) Total price of each lot *[insert the total price of each lot in words and figures, indicating the various amounts and the respective currencies];* and (b) Total price of all lots (sum of all lots) *[insert the total price of all lots in words and figures, indicating the various amounts and the respective currencies];*

- (g) **Discounts:** The discounts offered and the methodology for their application are:
- (i) The discounts offered are: *[Specify in detail each discount offered.]*
- (ii) The exact method of calculations to determine the net price after application of discounts is shown below: *[Specify in detail the method that shall be used to apply the discounts];*
- (h) **Bid Validity:** Our Bid shall be valid until *[insert day, month and year in accordance with ITP 18.1]*, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (i) **Performance Security:** If our Bid is accepted, we commit to obtain a performance security in accordance with the bidding document;
- (j) **One Bid per Bidder:** We are not submitting any other Bid(s) as an individual Bidder, and we are not participating in any other Bid(s) as a Joint Venture member, or as a subcontractor, and meet the requirements of ITB 4.3, other than alternative Bids submitted in accordance with ITB 13;
- (k) **Suspension and Debarment:** We, along with any of our subcontractors, suppliers, consultants, manufacturers, or service providers for any part of the contract, are not subject to, and not controlled by any entity or individual that is subject to, a temporary suspension or a debarment imposed by the World Bank Group or a debarment imposed by the World Bank Group in accordance with the Agreement for Mutual Enforcement of Debarment Decisions between the World Bank and other development banks. Further, we are not ineligible under the Purchaser's Country laws or official regulations or pursuant to a decision of the United Nations Security Council;
- (l) **State-owned enterprise or institution:** *[select the appropriate option and delete the other] [We are not a state-owned enterprise or institution] / [We are a state-owned enterprise or institution but meet the requirements of ITB 4.6];*
- (m) **Commissions, gratuities, fees:** We have paid, or will pay the following commissions, gratuities, or fees with respect to the Bidding process or execution of the Contract: *[insert complete name of each Recipient, its full address, the reason for which each commission or gratuity was paid and the amount and currency of each such commission or gratuity]*

Name of Recipient	Address	Reason	Amount

(If none has been paid or is to be paid, indicate “none.”)

- (n) **Binding Contract:** We understand that this Bid, together with your written acceptance thereof included in your Letter of Acceptance, shall constitute a binding contract between us, until a formal contract is prepared and executed;
- (o) **Purchaser Not Bound to Accept:** We understand that you are not bound to accept the lowest evaluated cost Bid, the Most Advantageous Bid or any other Bid that you may receive; and
- (p) **Fraud and Corruption:** We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf engages in any type of Fraud and Corruption.

Name of the Bidder: *[insert complete name of the Bidder]

Name of the person duly authorized to sign the Bid on behalf of the Bidder: **[insert complete name of person duly authorized to sign the Bid]

Title of the person signing the Bid: [insert complete title of the person signing the Bid]

Signature of the person named above: [insert signature of person whose name and capacity are shown above]

Date signed [insert date of signing] **day of** [insert month], [insert year]

*: In the case of the Bid submitted by a Joint Venture specify the name of the Joint Venture as Bidder.

**: Person signing the Bid shall have the power of attorney given by the Bidder. The power of attorney shall be attached with the Bid Schedules.

Bidder Information Form

[The Bidder shall fill in this Form in accordance with the instructions indicated below. No alterations to its format shall be permitted and no substitutions shall be accepted.]

Date: *[insert date (as day, month and year) of Bid submission]*

RFB No.: *[insert number of RFB process]*

Alternative No.: *[insert identification No if this is a Bid for an alternative]*

Page _____ of _____ pages

1. Bidder's Name <i>[insert Bidder's legal name]</i>
2. In case of JV, legal name of each member: <i>[insert legal name of each member in JV]</i>
3. Bidder's actual or intended country of registration: <i>[insert actual or intended country of registration]</i>
4. Bidder's year of registration: <i>[insert Bidder's year of registration]</i>
5. Bidder's Address in country of registration: <i>[insert Bidder's legal address in country of registration]</i>
6. Bidder's Authorized Representative Information Name: <i>[insert Authorized Representative's name]</i> Address: <i>[insert Authorized Representative's Address]</i> Telephone/Fax numbers: <i>[insert Authorized Representative's telephone/fax numbers]</i> Email Address: <i>[insert Authorized Representative's email address]</i>
7. Attached are copies of original documents of <i>[check the box(es) of the attached original documents]</i> <input type="checkbox"/> Articles of Incorporation (or equivalent documents of constitution or association), and/or documents of registration of the legal entity named above, in accordance with ITB 4.4. <input type="checkbox"/> In case of JV, letter of intent to form JV or JV agreement, in accordance with ITB 4.1. <input type="checkbox"/> In case of state-owned enterprise or institution, in accordance with ITB 4.6 documents establishing: <ul style="list-style-type: none"> • Legal and financial autonomy • Operation under commercial law • Establishing that the Bidder is not under the supervision of the Purchaser
8. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership. <i>[If required under BDS ITB 45.1, the successful Bidder shall provide additional information on beneficial ownership, using the Beneficial Ownership Disclosure Form.]</i>

Bidder's JV Members Information Form

[The Bidder shall fill in this Form in accordance with the instructions indicated below. The following table shall be filled in for the Bidder and for each member of a Joint Venture].

Date: *[insert date (as day, month and year) of Bid submission]*

RFB No.: *[insert number of Bidding process]*

Alternative No.: *[insert identification No if this is a Bid for an alternative]*

Page _____ of _____ pages

1. Bidder's Name: <i>[insert Bidder's legal name]</i>
2. Bidder's JV Member's name: <i>[insert JV's Member legal name]</i>
3. Bidder's JV Member's country of registration: <i>[insert JV's Member country of registration]</i>
4. Bidder's JV Member's year of registration: <i>[insert JV's Member year of registration]</i>
5. Bidder's JV Member's legal address in country of registration: <i>[insert JV's Member legal address in country of registration]</i>
6. Bidder's JV Member's authorized representative information Name: <i>[insert name of JV's Member authorized representative]</i> Address: <i>[insert address of JV's Member authorized representative]</i> Telephone/Fax numbers: <i>[insert telephone/fax numbers of JV's Member authorized representative]</i> Email Address: <i>[insert email address of JV's Member authorized representative]</i>
7. Attached are copies of original documents of <i>[check the box(es) of the attached original documents]</i> <input type="checkbox"/> Articles of Incorporation (or equivalent documents of constitution or association), and/or registration documents of the legal entity named above, in accordance with ITB 4.4. <input type="checkbox"/> In case of a state-owned enterprise or institution, documents establishing legal and financial autonomy, operation in accordance with commercial law, and that they are not under the supervision of the Purchaser, in accordance with ITB 4.6.
8. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership. <i>[If required under BDS ITB 45.1, the successful Bidder shall provide additional information on beneficial ownership for each JV member using the Beneficial Ownership Disclosure Form.]</i>

Sexual Exploitation and Abuse (SEA) and/or Sexual Harassment Performance Declaration

[The following table shall be filled in by the Bidder, each member of a Joint Venture and each subcontractor proposed by the Bidder]

Bidder's Name: *[insert full name]*

Date: *[insert day, month, year]*

Joint Venture Member's or Subcontractor's Name: *[insert full name]*

RFB No. and title: *[insert RFB number and title]*

Page *[insert page number]* of *[insert total number]* pages

SEA and/or SH Declaration in accordance with Section III, Qualification Criteria, and Requirements
We: <input type="checkbox"/> (a) have not been subject to disqualification by the Bank for non-compliance with SEA/ SH obligations <input type="checkbox"/> (b) are subject to disqualification by the Bank for non-compliance with SEA/ SH obligations <input type="checkbox"/> (c) had been subject to disqualification by the Bank for non-compliance with SEA/ SH obligations, and were removed from the disqualification list. An arbitral award on the disqualification case has been made in our favor.
<i>[If (c) above is applicable, attach evidence of an arbitral award reversing the findings on the issues underlying the disqualification.]</i>

Price Schedule Forms

*[The Bidder shall fill in these Price Schedule Forms in accordance with the instructions indicated. The list of line items in column 1 of the **Price Schedules** shall coincide with the List of Goods and Related Services specified by the Purchaser in the Schedule of Requirements.]*

Price Schedule: Goods Manufactured Outside the Purchaser's Country, to be Imported

(Group C Bids, goods to be imported)							Date: _____	
							RFB No: xxxxxxxxxxxxxxxxxxxxxx	
							Alternative No: _____	
							Page N° _____ of _____	
1	2	3	4	5	6	7	8	9
Line Item	Description of Goods	Country of Origin	Delivery Date as defined by Incoterms	Quantity and physical unit	Unit price CIP	CIP Price per line item	Price per line item for inland transportation and other services required in the Purchaser's Country to convey the Goods to their final destination specified in BDS	Total Price per Line item
N°					in accordance with ITB 14.8(b)(i)	(Col. 5x6)		(Col. 7+8)
[insert number of the item]	[insert name of good]	[insert country of origin of the Good]	[insert quoted Delivery Date]	[insert number of units to be supplied and name of the physical unit]	[insert unit price CIP per unit]	[insert total CIP price per line item]	[insert the corresponding price per line item]	[insert total price of the line item]
1.1	Meters							
1.1.1	3-phases CT multifunctional smart Meter (Type 1)			15500				
1.1.2	3-phases CT/VT multifunctional Smart meter (Type 2)			1000				
1.2	Meter Box							
1.2.1	Meter Box for Type 1 meters			8550				
1.2.2	Meter Box for Type 2 meters			2385				
1.3	Circuit Breaker							

1.3.1	Meter Box Circuit Breakers 230/400 V – 250 A			264				
1.3.2	Meter Box Circuit Breakers 230/400 V – 400 A			3				
1.3.3	Meter Box Circuit Breakers 230/400 V – 800 A			24				
1.4	Current and Voltage Transformer For Feeders							
1.4.1	HV Current Transformers, 60 KV (HVCT's), Outdoor - 600A~5000A/5A - Accuracy Class: 0,2S Set to 3			75				
1.4.2	MV Current Transformers, 30 KV (MVCT's), Outdoor - 600A~5000A/5A - Accuracy Class: 0,2S, Set to Two			142				
1.4.2	MV Current Transformers, 20 KV (MVCT's), Outdoor - 600A~5000A/5A - Accuracy Class: 0,2S, Set to Two			7				
1.4.4	MV Current Transformers, 15 KV (MVCT's), Outdoor - 600A~5000A/5A - Accuracy Class: 0,2S, Set to Two			638				
1.4.5	Voltage Transformers (VT's) - 60000V / 110 V – Set to 3 (For energy balance)			75				
1.4.6	Voltage Transformers (VT's) - 30000V / 110 V - Set to 3 (For energy balance)			142				

1.4.7	Voltage Transformers (VT's) - 20000V / 110 V - Set to 3 (For energy balance)			7				
1.4.8	Voltage Transformers (VT's) - 15000V / 110 V - Set to 3 (For energy balance)			638				
1.5	Current Transformers For MV Customers							
1.5.1	Indoor/Outdoor, rated short- time thermal current:12,5 KA, Accuracy Class: 0,5S, Ratio: 40/5A - Set to Three			12				
1.5.2	Indoor/Outdoor, rated short- time thermal current:12,5 KA, Accuracy Class: 0,5S, Ratio: 80/5A - Set to Three			312				
1.5.2	Indoor/Outdoor, rated short- time thermal current:12,5 KA, Accuracy Class: 0,5S, Ratio: 160/5A - Set to Three			688				
1.5.4	Indoor/Outdoor, rated short- time thermal current:12,5 KA, Accuracy Class: 0,5S, Ratio: 200/5 A - Set to Three			98				
1.5.5	Indoor/Outdoor, rated short- time thermal current:16 KA, Accuracy Class: 0,5S Ratio: 250/5 A - Set to Three			925				
1.5.6	Indoor/Outdoor, rated short- time thermal current:16 KA,			183				

	Accuracy Class: 0,5S Ratio: 300/5 A - Set to Three							
1.5.7	Indoor/Outdoor, rated short-time thermal current:16 KA, Accuracy Class: 0,5S Ratio: 400/5 A - Set to Three			1460				
1.5.8	Indoor/Outdoor, rated short-time thermal current:16 KA, Accuracy Class: 0,5S, Ratio: 500/ 5 A - Set to Three			235				
1.5.9	Indoor/Outdoor, rated short-time thermal current:16 KA, Accuracy Class: 0,5S, Ratio: 600/5 A - Set to Three			695				
1.5.10	Indoor/Outdoor, rated short-time thermal current:16 KA, Accuracy Class: 0,5S, Ratio: 800/5 A - Set to Three			169				
1.6	Current Transformers For LV Customers							
1.6.1	400 V (LVCT's), 80/5A- Accuracy Class: 0,5S,set of three			130				
1.6.2	400 V (LVCT's),60/5A- Accuracy Class: 0,5S,set of three			136				
1.6.3	400 V (LVCT's),200/5A- Accuracy Class: 0,5S,set of three			14				

1.6.4	400 V (LVCT's),250/5A- Accuracy Class: 0,5S,set of three			10				
1.6.5	400 V (LVCT's),300/5A- Accuracy Class: 0,5S,set of three			12				
1.6.6	400 V (LVCT's),400/5A- Accuracy Class:0,5S,set of three			4				
1.7	Others							
1.7.1	Meter programing tool			8				
1.7.2	Hand Held Units			48				
1.7.3	Cables & Accessories (Optic Cables)			48				
1.7.4	Meters Modems			16500				
1.7.5	Antenna (GPRS/3G/4G) 100cm cable			2000				
1.7.6	Antenna (GPRS/3G/4G) 200cm cable			2000				
2.1	MRS/HES SOFTWARE							
2.1.1	MRS/HES Application Software with lifetime license.			20000				
2.1.2	MRS/HES Database Management System with lifetime license			1				
2.1.3	Other software with lifetime license			1				
3.1	MDMS SOFTWARE							

3.1.1	MDMS Application Software with lifetime license.			1200000				
3.1.2	MDMS Database Management System with lifetime license			1				
3.1.3	Other software with lifetime license			1				
3.2	Software Documentation							
3.2.1	Hardware Documentation			1				
3.2.2	Software Documentation			1				
3.2.3	As-Built Documentation			1				
3.2.4	Database Document			1				
3.2.5	System Maintenance Manual			1				
3.2.6	Security Documentation			1				
3.2.7	Operating Manuals (including Operator's Manual, Database Editor's Manual, Display Editor's Manual)			1				
3.2.8	Specific Applications Software Maintenance Manuals			1				
3.2.9	Specific Systems Design Documentation			1				
4.1	IT INFRASTRUCTURE							
4.1.1	Firewall			3				
4.1.2	DataBase Enterprise Edition			6				
4.1.2	Operative System (OS) Licenses			13				
4.1.3	Virtualization (VMWare)			13				
4.1.4	Backup Software			1				
4.1.5	Firewall License			3				

4.1.6	HA & Replication Software			1				
4.1.7	Disaster Recovery software			1				
4.1.8	GPS CLOCK			1				
5.1	MCC INFRASTRUCTURE							
5.1.1	Desktop Computers			16				
5.1.2	Printers Black			8				
5.1.3	Printers Colors			4				
5.1.4	Switch 1GB 24 ports			1				
5.1.5.1	<i>Office Desks</i>			16				
5.1.5.2	<i>Office Chairs</i>			16				
5.1.5.3	<i>Cabinets</i>			3				
5.1.5.4	<i>TV LED 65"</i>			5				
							Total Price	
	Name of Bidder [insert complete name of Bidder] Signature of Bidder [signature of person signing the Bid] Date [Insert Date]							

Price Schedule: Goods Manufactured Outside the Purchaser's Country, already imported*

(Group C Bids, Goods already imported)

Currencies in accordance with ITB 15

Date: _____

RFB No: _____

Alternative No: _____

Page N° _____ of _____

1	2	3	4	5	6	7	8	9	10	11	12
Line Item N°	Description of Goods	Country of Origin	Delivery Date as defined by Incoterms	Quantity and physical unit	Unit price including Custom Duties and Import Taxes paid, in accordance with ITB 14.8(c)(i)	Custom Duties and Import Taxes paid per unit in accordance with ITB 14.8(c)(ii) , [to be supported by documents]	Unit Price net of custom duties and import taxes, in accordance with ITB 14.8 (c) (iii) (Col. 6 minus Col.7)	Price per line item net of Custom Duties and Import Taxes paid, in accordance with ITB 14.8(c)(i) (Col. 5×8)	Price per line item for inland transportation and other services required in the Purchaser's Country to convey the goods to their final destination, as specified in BDS in accordance with ITB 14.8 (c)(v)	Sales and other taxes paid or payable per item if Contract is awarded (in accordance with ITB 14.8(c)(iv)	Total Price per line item (Col. 9+10)
<i>[insert number of the item]</i>	<i>[insert name of Goods]</i>	<i>[insert country of origin of the Good]</i>	<i>[insert quoted Delivery Date]</i>	<i>[insert number of units to be supplied and name of the physical unit]</i>	<i>[insert unit price per unit]</i>	<i>[insert custom duties and taxes paid per unit]</i>	<i>[insert unit price net of custom duties and import taxes]</i>	<i>[insert price per line item net of custom duties and import taxes]</i>	<i>[insert price per line item for inland transportation and other services required in the Purchaser's Country]</i>	<i>[insert sales and other taxes payable per item if Contract is awarded]</i>	<i>[insert total price per line item]</i>
										Total Bid Price	

Name of Bidder *[insert complete name of Bidder]* Signature of Bidder *[signature of person signing the Bid]* Date *[insert date]*

* *[For previously imported Goods, the quoted price shall be distinguishable from the original import value of these Goods declared to customs and shall include any rebate or mark-up of the local agent or representative and all local costs except import duties and taxes, which have been and/or have to be paid by the Purchaser. For clarity the Bidders are asked to quote the price including import duties, and additionally to provide the import duties and the price net of import duties which is the difference of those values.]*

Price Schedule: Goods Manufactured in the Purchaser's Country

Purchaser's Country _____		(Group A and B Bids) Currencies in accordance with ITB 15				Date: _____ RFB No: _____ Alternative No: _____ Page N° _____ of _____			
1	2	3	4	5	6	7	8	9	10
Line Item N°	Description of Goods	Delivery Date as defined by Incoterms	Quantity and physical unit	Unit price EXW	Total EXW price per line item (Col. 4x5)	Price per line item for inland transportation and other services required in the Purchaser's Country to convey the Goods to their final destination	Cost of local labor, raw materials and components from within the Purchaser's Country as a % of Col. 5	Sales and other taxes payable per line item if Contract is awarded (in accordance with ITB 14.8(a)(ii))	Total Price per line item (Col. 6+7)
<i>[insert number of the item]</i>	<i>[insert name of Good]</i>	<i>[insert quoted Delivery Date]</i>	<i>[insert number of units to be supplied and name of the physical unit]</i>	<i>[insert EXW unit price]</i>	<i>[insert total EXW price per line item]</i>	<i>[insert the corresponding price per line item]</i>	<i>[Insert cost of local labor, raw material and components from within the Purchase's country as a % of the EXW price per line item]</i>	<i>[insert sales and other taxes payable per line item if Contract is awarded]</i>	<i>[insert total price per item]</i>
Total Price									

Name of Bidder *[insert complete name of Bidder]* Signature of Bidder *[signature of person signing the Bid]* Date *[insert date]*

Price and Completion Schedule - Related Services

Currencies in accordance with ITB 15					Date: _____ RFB No: _____ Alternative No: _____ Page N° _____ of _____	
1	2	3	4	5	6	7
Service	Description of Services (excludes inland transportation and other services required in the Purchaser's Country to convey the goods to their final destination)	Country of Origin	Delivery Date at place of Final destination	Quantity and physical unit	Unit price	Total Price per Service
N°						(Col. 5*6 or estimate)
<i>[insert number of the Service]</i>	<i>[insert name of Services]</i>	<i>[insert country of origin of the Services]</i>	<i>[insert delivery date at place of final destination per Service]</i>	<i>[insert number of units to be supplied and name of the physical unit]</i>	<i>[insert unit price per item]</i>	<i>[insert total price per item]</i>
1	Premise Inspection and Survey					
1.1	LV customers Premise Inspection & Survey			8550		
1.2	MV customers Premise Inspection & Survey			6450		
1.3	Feeder Site Inspection & Survey			862		
2	Meter Installation and CT/VT Installation					
2.1	Low Voltage consumers Meters Installation			8550		
2.2	Low Voltage consumers CTs Installation			306		
2.3	MV consumers meters installation			6450		
2.4	MV consumers CTs Installation			4777		
2.5	Feeder Meters Installation			862		
2.6	Feeder CTs/VTs Installation			862		

3	MCC Installation					
3.1	MCC Operation Centre Infrastructure design and implementation			1		
4	System Installation					
4.1	MRS/HES Installation, configuration & Testing			1		
4.2	MDMS Installation, Configuration & Testing			1		
4.3	Configuration and Building database			1		
4.4	System integration and Data Migration			1		
4.5	MDMS Interfaces develop, implementation and testing with SAP			1		
5	Training			1		
5.1	MRS Software Package training			1		
5.2	MDMS System Software Package training			1		
5.3	Meter, Modem and Meter Configuration Software Tool			1		
5.4	Hardware Security Module (HSM)			1		
5.5	Hand Held Unit training			1		
5.6	IT Components (OS, DataBase, VM, Firewall, Replication Software, etc.)			1		
6	Operation, Maintenance and Support					
6.1	On Site system Operation & maintenance support (Six Months)			1		
6.2	Maintenance & Support Service Contract for MRS/HES, MDM software			1		
6.3	Maintenance & Support Service Contract for all other software			1		
6.4	Interfaces Maintenance & Support Service Contract					
7	Other (specify)					
Total Bid Price						

Form of Bid Security

(Bank Guarantee)

[The bank shall fill in this Bank Guarantee Form in accordance with the instructions indicated.]

[Guarantor letterhead or SWIFT identifier code]

Beneficiary: *[Purchaser to insert its name and address]*

RFB No.: *[Purchaser to insert reference number for the Request for Bids]*

Alternative No.: *[Insert identification No if this is a Bid for an alternative]*

Date: *[Insert date of issue]*

BID GUARANTEE No.: *[Insert guarantee reference number]*

Guarantor: *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that _____ *[insert name of the Bidder, which in the case of a joint venture shall be the name of the joint venture (whether legally constituted or prospective) or the names of all members thereof]* (hereinafter called "the Applicant") has submitted or will submit to the Beneficiary its Bid (hereinafter called "the Bid") for the execution of _____ under Request for Bids No. _____ ("the RFB").

Furthermore, we understand that, according to the Beneficiary's conditions, Bids must be supported by a Bid guarantee.

At the request of the Applicant, we, as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of _____ (_____) upon receipt by us of the Beneficiary's complying demand, supported by the Beneficiary's statement, whether in the demand itself or a separate signed document accompanying or identifying the demand, stating that either the Applicant:

- (a) has withdrawn its Bid prior to the Bid validity expiry date set forth in the Applicant's Letter of Bid, or any extended date provided by the Applicant; or
- (b) having been notified of the acceptance of its Bid by the Beneficiary prior to the expiry date of the Bid validity or any extension thereof provided by the Applicant has failed to:
 - (i) sign the contract agreement, or
 - (ii) furnish the performance security, in accordance with the Instructions to Bidders ("ITB") of the Beneficiary's bidding document.

This guarantee will expire: (a) if the Applicant is the successful Bidder, upon our receipt of copies of the Contract agreement signed by the Applicant and the performance security issued to the Beneficiary in relation to such Contract agreement; or (b) if the Applicant is not the successful Bidder, upon the earlier of (i) our receipt of a copy of the Beneficiary's notification to the Applicant of the results of the Bidding process; or (ii) twenty-eight days after the expiry date of the Bid validity.

Consequently, any demand for payment under this guarantee must be received by us at the office indicated above on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758.

[Signature(s)]

Note: All italicized text is for use in preparing this form and shall be deleted from the final product.

Form of Bid Security (Bid Bond)

[The Surety shall fill in this Bid Bond Form in accordance with the instructions indicated.]

BOND NO. _____

BY THIS BOND *[name of Bidder]* as Principal (hereinafter called “the Principal”), and *[name, legal title, and address of surety]*, **authorized to transact business in** *[name of country of Purchaser]*, as Surety (hereinafter called “the Surety”), are held and firmly bound unto *[name of Purchaser]* as Obligee (hereinafter called “the Purchaser”) in the sum of *[amount of Bond]*³ *[amount in words]*, for the payment of which sum, well and truly to be made, we, the said Principal and Surety, bind ourselves, our successors and assigns, jointly and severally, firmly by these presents.

WHEREAS the Principal has submitted or will submit a written Bid to the Purchaser dated the ____ day of _____, 20__, for the supply of *[name of Contract]* (hereinafter called the “Bid”).

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Principal:

- (a) withdraws its Bid prior to the Bid validity expiry date set forth in the Principal’s Letter of Bid, or any extended date provided by the Principal; or
- (b) having been notified of the acceptance of its Bid by the Purchaser prior to the expiry date of the Bid validity or any extension thereto provided by the Applicant has failed to: (i) execute the Contract agreement; or (ii) furnish the Performance Security, in accordance with the Instructions to Bidders (“ITB”) of the Purchaser’s bidding document.

then the Surety undertakes to immediately pay to the Purchaser up to the above amount upon receipt of the Purchaser’s first written demand, without the Purchaser having to substantiate its demand, provided that in its demand the Purchaser shall state that the demand arises from the occurrence of any of the above events, specifying which event(s) has occurred.

The Surety hereby agrees that its obligation will remain in full force and effect up to and including the date 28 days after the date of expiry of the Bid validity set forth in the Principal’s Letter of Bid or any extension thereto provided by the Principal.

IN TESTIMONY WHEREOF, the Principal and the Surety have caused these presents to be executed in their respective names this ____ day of _____ 20__.

Principal: _____ Surety: _____

Corporate Seal (where appropriate)

(Signature)

(Printed name and title)

(Signature)

(Printed name and title)

³ The amount of the Bond shall be denominated in the currency of the Purchaser’s Country or the equivalent amount in a freely convertible currency.

Form of Bid-Securing Declaration - ***NOT APPLICABLE***

Date: *[date (as day, month and year)]*

Bid No.: *[number of RFB process]*

Alternative No.: *[insert identification No if this is a Bid for an alternative]*

To: *[complete name of Purchaser]*

We, the undersigned, declare that:

We understand that, according to your conditions, Bids must be supported by a Bid-Securing Declaration.

We accept that we will automatically be suspended from being eligible for bidding or submitting proposals in any contract with the Purchaser for the period of time specified in Section II – Bid Data Sheet, if we are in breach of our obligation(s) under the Bid conditions, because we:

- (a) have withdrawn our Bid prior to the expiry date of the Bid validity specified in the Letter of Bid or any extended date provided by us; or
- (b) having been notified of the acceptance of our Bid by the Purchaser prior to the expiry date of the Bid validity in the Letter of Bid or any extended date provided by us, (i) fail or refuse to sign the Contract; or (ii) fail or refuse to furnish the Performance Security, if required, in accordance with the ITB.

We understand this Bid Securing Declaration shall expire if we are not the successful Bidder, upon the earlier of (i) our receipt of your notification to us of the name of the successful Bidder; or (ii) twenty-eight days after the expiry date of the Bid validity.

Name of the Bidder* _____

Name of the person duly authorized to sign the Bid on behalf of the Bidder** _____

Title of the person signing the Bid _____

Signature of the person named above _____

Date signed _____ day of _____, _____

*: In the case of the Bid submitted by joint venture specify the name of the Joint Venture as Bidder

**: Person signing the Bid shall have the power of attorney given by the Bidder attached to the Bid

[Note: In case of a Joint Venture, the Bid-Securing Declaration must be in the name of all members to the Joint Venture that submits the Bid.]

Manufacturer's Authorization

*[The Bidder shall require the Manufacturer to fill in this Form in accordance with the instructions indicated. This letter of authorization should be on the letterhead of the Manufacturer and should be signed by a person with the proper authority to sign documents that are binding on the Manufacturer. The Bidder shall include it in its Bid, if so indicated in the **BDS**.]*

Date: *[insert date (as day, month and year) of Bid submission]*

RFB No.: *[insert number of RFB process]*

Alternative No.: *[insert identification No if this is a Bid for an alternative]*

To: *[insert complete name of Purchaser]*

WHEREAS

We *[insert complete name of Manufacturer]*, who are official manufacturers of *[insert type of goods manufactured]*, having factories at *[insert full address of Manufacturer's factories]*, do hereby authorize *[insert complete name of Bidder]* to submit a Bid the purpose of which is to provide the following Goods, manufactured by us *[insert name and or brief description of the Goods]*, and to subsequently negotiate and sign the Contract.

We hereby extend our full guarantee and warranty in accordance with Clause 28 of the General Conditions of Contract, with respect to the Goods offered by the above firm.

We confirm that we do not engage or employ forced labor or persons subject to trafficking or child labor, in accordance with Clause 14 of the General Conditions of Contract.

Signed: *[insert signature(s) of authorized representative(s) of the Manufacturer]*

Name: *[insert complete name(s) of authorized representative(s) of the Manufacturer]*

Title: *[insert title]*

Dated on _____ day of _____, _____ *[insert date of signing]*

Form CON – 1

Historical Contract Non-Performance

Bidder's Legal Name: _____ Date: _____

JVA Partner Legal Name: _____

ICB No.: _____

Page _____ of _____ pages

Non-Performing Contracts in accordance with Section III, Evaluation Criteria			
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Contract non-performance did not occur during the stipulated period, in accordance with Sub- Factor 3.2.1 of Section III, Evaluation Criteria			
Year	Outcome as Percent of Total Assets	Contract Identification	Total Contract Amount (current value, US\$ equivalent)
_____	_____	Contract Identification: Name of Employer: Address of Employer: Matter in dispute:	_____
Pending Litigation, in accordance with Section III, Evaluation Criteria			
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> No pending litigation in accordance with Sub-Factor 3.2 .3of Section III, Evaluation Criteria <input type="checkbox"/> Pending litigation in accordance with Sub-Factor 3.2.4 of Section III, Evaluation Criteria, as indicated below			
Year	Outcome as Percent of Total Assets	Contract Identification	Total Contract Amount (current value, US\$ equivalent)
_____	_____	Contract Identification: Name of Employer: Address of Employer: Matter in dispute:	_____
Litigation History in accordance with Section III, Evaluation and Qualification Criteria			
<input type="checkbox"/> No Litigation History in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 3.2.3 <input type="checkbox"/> Litigation History in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 3.2.4 as indicated below.			

Year of award	Outcome as percentage of Net Worth	Contract Identification	Total Contract Amount (currency), USD Equivalent (exchange rate)
[insert year]	[insert percentage]	<p>Contract Identification: [indicate complete contract name, number, and any other identification]</p> <p>Name of Employer: [insert full name]</p> <p>Address of Employer: [insert street/city/country]</p> <p>Matter in dispute: [indicate main issues in dispute]</p> <p>Party who initiated the dispute: [indicate “Employer” or “Contractor”]</p> <p>Reason(s) for Litigation and award decision [indicate main reason(s)]</p>	[insert amount]

CON – 2

Environmental and Social Performance Declaration

[The following table shall be filled in for the Bidder, each member of a Joint Venture and each Specialized Subcontractor]

Bidder's Name: *[insert full name]*

Date: *[insert day, month, year]*Joint Venture Member's or Specialized Subcontractor's Name: *[insert full name]*[illegible]Page *[insert page number]* of *[insert total number]* pages

Environmental and Social Performance Declaration			
in accordance with Section III, Qualification Criteria, and Requirements			
<input type="checkbox"/> No suspension or termination of contract: An employer has not suspended or terminated a contract and/or called the performance security for a contract for reasons related to Environmental or Social (ES) performance since the date specified in Section III, Qualification Criteria, and Requirements, Sub-Factor 3.2.5.			
<input type="checkbox"/> Declaration of suspension or termination of contract: The following contract(s) has/have been suspended or terminated and/or Performance Security called by an employer(s) for reasons related to Environmental or Social (ES) performance since the date specified in Section III, Qualification Criteria, and Requirements, Sub-Factor 3.2.5 Details are described below:			
Year	Suspended or terminated portion of contract	Contract Identification	Total Contract Amount (current value, currency, exchange rate and US\$ equivalent)
[insert year]	[insert amount and percentage]	Contract Identification: [indicate complete contract name/ number, and any other identification] Name of Employer: [insert full name] Address of Employer: [insert street/city/country] Reason(s) for suspension or termination: [indicate main reason(s) e.g. gender-based violence; sexual exploitation or assault breaches]	[insert amount]
[insert year]	[insert amount and percentage]	Contract Identification: [indicate complete contract name/ number, and any other identification] Name of Employer: [insert full name] Address of Employer: [insert street/city/country] Reason(s) for suspension or termination: [indicate main reason(s)]	[insert amount]
...	...	[list all applicable contracts]	...
Performance Security called by an employer(s) for reasons related to ES performance			

Year	Contract Identification	Total Contract Amount (current value, currency, exchange rate and US\$ equivalent)
<i>[insert year]</i>	Contract Identification: <i>[indicate complete contract name/ number, and any other identification]</i> Name of Employer: <i>[insert full name]</i> Address of Employer: <i>[insert street/city/country]</i> Reason(s) for calling of performance security: <i>[indicate main reason(s) e.g. for gender-based violence; sexual exploitation, or assault breaches]</i>	<i>[insert amount]</i>

Current Contract Commitments / Works in Progress

Bidder's Legal Name: _____

Date: _____

JVA Partner Legal Name: _____

ICB No.: _____

Page _____ of _____ pages

Bidders and each partner to a JVA should provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

Name of contract	Employer, contact address/tel/fax	Value of outstanding work (current US\$ equivalent)	Estimated completion date	Average monthly invoicing over last six months (US\$/month)
1.				
2.				
3.				
4.				
5.				
etc.				

Form FIN – 3.3.1
Financial Situation
Historical Financial Performance

Bidder's Legal Name: _____

Date: _____

JVA Partner Legal Name: _____

ICB No.: _____

Page _____ of _____ pages

To be completed by the Bidder and, if JVA, by each partner

1. Financial information

Financial information in US\$ equivalent	Historic information for previous _____ () years (US\$ equivalent in 000s)						
	Year 1	Year 2	Year 3	Year ...	Year n	Avg.	Avg. Ratio
Information from Balance Sheet							
1. Total Assets (TA)							
2. Total Liabilities (TL)							
3. Net Worth (NW)							
4. Current Assets (CA)							
5. Current Liabilities (CL)							
6. Working capital (FR) = (4-5)							
7. Current Ratio = (4/5)							
Information from Income Statement							
8. Total Revenue (TR)							
9. Profits Before Taxes (PBT)							
10. Return on capital = (9 / 3)							

2. Financial Documents

Attached are copies of financial statements (balance sheets, including all related notes, and income statements) for the years required above complying with the following conditions:

- (a) Must reflect the financial situation of the Bidder or partner to a JVA, and not sister or parent companies
- (b) Historic financial statements must be audited by a certified accountant
- (c) Historic financial statements must be complete, including all notes to the financial statements
- (d) Historic financial statements must correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted)

Form FIN – 3.3.2
Average Annual Turnover

Bidder's Legal Name: _____ Date: _____

JVA Partner Legal Name: _____ ICB No.: _____

Page _____ of _____ pages

Annual turnover data (construction only)		
Year	Amount and Currency	US\$ equivalent
	_____	_____
	_____	_____
	_____	_____
	_____	_____
	_____	_____
	_____	_____
*Average Annual Construction Turnover	_____	_____

*Average annual turnover calculated as total certified payments received for work in progress or completed, divided by the number of years specified in Section III, Evaluation Criteria, Sub-Factor 3.3.2.

Form FIN 3.3.3
Financial Resources

(Each Bidder, and in the case of a Group, each member of the grouping must complete the table below)

Bidder's Legal Name: _____ Date: _____

JVA Partner Legal Name: _____ ICB No.: _____

Page _____ of _____ pages

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, net of current commitments, available to meet the total construction cash flow demands of the subject contract or contracts as indicated in Section III, Evaluation and Qualification Criteria

Source of financing	Amount (US\$ equivalent)
1.	
2.	
3.	
4.	

Form EXP 3.4.1 (a)
System Experience - General Experience MRS

MRS Software Name: _____

Software Version: _____ Release: _____

Page _____ of _____ pages

Starting Month / Year	Ending Month / Year	Meter Quantity	Project Identification	Software and Service Provider
_____	_____		Customer name: Brief Description of the Project Executed: Contact Person: Address: Industrial & Commercial Meter Quantity: Residential Meter Quantity: Type of Communication used:	_____
_____	_____		Customer name: Brief Description of the Project Executed: Contact Person: Address: Industrial & Commercial Meter Quantity: Residential Meter Quantity: Type of Communication used:	_____
_____	_____		Customer name: Brief Description of the Project Executed: Contact Person: Address: Industrial & Commercial Meter Quantity: Residential Meter Quantity: Type of Communication used:	_____
_____	_____		Customer name: Brief Description of the Project Executed: Contact Person: Address: Industrial & Commercial Meter Quantity: Residential Meter Quantity: Type of Communication used:	_____

Form EXP 3.4.1 (b)
System Experience - General Experience MDM

Software Name: _____

Software Version: _____

Release: _____

Page _____ of _____ pages

Starting Month / Year	Ending Month / Year	Meter Quantity	Project Identification	Software and Service Provider
_____	_____		Customer name: Brief Description of the Project Executed: Contact Person: Address: Integrated with the MRS: Industrial & Commercial Meter Quantity: Residential Meter Quantity:	_____
_____	_____		Customer name: Brief Description of the Project Executed: Contact Person: Address: Integrated with the MRS: Industrial & Commercial Meter Quantity: Residential Meter Quantity:	_____
_____	_____		Customer name: Brief Description of the Project Executed: Contact Person: Address: Integrated with the MRS: Industrial & Commercial Meter Quantity: Residential Meter Quantity:	_____
_____	_____		Customer name: Brief Description of the Project Executed: Contact Person: Address: Integrated with the MRS: Industrial & Commercial Meter Quantity: Residential Meter Quantity:	_____

Form EXP 3.4.2 (a)

**Specific Experience MDM-MRS Software Integration
(In case software package are different)**

MRS Software Name: _____

MRS Software Version: _____ Release: _____

MDM Software Name: _____

MDM Software Version: _____ Release: _____

Starting Month / Year	Ending Month / Year	Meter Quantity	Project Identification	Software and Service Provider
_____	_____		Customer name: Brief Description of the Project Executed: Brief Description of the integration model implemented Contact Person: Address:	_____
_____	_____		Customer name: Brief Description of the Project Executed: Brief Description of the integration model implemented Contact Person: Address:	_____
_____	_____		Customer name: Brief Description of the Project Executed: Brief Description of the integration model implemented Contact Person: Address:	_____
_____	_____		Customer name: Brief Description of the Project Executed: Brief Description of the integration model implemented Contact Person: Address:	_____

Form EXP 3.4.2 (b)

Specific Experience MDM-CIS/Billing Software Integration

CIS/Billing software Name: _____

CIS/Billing Software Version: _____ Release: _____

MDM Software Name: _____

MDM Software Version: _____ Release: _____

Starting Month / Year	Ending Month / Year	Meter Quantity	Project Identification	Software and Service Provider
_____	_____		Customer name: Brief Description of the Project Executed: Brief Description of the integration model implemented Contact Person: Address: MDM software version: CIS/Billing software version: Interface Detail:	_____
_____	_____		Customer name: Brief Description of the Project Executed: Brief Description of the integration model implemented Contact Person: Address: MDM software version: CIS/Billing software version: Interface Detail:	_____
_____	_____		Customer name: Brief Description of the Project Executed: Brief Description of the integration model implemented Contact Person: Address: MDM software version: CIS/Billing software version: Interface Detail:	_____
_____	_____		Customer name: Brief Description of the Project Executed: Brief Description of the integration model implemented Contact Person: Address: MDM software version: CIS/Billing software version: Interface Detail:	_____

Form EXP – 3.4.2(c)
MDM Specific Experience

Customer Name: _____

Date: _____

MDM Version: _____

MDM Release: _____

Page _____ of _____ pages

Description of the similarity in accordance with Sub-Factor 3.4.2 (c) of Section III:

Starting Month / Year	Ending Month / Year	Commercial Meter Quantity > 5,000	Project Identification	Software and Service Provider
_____	_____		Customer name: Brief Description of the Project Executed: Brief Description of the integration model implemented Contact Person: Address:	_____
_____	_____		Customer name: Brief Description of the Project Executed: Brief Description of the integration model implemented Contact Person: Address:	_____
_____	_____		Customer name: Brief Description of the Project Executed: Brief Description of the integration model implemented Contact Person: Address:	_____
_____	_____		Customer name: Brief Description of the Project Executed: Brief Description of the integration model implemented Contact Person: Address:	_____

Form EXP – 3.4.2(d)
MDM Specific Experience

Customer Name: _____ Date: _____
MDM Version: _____ MDM Release: _____
Page _____ of _____ pages

Description of the similarity in accordance with Sub-Factor 3.4.2 (d) of Section III:

Starting Month / Year	Ending Month / Year	Meter Quantity > 100,000	Project Identification	Software and Service Provider
_____	_____		Customer name: Brief Description of the Project Executed: Brief Description of the integration model implemented Contact Person: Address:	_____
_____	_____		Customer name: Brief Description of the Project Executed: Brief Description of the integration model implemented Contact Person: Address:	_____
_____	_____		Customer name: Brief Description of the Project Executed: Brief Description of the integration model implemented Contact Person: Address:	_____
_____	_____		Customer name: Brief Description of the Project Executed: Brief Description of the integration model implemented Contact Person: Address:	_____

Form EXP 3.5.1 (a)

Bidder General Experience in MRS Software Implementation

Bidder's Legal Name: _____

Date: _____

JVA Partner Legal Name: _____

ICB No.: _____

Page _____ of _____ pages

Starting Month / Year	Ending Month / Year	Years *	Contract Identification	Role of Bidder
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____

Form EXP 3.5.1 (b)
Bidder General Experience in MDMS Software Implementation

Bidder's Legal Name: _____

Date: _____

JVA Partner Legal Name: _____

ICB No.: _____

Page _____ of _____ pages

Starting Month / Year	Ending Month / Year	Years *	Contract Identification	Role of Bidder
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____

Form EXP 3.5.1 (c)
Bidder General Experience in MRS-MDM System Integration
(In case software package are different)

Bidder's Legal Name: _____

Date: _____

JVA Partner Legal Name: _____

ICB No.: _____

Page _____ of _____ pages

Starting Month / Year	Ending Month / Year	Years *	Contract Identification	Role of Bidder
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____

Form EXP 3.5.1 (d)
Bidder General Experience in MDM – CIS/Billing Integration

Bidder's Legal Name: _____

Date: _____

JVA Partner Legal Name: _____

ICB No.: _____

Page _____ of _____ pages

Starting Month / Year	Ending Month / Year	Years *	Contract Identification	Role of Bidder
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____		Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____

Form EXP – 3.5.2(a)
Specific Experience

Bidder's Legal Name: _____

Date: _____

JVA Partner Legal Name: _____

ICB No.: _____

Page _____ of _____ pages

Similar Contract Number: ____ of ____ required.	Information		
1. Contract Identification	2. _____ _____		
3. Award date 4. Completion date	5. _____ _____ 6. _____ _____		
7.	8.		
Role in Contract	<input type="checkbox"/> Contractor	<input type="checkbox"/> Management Contractor	<input type="checkbox"/> Subcontract or
9. Total contract amount	10. _____ _____		11. US\$_ _____
12. If partner in a JVA or subcontractor, specify participation of total contract amount	13. _____ 14. _____ _____ %	15. _____ 16. _____ _____	17. _____ 18. US\$_ _____
19. Employer's Name:	20. _____ _____		
21. Address: 22. 23. Telephone/fax number: 24. E-mail:	25. _____ _____ 26. _____ _____ 27. _____ _____ 28. _____ _____		

Form EXP – 3.5.2(a) (cont.)
Specific Experience (cont.)

Bidder's Legal Name: _____ Page _____ of _____ pages
 JVA Partner Legal Name: _____

Similar Contract No. __[insert specific number] of [total number of contracts] __ required	Information
Description of the similarity in accordance with Sub-Factor 2.5.2a) of Section III:	
Amount	_____
Physical size	_____
Complexity	_____
Methods/Technology	_____
Physical Production Rate	_____

Form EXP – 3.5.2(b)
Specific Experience in Key Activities

Bidder's Legal Name: _____ Date: _____
 JVA Partner Legal Name: _____ ICB No.: _____
 Subcontractor's Legal Name: _____ Page _____ of _____ pages

	Information		
Contract Identification	_____		
Award date	_____		
Completion date	_____		
Role in Contract	<input type="checkbox"/> Contractor	<input type="checkbox"/> Management Contractor	<input type="checkbox"/> Subcontract or
Total contract amount	_____		US\$ _____
If partner in a JVA or subcontractor, specify participation of total contract amount	_____%	_____	US\$ _____
Employer's Name:	_____		
Address:	_____ _____ _____		
Telephone/fax number:	_____ _____		
E-mail:	_____ _____		

Form EXP – 3.5.2 (b)(cont.)
Specific Experience in Key Activities (cont.)

Bidder’s Legal Name: _____ Page _____ of _____ pages
JVA Partner Legal Name: _____
Subcontractor’s Legal Name: _____

	Information
Description of the key activities in accordance with Sub-Factor 3.5.2b) of Section III:	

PERSONNEL

Form PER -1

Proposed Personnel

Bidders should provide the names of suitably qualified personnel to meet the specified requirements stated in Section III. The data on their experience should be supplied using the Form below for each candidate.

1.	Title of position*
	Name
2.	Title of position*
	Name
3.	Title of position*
	Name
4.	Title of position*
	Name

Form PER-2

Resume of Proposed Personnel

Name of Bidder

Position		
Personnel information	Name	Date of birth
	Professional qualifications	
Present employment	Name of employer	
	Address of employer	
	Telephone	Contact (manager / personnel officer)
	Fax	E-mail
	Job title	Years with present employer

Summarize professional experience over the last 8 years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	To	Company / Project / Position / Relevant technical and management experience

Code of Conduct for Supplier's Personnel (ES) Form

Note to the Employer:

The following minimum requirements shall not be modified. The Employer may add additional requirements to address identified issues, informed by relevant environmental and social assessment.

The types of issues identified could include risks associated with: labor influx, spread of communicable diseases, and Sexual Exploitation and Abuse (SEA), Sexual Harassment (SH) etc.

Delete this Box prior to issuance of the bidding documents.

Note to the Bidder:

The minimum content of the Code of Conduct form as set out by the Employer shall not be substantially modified. However, the Bidder may add requirements as appropriate, including to take into account Contract-specific issues/risks.

The Bidder shall initial and submit the Code of Conduct form as part of its bid.

CODE OF CONDUCT FOR SUPPLIER'S AND SUBCONTRACTOR'S PERSONNEL

We are the Supplier, [*enter name of Supplier*]. We have signed a contract with [*enter name of Employer*] for [*enter description of the Contract*]. The AMI System will be installed at [*enter the Site*]. Our contract requires us to implement measures to address environmental and social risks, related to the Installation and maintenance support services and Maintenance Support Services i.e. services ancillary to the Goods supply, such as inland transportation, site preparation works/ associated civil works, installation and maintenance support services, testing, precommissioning, commissioning, operations and maintenance etc. as the case may require.

This Code of Conduct is part of our measures to deal with environmental and social risks related to the Installation and maintenance support services and Maintenance Support Services.

All personnel that we utilize in the execution of the Contract, including staff, labor and other employees of us and of each Subcontractor, and any other personnel assisting us in the execution of the Contract, are referred to as Supplier's personnel.

This Code of Conduct identifies the behavior that we require from the Supplier's Personnel employed for the execution of Installation and maintenance support services and Maintenance Support Services at the Site (or other places in the country where the Site is located).

Our workplace is an environment where unsafe, offensive, abusive or violent behavior will not be tolerated and where all persons should feel comfortable raising issues or concerns without fear of retaliation.

REQUIRED CONDUCT

Supplier's Personnel employed for the execution of Installation and maintenance support services and Maintenance Support Services at the Site (or other places in the country where the Site is located) shall:

1. carry out his/her duties competently and diligently;
2. comply with this Code of Conduct and all applicable laws, regulations and other requirements, including requirements to protect the health, safety and well-being of other Supplier's and Subcontractor's personnel and any other person;
3. maintain a safe working environment including by:
 - a. ensuring that workplaces, machinery, equipment and processes under each person's control are safe and without risk to health;
 - b. wearing required personal protective equipment;
 - c. using appropriate measures relating to chemical, physical and biological substances and agents; and
 - d. following applicable emergency operating procedures.
4. report work situations that he/she believes are not safe or healthy and remove himself/herself from a work situation which he/she reasonably believes presents an imminent and serious danger to his/her life or health;
5. treat other people with respect, and not discriminate against specific groups such as women, people with disabilities, migrant workers or children;
6. not engage in any form of sexual harassment including unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature with other Supplier's or Employer's Personnel;
7. not engage in Sexual Exploitation, which means any actual or attempted abuse of position of vulnerability, differential power or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another;
8. not engage in Sexual Abuse, which means the actual or threatened physical intrusion of a sexual nature, whether by force or under unequal or coercive conditions;
9. not engage in any form of sexual activity with individuals under the age of 18, except in case of pre-existing marriage;
10. complete relevant training courses that will be provided related to the environmental and social aspects of the Contract, including on health and safety matters, and Sexual Exploitation and Abuse, and Sexual Harassment (SH);
11. report violations of this Code of Conduct; and
12. not retaliate against any person who reports violations of this Code of Conduct, whether to us or the Employer, or who makes use of the grievance mechanism for Supplier's Personnel or the project's Grievance Redress Mechanism.

RAISING CONCERNS

If any person observes behavior that he/she believes may represent a violation of this Code of Conduct, or that otherwise concerns him/her, he/she should raise the issue promptly. This can be done in either of the following ways:

1. Contact [*enter name of the Supplier's Social Expert with relevant experience in handling sexual exploitation, sexual abuse and sexual harassment cases, or if such person is not required under the Contract, another individual designated by the Supplier to handle these matters*] in writing at this address [] or by telephone at [] or in person at []; or
2. Call [] to reach the Supplier's hotline (*if any*) and leave a message.

The person's identity will be kept confidential, unless reporting of allegations is mandated by the country law. Anonymous complaints or allegations may also be submitted and will be given all due and appropriate consideration. We take seriously all reports of possible misconduct and will investigate and take appropriate action. We will provide warm referrals to service providers that may help support the person who experienced the alleged incident, as appropriate.

There will be no retaliation against any person who raises a concern in good faith about any behavior prohibited by this Code of Conduct. Such retaliation would be a violation of this Code of Conduct.

CONSEQUENCES OF VIOLATING THE CODE OF CONDUCT

Any violation of this Code of Conduct by the Supplier's Personnel may result in serious consequences, up to and including termination and possible referral to legal authorities.

FOR SUPPLIER'S PERSONNEL:

I have received a copy of this Code of Conduct written in a language that I comprehend. I understand that if I have any questions about this Code of Conduct, I can contact [*enter name of Supplier's contact person(s) with relevant experience*] requesting an explanation.

Name of Supplier's Personnel: [insert name]

Signature: _____

Date: (day month year): _____

Countersignature of authorized representative of the Supplier:

Signature: _____

Date: (day month year): _____

ATTACHMENT 1: Behaviors constituting SEA and behaviors constituting SH

**ATTACHMENT 1 TO THE CODE OF CONDUCT FORM
BEHAVIORS CONSTITUTING SEXUAL EXPLOITATION AND ABUSE (SEA)
AND BEHAVIORS CONSTITUTING SEXUAL HARASSMENT (SH)**

The following non-exhaustive list is intended to illustrate types of prohibited behaviors.

(1) Examples of sexual exploitation and abuse include, but are not limited to:

- A Contractor's Personnel tells a member of the community that he/she can get them jobs related to the work site (e.g. cooking and cleaning) in exchange for sex.
- A Contractor's Personnel that is connecting electricity input to households says that he can connect women headed households to the grid in exchange for sex.
- A Contractor's Personnel rapes, or otherwise sexually assaults a member of the community.
- A Contractor's Personnel denies a person access to the Site unless he/she performs a sexual favor.
- A Contractor's Personnel tells a person applying for employment under the Contract that he/she will only hire him/her if he/she has sex with him/her.

(2) Examples of sexual harassment in a work context

- A Contractor's Personnel comment on the appearance of another Installation and maintenance support services Personnel (either positive or negative) and sexual desirability.
- When a Contractor's Personnel complains about comments made by another Contractor's Personnel on his/her appearance, the other Contractor's Personnel comment that he/she is "asking for it" because of how he/she dresses.
- Unwelcome touching of a Contractor's Personnel or Employer's Personnel by another Contractor's Personnel.
- A Contractor's Personnel tells another Contractor's Personnel that he/she will get him/her a salary raise, or promotion if he/she sends him/her naked photographs of himself/herself

Section V - Eligible Countries

Eligibility for the Provision of Goods, Works and Non-Consulting Services in Bank-Financed Procurement

In reference to ITB 4.8 and ITB 5.1, for the information of the Bidders, at the present time firms, goods and services from the following countries are excluded from this Bidding process:

Under ITB 4.8(a) and ITB 5.1: *none*

Under ITB 4.8(b) and ITB 5.1: *none*

Section VI - Fraud and Corruption

(Section VI shall not be modified)

1. Purpose

1.1 The Bank's Anti-Corruption Guidelines and this annex apply with respect to procurement under Bank Investment Project Financing operations.

2. Requirements

2.1 The Bank requires that Borrowers (including beneficiaries of Bank financing); bidders (applicants/proposers), consultants, contractors and suppliers; any sub-contractors, sub-consultants, service providers or suppliers; any agents (whether declared or not); and any of their personnel, observe the highest standard of ethics during the procurement process, selection and contract execution of Bank-financed contracts, and refrain from Fraud and Corruption.

2.2 To this end, the Bank:

- a. Defines, for the purposes of this provision, the terms set forth below as follows:
 - i. "corrupt practice" is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;
 - ii. "fraudulent practice" is any act or omission, including misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain financial or other benefit or to avoid an obligation;
 - iii. "collusive practice" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;
 - iv. "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;
 - v. "obstructive practice" is:
 - (a) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive, or collusive practice; and/or threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or
 - (b) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under paragraph 2.2 e. below.
- b. Rejects a proposal for award if the Bank determines that the firm or individual recommended for award, any of its personnel, or its agents, or its sub-

- consultants, sub-contractors, service providers, suppliers and/ or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;
- c. In addition to the legal remedies set out in the relevant Legal Agreement, may take other appropriate actions, including declaring misprocurement, if the Bank determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement process, selection and/or execution of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;
 - d. Pursuant to the Bank's Anti- Corruption Guidelines, and in accordance with the Bank's prevailing sanctions policies and procedures, may sanction a firm or individual, either indefinitely or for a stated period of time, including by publicly declaring such firm or individual ineligible (i) to be awarded or otherwise benefit from a Bank-financed contract, financially or in any other manner;⁴ (ii) to be a nominated⁵ sub-contractor, consultant, manufacturer or supplier, or service provider of an otherwise eligible firm being awarded a Bank-financed contract; and (iii) to receive the proceeds of any loan made by the Bank or otherwise to participate further in the preparation or implementation of any Bank-financed project;
 - e. Requires that a clause be included in bidding/request for proposals documents and in contracts financed by a Bank loan, requiring (i) bidders (applicants/proposers), consultants, contractors, and suppliers, and their sub-contractors, sub-consultants, service providers, suppliers, agents personnel, permit the Bank to inspect⁶ all accounts, records and other documents relating to the procurement process, selection and/or contract execution, and to have them audited by auditors appointed by the Bank.

⁴ For the avoidance of doubt, a sanctioned party's ineligibility to be awarded a contract shall include, without limitation, (i) applying for pre-qualification, expressing interest in a consultancy, and bidding, either directly or as a nominated sub-contractor, nominated consultant, nominated manufacturer or supplier, or nominated service provider, in respect of such contract, and (ii) entering into an addendum or amendment introducing a material modification to any existing contract.

⁵ A nominated sub-contractor, nominated consultant, nominated manufacturer or supplier, or nominated service provider (different names are used depending on the particular bidding document) is one which has been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.

⁶ Inspections in this context usually are investigative (i.e., forensic) in nature. They involve fact-finding activities undertaken by the Bank or persons appointed by the Bank to address specific matters related to investigations/audits, such as evaluating the veracity of an allegation of possible Fraud and Corruption, through the appropriate mechanisms. Such activity includes but is not limited to: accessing and examining a firm's or individual's financial records and information, and making copies thereof as relevant; accessing and examining any other documents, data and information (whether in hard copy or electronic format) deemed relevant for the investigation/audit, and making copies thereof as relevant; interviewing staff and other relevant individuals; performing physical inspections and site visits; and obtaining third party verification of information.

PART 2 – Supply Requirements

Section VII - Schedule of Requirements

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1. List of Goods and Delivery Schedule

Line Item No.	Description of Goods	Quantity	Physical unit	Final (Project Site) Destination as specified in BDS	Delivery (as per Incoterms) Date		
					Earliest Delivery Date*	Latest Delivery Date*	Bidder's offered Delivery date [to be provided by the bidder]
1.1	Meters						
1.1.3	3-phase CT multifunctional Smart Meter Type 1	15500	Unit	Project Site	60 Days	90 Days	
1.1.4	3-phase CT/VT multifunctional Smart Meter Type 1	1000	Unit	Project Site	60 Days	90 Days	
1.2	Meter Box						
1.2.1	Meter Box for Type 1 meters	8550	Unit	Project Site	60 Days	90 Days	
1.2.2	Meter Box for Type 2 meters	2385	Unit	Project Site	60 Days	90 Days	
1.3	Circuit Breaker						
1.3.1	Meter Box Circuit Breakers 230/400 V – 250 A	264	Unit	Project Site	60 Days	90 Days	
1.3.2	Meter Box Circuit Breakers 230/400 V – 400 A	3	Unit	Project Site	60 Days	90 Days	
1.3.3	Meter Box Circuit Breakers 230/400 V – 800 A	24	Unit	Project Site	60 Days	90 Days	
1.4	Current and Voltage Transformer For Feeders						
1.4.1	HV Current Transformers, 60 KV (HVCT's), Outdoor - 600A~5000A/5A - Accuracy Class: 0,2S Set to 3	75	Unit	Project Site	60 Days	90 Days	
1.4.2	MV Current Transformers, 30 KV (MVCT's), Outdoor - 600A~5000A/5A - Accuracy Class: 0,2S, Set to Two	142	Unit	Project Site	60 Days	90 Days	
1.4.2	MV Current Transformers, 20 KV (MVCT's), Outdoor - 600A~5000A/5A - Accuracy Class: 0,2S, Set to Two	7	Unit	Project Site	60 Days	90 Days	
1.4.4	MV Current Transformers, 15 KV (MVCT's), Outdoor - 600A~5000A/5A - Accuracy Class: 0,2S, Set to Two	638	Unit	Project Site	60 Days	90 Days	

Line Item No.	Description of Goods	Quantity	Physical unit	Final (Project Site) Destination as specified in BDS	Delivery (as per Incoterms) Date		
					Earliest Delivery Date*	Latest Delivery Date*	Bidder's offered Delivery date [to be provided by the bidder]
1.4.5	Voltage Transformers (VT's) - 60000V / 110 V – Set to 3 (For energy balance)	75	Unit	Project Site	60 Days	90 Days	
1.4.6	Voltage Transformers (VT's) - 30000V / 110 V - Set to 3 (For energy balance)	142	Unit	Project Site	60 Days	90 Days	
1.4.7	Voltage Transformers (VT's) - 20000V / 110 V - Set to 3 (For energy balance)	7	Unit	Project Site	60 Days	90 Days	
1.4.8	Voltage Transformers (VT's) - 15000V / 110 V - Set to 3 (For energy balance)	638	Unit	Project Site	60 Days	90 Days	
1.5	Current Transformers For MV Customers						
1.5.1	Indoor/Outdoor, rated short-time thermal current:12,5 KA, Accuracy Class: 0,5S, Ratio: 40/5A - Set to Three	12	Unit	Project Site	60 Days	90 Days	
1.5.2	Indoor/Outdoor, rated short-time thermal current:12,5 KA, Accuracy Class: 0,5S, Ratio: 80/5A - Set to Three	312	Unit	Project Site	60 Days	90 Days	
1.5.2	Indoor/Outdoor, rated short-time thermal current:12,5 KA, Accuracy Class: 0,5S, Ratio: 160/5A - Set to Three	688	Unit	Project Site	60 Days	90 Days	
1.5.4	Indoor/Outdoor, rated short-time thermal current:12,5 KA, Accuracy Class: 0,5S, Ratio: 200/5 A - Set to Three	98	Unit	Project Site	60 Days	90 Days	
1.5.5	Indoor/Outdoor, rated short-time thermal current:16 KA, Accuracy Class: 0,5S Ratio: 250/5 A - Set to Three	925	Unit	Project Site	60 Days	90 Days	
1.5.6	Indoor/Outdoor, rated short-time thermal current:16 KA, Accuracy Class: 0,5S Ratio: 300/5 A - Set to Three	183	Unit	Project Site	60 Days	90 Days	
1.5.7	Indoor/Outdoor, rated short-time thermal current:16 KA, Accuracy Class: 0,5S Ratio: 400/5 A - Set to Three	1460	Unit	Project Site	60 Days	90 Days	
1.5.8	Indoor/Outdoor, rated short-time thermal current:16 KA, Accuracy Class: 0,5S, Ratio: 500/ 5 A - Set to Three	235	Unit	Project Site	60 Days	90 Days	

Line Item No.	Description of Goods	Quantity	Physical unit	Final (Project Site) Destination as specified in BDS	Delivery (as per Incoterms) Date		
					Earliest Delivery Date*	Latest Delivery Date*	Bidder's offered Delivery date [to be provided by the bidder]
1.5.9	Indoor/Outdoor, rated short-time thermal current:16 KA, Accuracy Class: 0,5S, Ratio: 600/5 A - Set to Three	695	Unit	Project Site	60 Days	90 Days	
1.5.10	Indoor/Outdoor, rated short-time thermal current:16 KA, Accuracy Class: 0,5S, Ratio: 800/5 A - Set to Three	169	Unit	Project Site	60 Days	90 Days	
1.6	Current Transformers For LV Customers						
1.6.1	400 V (LVCT's), 80/5A- Accuracy Class: 0,5S,set of three	130	No.	Project Site	60 Days	90 Days	
1.6.2	400 V (LVCT's),60/5A- Accuracy Class: 0,5S,set of three	136	No.	Project Site	60 Days	90 Days	
1.6.3	400 V (LVCT's),200/5A-Accuracy Class: 0,5S,set of three	14	No.	Project Site	60 Days	90 Days	
1.6.4	400 V (LVCT's),250/5A-Accuracy Class: 0,5S,set of three	10	No.	Project Site	60 Days	90 Days	
1.6.5	400 V (LVCT's),300/5A-Accuracy Class: 0,5S,set of three	12	No.	Project Site	60 Days	90 Days	
1.6.6	400 V (LVCT's),400/5A-Accuracy Class:0,5S,set of three	4	No.	Project Site	60 Days	90 Days	
1.7	Others						
1.7.1	Meter programing tool	8	No.	Project Site	60 Days	90 Days	
1.7.2	Hand Held Unit	48	No.	Project Site	60 Days	90 Days	
1.7.3	Cables & Accessories (Optic Cables)	48	No.	Project Site	60 Days	90 Days	
1.7.4	Meters Modems	16500	No.	Project Site	60 Days	90 Days	
1.7.5	Antenna (GPRS/3G/4G) 100cm cable	2000	No.	Project Site	60 Days	90 Days	
1.7.6	Antenna (GPRS/3G/4G) 200cm cable	2000	No.	Project Site	60 Days	90 Days	
2.1	MRS/HES SOFTWARE						
2.1.1	MRS/HES Application Software with lifetime license.	20,000	Meter	Project Site	60 Days	90 Days	

Line Item No.	Description of Goods	Quantity	Physical unit	Final (Project Site) Destination as specified in BDS	Delivery (as per Incoterms) Date		
					Earliest Delivery Date*	Latest Delivery Date*	Bidder's offered Delivery date [to be provided by the bidder]
2.1.2	MRS/HES Database Management System with lifetime license	1	Unit	Project Site	60 Days	90 Days	
2.1.3	Other software with lifetime license	1	Unit	Project Site	60 Days	90 Days	
3.1	MDMS SOFTWARE						
3.1.1	MDMS Application Software with lifetime license.	1,200,000	Meter	Project Site	60 Days	90 Days	
3.1.2	MDMS Database Management System with lifetime license	1	Unit	Project Site	60 Days	90 Days	
3.1.3	Other software with lifetime license	1	Unit	Project Site	60 Days	90 Days	
3.2	Software Documentation						
3.2.1	Hardware Documentation	1	Unit	Project Site	60 Days	90 Days	
3.2.2	Software Documentation	1	Unit	Project Site	60 Days	90 Days	
3.2.3	As-Built Documentation	1	Unit	Project Site	60 Days	90 Days	
3.2.4	Database Document	1	Unit	Project Site	60 Days	90 Days	
3.2.5	System Maintenance Manual	1	Unit	Project Site	60 Days	90 Days	
3.2.6	Security Documentation	1	Unit	Project Site	60 Days	90 Days	
3.2.7	Operating Manuals (including Operator's Manual, Database Editor's Manual, Display Editor's Manual)	1	Unit	Project Site	60 Days	90 Days	
3.2.8	Specific Applications Software Maintenance Manuals	1	Unit	Project Site	60 Days	90 Days	
3.2.11	Specific Systems Design Documentation	1	Unit	Project Site	60 Days	90 Days	
4.1	MCC INFRASTRUCTURE						
4.1.1	Furniture						
4.1.1.1	TV LED 65"	5	Unit	MCC Site	60 Days	90 Days	

Line Item No.	Description of Goods	Quantity	Physical unit	Final (Project Site) Destination as specified in BDS	Delivery (as per Incoterms) Date		
					Earliest Delivery Date*	Latest Delivery Date*	Bidder's offered Delivery date <i>[to be provided by the bidder]</i>
4.1.1.2	Office Desks	16	Unit	MCC Site	60 Days	90 Days	
4.1.1.3	Office Chairs	16	Unit	MCC Site	60 Days	90 Days	
4.1.1.4	Cabinets	3	Unit	Mcc Site	60 Days	90 Days	
4.1.2	Desktop Computers	16	No.	Project Site	60 Days	90 Days	
4.1.3	Printers Black	8	No.	Project Site	60 Days	90 Days	
5.1.4	Printers Colors	4	No.	Project Site	60 Days	90 Days	
5.1.5	Switch 1GB 12 ports	1	Unit	Project Site	60 Days	90 Days	

2. List of Related Services and Completion Schedule

Service	Description of Service	Quantity (*)	Physical Unit (*)	Place where Services shall be performed	Final Completion Date(s) of Services
1	Premise Inspection and Survey				
1.1	LV customers Premise Inspection & Survey	8550	Service	Project Site	120 days after contract signed
1.2	MV customers Premise Inspection & Survey	6450	Service	Project Site	120 days after contract signed
1.3	Feeder Site Inspection & Survey	862	Service	Project Site	120 days after contract signed
2	Meter Installation and CT/VT Installation				
2.1	Low Voltage consumers Meters Installation	8550	Service	Project Site	120 days after contract signed
2.2	Low Voltage consumers CTs Installation	306	Service	Project Site	120 days after contract signed
2.3	MV consumers meters installation	6450	Service	Project Site	120 days after contract signed
2.4	MV consumers CTs Installation	4777	Service	Project Site	180 days after contract signed
2.5	Feeder Meters Installation	862	Service	Project Site	180 days after contract signed
2.6	Feeder CTs/VTs Installation	862	Service	Project Site	180 days after contract signed
3	MCC Installation				
3.1	MCC Operation Centre Infrastructure design and implementation	1	Service	Project Site	180 days after contract signed
4	System Installation				
4.1	MRS/HES Installation, configuration & Testing	1	Service	Project Site	120 days after contract signed
4.2	MDMS Installation, Configuration & Testing	1	Service	Project Site	120 days after contract signed
4.3	Configuration and Building database	1	Service	Project Site	120 days after contract signed
4.4	System integration and Data Migration	1	Service	Project Site	180 days after contract signed
4.5	MDMS Interfaces develop, implementation and testing	1	Service	Project Site	180 days after contract signed

Service	Description of Service	Quantity (*)	Physical Unit (*)	Place where Services shall be performed	Final Completion Date(s) of Services
5	Training				
5.1	MRS Software Package training	1	Service	Project Site	120 days after contract signed
5.2	MDMS System Software Package training	1	Service	Project Site	120 days after contract signed
5.3	Meter, Modem and Meter Configuration Software Tool	1	Service	Project Site	120 days after contract signed
5.4	Hardware Security Module (HSM)	1	Service	Project Site	120 days after contract signed
5.5	Hand Held training	1	Service	Project Site	120 days after contract signed
5.6	IT Components (OS, DataBase, VM, Firewall, Replication Software, etc.)	1	Service	Project Site	120 days after contract signed
6	Operation, Maintenance and Support				
6.1	On Site system Operation & maintenance support (Six Months)	1	Service	Project Site	After final OSAT
6.2	Maintenance & Support Service Contract for MRS/HES, MDM software (3 years)	1	Service	Project Site	Three years after Warranty end
6.3	Maintenance & Support Service Contract for all other software (3 years)	1	Service	Project Site	Three years after Warranty end

3. Technical Specifications

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3.1 INTRODUCTION

3.1.1 The Country

Angola is a country located at west-coast of south-central Africa, bordered by Namibia to the south, the Democratic Republic of the Congo to the north, Zambia to the east, and the Atlantic Ocean to the west. The capital and largest city of Angola is Luanda.

Angola's GDP was approximately US \$100 Billion in 2019 with a per capita income of US\$ 3,036 with a population of 30.1 million. Angola faces considerable social and economic challenges given its dependence on oil exports.

3.1.2 Energy Sector

A major oil-exporting country and OPEC member with oil production of 1.4 million barrels per day, Angola is sub-Saharan Africa's third-largest economy.

Increasing the access to electric power is a high priority for the Government of Angola, which has set targets of 9.9 gigawatts (GW) of installed generation capacity and a 60% electrification rate by 2025. The generation mix is projected to be 58% hydro, 12% natural gas, and 30% diesel powered generation by the end of 2018. Large-scale projects implemented in 2017/18 include the Soyo combined cycle natural gas plant (750 MW), and the Lauca hydroelectric project (2.1 GW). In 2014, mapping studies identified the potential for 55 GW solar power, 3 GW wind power, and 18 GW in hydropower throughout the country.

Angola electricity access reaches more than 70% in urban areas but is limited to 16% in rural areas.

To faces these challenges, in 2014 the Presidential Decree Nr. 305/14 of November 20th created the Empresa Nacional de Distribuição de Electricidade (ENDE-EP), the result of extinguishing of Empresa Nacional de Electricidade (ENE-EPE).

3.1.3 The Beneficiary

ENDE-EP results from merging of assets from extinguished EDEL as well as from ENE's Distribution Department, developing their activities in all over the country.

The National Electricity Distribution Company (ENDE) is primarily intended to distribute and market electricity at national level, under the Electric Public System (SEP), through the operation of distribution grid assets at High, Medium and Low voltage (HV, MV, LV), under public utilities way, under the General Electricity Law and its Regulations.

At end of 2018 ENDE had 1.6 million of customers spread across 20 Distribution Centers spread through the country. Of these customers 150 thousand have post-paid meters and 450

thousand have prepayment meters. At least 1 million of customers are connected directly, without meters and billed by a monthly average consumption.

Currently, the power utility companies in Angola are heavily dependent on Government subsidies to sustain operations. This situation severely impacts the cost and availability of energy in the Southern region but also presents a risk for the region's future economic growth. In what refers to the distribution sub-sector, it is approximated that 860,000 out of 1.08 million residential customers (>79%) are not metered, which contributes significantly to the financial losses that affect the levels of subsidies and utility performance. Angola needs to address structural bottlenecks on economic infrastructure.

Investments towards the enhanced efficiency and sustainability of the energy sector is critical to reduce the current high production costs, reduce/eliminate government subsidies and unlock the full economic potential of the country. This operation is aligned with the current IMF program that recommends Angola only to borrow cheaper funding in order to allow sustainable economic growth. This intervention will be the first phase of a medium-to-long term support to the development of Angola's power sector, with the aim of increasing its financial and economic sustainability, whilst contributing to unleashing the potential benefits associated with the regional interconnection of the country's power system.

3.1.4 Objectives of the Tender

The World Bank Group (WB), in partnership with the French Development Agency (AFD), are providing funding to support the Angolan Electricity Sector improve the commercial and operational performance of the sector companies and increase access to electricity in selected cities in Angola. The Project designation is "Electricity Sector Improvement and Access Project", or "Projecto de Melhoria e Acesso ao Sector de Electricidade" (ESIAP, P166805).

The ESIAP Project Components were structured as follows:

Component 1: Expanding access to electricity and improving revenue collection (US\$250 million, including US\$100 million from IBRD and US\$150 million from WB/AFD). This component will help to improve the commercial and operational performance of ENDE's distribution services. Activities will be grouped into two subcomponents:

- Subcomponent 1.1: Rehabilitation and expansion of the distribution network (US\$243 million, including US\$93 million from IBRD and US\$150 million from WB/AFD).
- Subcomponent 1.2: Revenue protection program (US\$7 million dollars from IBRD).

Component 2: Improved electricity service (US\$115 million from IBRD). This component will finance work, new instruments and software, and training to improve dispatch and electrical transmission services by RNT.

Component 3: Improved planning, operations and maintenance of public companies (US\$37 million, including US\$30 million from IBRD and US\$17 million from WB/AFD). This component will finance activities to strengthen the technical and institutional capacity and the

sustainable management of power plants, as well as the provisioning and installation of measurement infrastructures at points of sale / purchase (ENDE, RNT and PRODEL).

Component 4: Project management and training (US\$15 million from IBRD). This component will finance the costs of the PCU (Project Coordination Unit) and additional technical support to ENDE, RNT and PRODEL throughout the implementation, including the capacity strengthening and equipment to support commercial and logistics operations in the provinces where the electrification activities will be carried out.

The objectives of this RFB are to contract services for implementing Five Project Items of the ESIAP WB Project Subcomponent 1.2, as set out below.

Sub-component 1.2 of the World Bank Electricity Sector Improvement Project will support the implementation of a revenue protection program (RPP) to eliminate non-technical losses from ENDE's 15,000 "high-value" customers, including industrial and commercial customers supplied in high- or medium-voltage (HV or MV), and the largest customers supplied in low voltage (LV). Although representing only 3 percent of the total customer basis, these customers account for 56 percent of total electricity consumption currently billed. Thus, ENDE's commercial performance can improve quickly by correctly tracking consumption, and systematically billing and collecting revenues from this segment.

This will be achieved through:

- (i) Installation/replacement of multifunctional post-paid smart meters, meters boxes, modems for remote communication, voltage and current transformers (VT and CT) at the customers' premises in the advanced metering infrastructure (AMI).
- (ii) Installation/replacement of multifunctional post-paid smart meters and voltage and current transformers (VT and CT) at the substation for energy balance.
- (iii) Installation, implementation and commissioning of the Meter Reading Software (MRS) also known like Head End System to communicate with supplied meters including the training of the MCC Team and IT Team
- (iv) Provide all equipment for the Meter Control Center as is specified in this document and provide the services to do the software platform available in the MCC. Also the supplier will operate the AMI System during the first 6 (six) months and will be responsible of the AMI system correct operation and the knowledge transfer process after AMI System its commissioning and acceptance by ENDE.
- (v) Installation, implementation and commissioning of a Meter Data Management (MDM) software package including the integration with SAP and ENDE's Pre-paid System and Pre-paid Head End System, the supplied MRS System, and training MCC Team and IT Team.

3.2 PROJECT GOALS

ENDE is seeking an integrated technical solution to support the objectives of the Revenue Protection Project (RPP) which is to establish an AMI infrastructure that support the commercial and operational activities to achieve the following:

- Increase of metering accuracy and reduction of the number of complaints
- Reduction of non-technical losses;
- Reduction in the operation tasks;
- Acceleration of invoice issuing and reduction of collection period;
- Reduction in the Human Resource risk

The Revenue Protection Project consist on the following components:

- **Smart Meter and Communication Equipment:** Electronic Meters with two ways remote communication capacity.
- **Meter Box:** Plastic Meter boxes
- **Meter Data Management Software (MDM):** The application software will help with metering data administration and to fight the commercial energy losses. This software has the following main functions:
 - Loading the metering data from any reading system using different technologies.
 - Validation, Edition and Estimation (VEE) of Metering Data.
 - Providing data to the Billing system
 - Abnormally consumption of energy detection
 - Billing simulator
 - Interface capacity using a standard open Protocol.
- **Metering Control Center (MCC):** It is the unit responsible for revenue protection, whose structure includes the hardware and complementary equipment for managing the entire control and measurement system, including the MRS/HES, MDM software and the maintenance of the Revenue Protection Program. The supplier will deliver the CCM equipment and software training to the users of the CCM team. The location of the MCC offices, organizational structure, definition of operational processes, etc., are the responsibility of ENDE.
-
- **Current Transformer (CT) package:** It is the CT package to connect the Indirect meters.
- **Voltage Transformer (VT) package:** It is the VT to connect the Indirect CT/VT meters.
- **Hand Held Unit:** It is the mobile device to be used in the field operation for meter programing, meter reading, etc.
- **Services:** A series of services are including in the RPP project to be under supplier performance:
 - Inspection of each customer premise and meter installation place
 - Installation of the Meters

- Installation of CT and/or CT/VT.
- Installation, configuration and implementation of all solution software.
- Integration with SAP System, Pre-Paid System and Pre-Paid HES software including the develop of batch and on-line interfaces in the MDMS software package.
- Training ENDE personnel in all elements of the AMI solutions
- Testing.
- Maintenance of System
- Operation of system

The new system is expected to have a useful productive life of at least 10 years, and must be designed and configured to support the future growth and expansion requirements of the organization in terms of both size and functional parameters. It is required that the new system must also be able to accommodate future technology enhancements that have the potential to increase operational effectiveness and ease implementation of new features, functions, and applications.

3.2.1 Communication Services Lines

ENDE will provide the communication link between the meters and the Automatic Meter Reading Software (MRS/HES). The characteristic of the communication link between will be the following:

- Communication technology: Cellular Network
- Type of Cellular Network: GSM/GPRS/2G/3G/4G/LTE
- Band Frequency: Multi Band (900, 1800, 2100 MHZ)
- Size of the link: Not less than 5Mb connection

Also ENDE will contract the communication link between the Meters and MRS/HES communication Servers with the different TELCO's in Country.

3.2.2 Equipment and Software for the RPP Project

All meters, IT equipment and software necessary to support the RPP project according to the technical specification as specified in these documents must be provided by the Supplier.

All software required to maintain the performance and availability of the system must be included in the proposal by the bidders.

Wherever brand names, catalogue numbers, or similar classifications are specified in these specifications, bidders may offer goods or equipment which have similar characteristics and performance at least substantially equivalent to those specified.

The new Smart Meters to be supplied must be fully compliant with Protocol DLMS/COSEM according to the IEC 62056 Standard.

The Software application will be implementing under standards IEC 61850 DLMS/COSEM data models, IEC 61968 Interface architecture for integration with other systems.

3.3 DESCRIPTION OF THE SOLUTION

The Solution will be based on the following principles: Interoperability; Reliability; Scalability; Flexibility; Modularity and Data security.

3.3.1 AMI SYSTEM.

The supplier will be responsible for the following components of the AMI SYSTEM:

- Multifunctional Electronic meters (Smart Meter)
- Communication Network Component (CNC)
- Head End Software or Automatic Meter Reading Software (MRS/HES)
- Meter Data Management Software (MDM)
- Handheld Units
- IT hardware and software
- MCC hardware and software
- CT & CT/VT Packages
- Premises Inspection and Meter/Metering Installations
- Implementation and Integration Services
- Training services
- Software Support and Maintenance
- On-Site Support Services

MRS/HES and MDM could be a solution integrated in only one application software package or can be a modular solution integrated with different application software package.

In this document the word “software” are used individually or in reference to the total software supplied to meet the requirements and functionalities that has been requested for the different application components (MRS/HES and MDM).

3.4 GENERAL SPECIFICATION OF THE SYSTEM

The RPP Project is designed primarily to support the implementation of the AMI System infrastructure for the metering of the energy consumption, remote data acquisition and recording and analysis of the data.

- AMI system must interface with existing ENDE systems, including legacy SAP CCS/CRM applications.
- AMI system, especially the MDM, must be compatible with multiple meter data collection technologies with diverse reading requirements.
- AMI system should have capacity to produce high volumes of data for both Billing and analytic purposes.

- AMI system should support bidirectional communication between ENDE applications and the smart meters.

3.4.1 Architecture of the system

Operating systems and databases must run in high availability and load balancing

The infrastructure included in the AMI refers to:

1. Smart meters
2. Communication network
3. Head END System (MRS)
4. Meter Data Management (MDM) system

Smart meters: are solid-state electronic electricity meters supporting not only the measurement of electricity consumption but also additional smart functionalities as hourly electricity consumption, time-based load control, remote connection and disconnection of delivery site, tamper detection, etc. The operation of all these functionalities can be remotely configured and customized in the metering devices, and they are also remotely managed and gathered either on demand or on a scheduled basis. Those meters must be supplied/installed and commissioned by the Bidder. The commissioning includes communication tests with the MCC/MDMS

Communication Network: are the communications used between the different components of the AMI platform, employing bidirectional communication channels. This will be a ENDE responsibility.

MRS or HES system is the set of software tools and utilities required to gather data from every single smart meter to a unique central database, as well as to operate the smart metering infrastructure to keep it up and running, implementing the required utility operational routines and services (either internal or outsourced).. The commissioning includes communication tests with the meters and MDMS.

MDM system: includes a set of software tools and databases, built on top of the MCC system, whose primary functions include the validation, estimation, and editing (VEE) of meter data that are later passed to other utility systems, as billing systems, even in case of disruption of meter data flows. MDM functionalities can usually be distributed over other systems instead of being present as separate systems. The MDMS will be supplied/installed and commissioned by the Bidder. MDM system is also in charge of interfacing with other utility systems, either to provide them with required meter data or as a gateway to the infrastructure to implement on-demand services over the devices. Also, the MDMS will be integrated to a SAP system according to the Integration defined in this document. The commissioning includes interface tests with the SAP and MRS. The tests to be done will be defined with ENDE.

3.5 SCOPE OF THE WORK

Design, supply, installation and implementation of all components of AMI System with the quantity, capacity and functionalities as have been required in this document.

- Providing all meters, equipment, hardware and software in the quantities and characteristics as was required in this document.
- Providing all installations and implementation services and the other services as required in this document.
- Providing the support team and plan for developing system testing and acceptance test.
- Providing supervisory services for meters' installation until acceptance test was done.
- Providing all programs, engineering, software design, development, and integration services necessary for meters, MRS/HES and MDM installation, implementation and integration as specified in this document.
- The Supplier shall be fully responsible for the preparation, verification and integration (Import) of the ENDE data into the Database of the system that have been supplied.
- The supplier must provide the mechanism to maintain the Master Data of the new software platform synchronized with the ENDE systems, especially the SAP CCS/CRM System.
- In consultation with the Purchaser the Supplier shall define operator roles, establish logins, security requirements and shall design the profiles that align with the Purchaser operating vision.
- Ensuring that the requisite security measures have been incorporated in all software, upon delivery, is free of viruses, worms, trapdoors, and other software contaminants.
- Managing, coordinating, and scheduling the activities of all Subcontractors employed by the Supplier for this project. This shall include the resolution of all problems that may arise in connection with the hardware, software, and services supplied by the Subcontractors.
- Implementing all software according to the quality standards acceptable by the Purchaser.
- Supplying final ("as built") documentation that is accurate and complete.
- Transportation and delivery of all Supplier-provided equipment and materials to Purchaser sites.
- Performing system start-up after satisfactory system installation, including powering up the system, loading correct versions of all software and databases, activating data links, verifying correct operation of the system including checking the database and displays are correctly showing data and turning over to Purchaser an operational system ready for site testing.
- Performing after delivery and start-up of the system, but prior to any site testing, setting up all functions for proper operation (system and function "tuning") including MRS/HES – MDM - SAP CCS/CRM System Interface.
- Performing FAT prior to delivery any component to the Purchaser site.
- Performing the on-site acceptance test during system implementation.
- Correcting all reported errors or bad functions detected during on-site test.
- Ensuring and periodically demonstrating that the work is progressing according to the approved schedule.

- Develop in consultation with Purchaser a recommended plan to perform a smooth integration of the new System with the minimum disruption of the operations.
- The Supplier shall be responsible for supplying the MDM interfaces or adaptor software, installation and customization services in order to allow the data exchange with ENDE SAP SYSTEM.
- The supplier should consider two Type of integration:
 - The first level will be a basic and standard integration fundament in the flat file transfer or intermediate table use for Bi-directional data move and that will be used until full On-line integration base in Web services was developed.
 - The second level of the integration will be the full On-line interface and the provider must supply the services to develop and adapt the MDM web services interface for proper integration with ENDE SAP CCS/CRM System.
- Optimally using the available communications bandwidth (provided by Purchaser) in order to guarantee the correct operation of MRS/HES and MDM architecture with the specified performance conditions.
- The Supplier shall be responsible for supplying the MDM interfaces or adaptor software, installation and customization services in order to allow the data exchange with ENDE PRE-PAID System including the meter data exchange with the HES of the Pre-Paid System.
- Specifying the policy for backup & archiving / restore of data and image of MRS/HES and MDM data, in advance, in order to allow Purchaser to prepare accordingly the Corporate Backup/restore facilities.
- Assure that the third-party software and hardware is covered by the support of the original.

3.5.1 METHODOLOGY AND STRATEGY OF IMPLEMENTATION

The technical proposal shall include the strategy and plan for Contract implementation & Administration as specified in section VII. Schedule of Requirements: **Project management**.

3.5.2 TRAINING

The technical proposal shall include the strategy and plan for training as indicated in section VII. Schedule of Requirements: **Training**.

3.5.3 QUALITY ASSURANCE AND TESTING STRATEGY

The Supplier must provide a quality assurance plan and the adequate facilities and resources for performing the tests in accordance with the specified in the section VII. Schedule of Requirements: **Quality Assurance and Testing**.

3.5.4 SUPPORT AND MAINTENANCE

The technical proposal shall include the strategy and plan for the support and maintenance as specified in section VII. Schedule of Requirements: **System maintenance, evolution and update renovation (support program)**.

3.5.5 TECHNICAL DOCUMENTS

The supplier shall include in the proposal and delivery after contract all documentation as specified in section VII. Schedule of Requirements: **Documentation**

3.6 TECHNICAL SOLUTION DESCRIPTION

The proposal shall include the description detailed of the technical solution, also must include the logic diagram of the architecture proposed and the network connectivity, the features and characteristics of the main components.

In the following section a complete definition of the technical components of the project:

- **SMARTS METER**
- **METER BOX**
- **SOFTWARE PLATFORM** (MRS, MDMS, DATA BASE, ETC.)
- **INTEGRATION SERVICES**
- **CT & VT PACKAGE**
- **HAND HELD UNIT**
- **MCC COMPUTER EQUIPMENT**
- **INSTALLATION, TRAINING AND SYSTEM MAINTENANCE SUPPORT SERVICES**

3.7 STANDARDS

The meters and software must be complaint with the standards according to the list in the section VII. Schedule of Requirements: **STANDARDS** of this document.

SPECIFICATIONS FOR SMART METERS

3.8 SCOPE OF SUPPLY

This specification covers the functional and technical requirements for three phase Smart meters within the scope of the project.

The technical features of the meter shall be in conformity with international standards IEC and local regulations and with quality and performance requirements set by this document.

The meters and the meter software shall be provided with related documentation, like, but not limited to, manufacturer information, product data sheet, material and testing certificates (where applicable), operational manual (where applicable), and maintenance instructions.

The Contract Supplies shall be designed to facilitate inspection, cleaning and repairs and for operation, in which continuity of service is the first consideration. All equipment shall be designed to ensure reliable and safe operation under the atmospheric conditions prevailing at the Site and under such sudden variations of load and voltage as may be met with under working conditions of the system, and short circuits, including those due to faulty synchronizing, within the rating of the equipment.

3.8.1 Meter Quantities & Type

A total of 15,500 meters with LTE/4G/3G/2G modems included must be supplied.

Meters Type	
Meter Type	Quantity
3-phases CT multifunctional postpaid smart Meter (Type 1)	15,500
3-phases CT/VT multifunctional postpaid Smart meter (Type 2)	1,000
TOTAL	16,500

- A. TYPE 1. Three Phase Multifunctional Post-paid Smart Meter (CT Connected meters)** with Plug-in Communication Modem. Similar to the picture below and to be used in LV CT connected customers.
- B. TYPE 2. Three Phase Multifunctional Post-paid Smart Meter (CT/VT connected meter)** with Plug-in Communication Modem. Similar to the pictures below and to be used in CT/VT connected HV customers and Energy Balance meters in Substation Feeders.



3.8.2 Meter Characteristics

The meters will be used as part of AMI infrastructure and must support smart metering functionality like:

- Two Way (Bidirectional) Communication
- Real Time synchronization clock from Central System
- Remote Meter Data Collection
- Remote Firmware update
- Event and Alarm Notification.

3.9 METER CERTIFICATION

All meters are required to have a traceable calibration certificate, this is to be provided with the metering device and made available to the user on request in soft copy.

The Meter certification must come from an international certification laboratory.

3.10 FUNCTIONAL REQUIREMENTS

Capacities of all the three-phase smart meters shall comply with the following functionalities:

3.10.1 Operational Conditions

- The equipment to be delivered under this Contract must be warranted to function correctly without degradation of the guaranteed life time under the following network conditions:
 - The total harmonics up to 15%
 - Surge withstand and electromagnetic interference; as per IEC specifications
 - Voltage fluctuation: -20% - +30% of nominal voltage.

3.10.2 Measurement

- The meter shall measure and register active and reactive energy in two directions forward and reverse energy measurements (4-quadrant).
 - Wh: delivered, received, net, unidirectional (Default)
 - VARh: delivered, received, net delivered, net received, unidirectional
 - VAh: vectorial and arithmetic, delivered, received and lagging

- Ah: per phase and neutral
- Vh: per phase and average
- The meter default factory method for energy value (KWh, KVARh) is unidirectional (sum of forward + reverse energy flow).
- Instantaneous Values for:
 - Voltage (Phase A/B/C)
 - Current (Phase A/B/C)
 - Total active power
 - Active power (Phase A/B/C)
 - Total reactive Power
 - Reactive power (Phase A/B/C)
 - Total power factor
 - Power factor(A/B/C)
 - Frequency
 - Export active power
 - Export active power (phase A /B/C)
 - Export reactive power
 - Export reactive power (phase A/B/C)
 - Phase angle of phase A/B/C
 - Voltage phase angle
 - The period of register should be performed in 5, 10, 15 minutes, 30 minutes, 60 minutes, configurable according to customer requirement.
- Demand measurement
 - Maximum Demand: When a demand period ends, the demand is compared with channel's maximum demand register. If it is larger, the new maximum register and the time of maximum demand is updated to the current time.
 - Import active Maximum Demand (total & each tariff)
 - Export active Maximum Demand (total & each tariff)
 - Import reactive Maximum Demand (total & each tariff)
 - Export reactive Maximum Demand (total & each tariff)
 - Import active accumulative Maximum Demand (total & each tariff)
 - Export active accumulative Maximum Demand (total & each tariff)
 - Import reactive accumulative Maximum Demand (total & each tariff)
 - Export reactive accumulative Maximum Demand (total & each tariff)
 - The date/time of the maximum demand must be registered.
 - Meter measures, registers and displays maximum mean active power under all tariffs and in both directions. Power integration period is initially 15 minutes. This value is programmable with the following values: 5, 10, 15, 30 and 60 minutes and display of this value is easily accessible under manual display operation regime and remotely.
 - Demand reset: Automatically reset at predefined date, by remote command and push bottom.

3.10.2.1 Monthly Energy Consumption Billing Date

Meter can be programmed for monthly settlement day according to electricity company requirement. Default setting is the last day of each month.

3.10.2.2 Billing Data register

- Monthly frozen energy: last 12 months' data of monthly frozen occurrence time, total active energy, total reverse active energy, export & import.
- Daily frozen energy: last 62 days' data of daily frozen occurrence time, total active energy, total reverse active energy, export & import.

3.10.2.3 Meters Voltage Control and Register

- Meter should record under voltage and overvoltage and also power cut.
- Events related to under voltage and overvoltage should be recorded in the meter. Threshold of under and over voltage:
 - Over voltage: 120% (default)
 - Under voltage: 80% (default)
- For each under voltage, min. voltage during one period should be detected and recorded.
- For each overvoltage, max. Voltage during one period should be detected and recorded.
- Parameters related to threshold and duration of under voltage and overvoltage should be adjustable locally and remotely.

3.10.2.4 Power quality analysis

- Programmable sag and swell monitor that logs voltage sag and swell duration down to one cycle, minimum or maximum voltage, coincident current, and date and time of occurrence.
- Voltage and Current THD (Total Harmonic Distortion) per phase, TDD (Total Demand Distortion), Distortion Power Factor, Displacement Power Factor, Distortion kVA, and Distortion kVAh (all recordable).
- Voltage Quality Records:
 - Phase to phase or phase to ground
 - event detection
 - various levels of sags
 - various levels of swells
 - various levels of voltage imbalances
 - various levels of current imbalances
 - various classes of interruptions.
- Harmonics Records:
 - Per phase instantaneous % THD V and % TDD I
 - Prompt for peak demand current

- Per phase data is displayable
- IEC calculation
- Harmonic Distortion Check.

3.10.3 Internal Memory

- The meter shall archive in its non-volatile memory the metering and non-metering data including the program parameters.
- Memory size shall enable storage of profile data for at least 62 days notwithstanding other parameters defined in these specifications.

3.10.4 Data protection

- During operation the current measurements are stored in the working memory (RAM or EPROM).
- Every 24 hours this data is transferred to a non-volatile memory. It is only in cases of longer interruptions that the measuring period is interrupted and the device completely shuts down.
- Data remains stored in the non-volatile memory for at least ten years.
- No buffer battery is needed to preserve the data. The data retention is assured exclusively by the qualities of the storage medium (Flash).

3.10.5 Security features

- The meter shall have a programmable facility to restrict access to the information recorded at different security levels, such as communication read, communication write, and so on.
- Each meter password should have inaccessible and protected codes.
- The exchange of data between the meters and the metering data management system shall be encrypted.

3.10.6 Firmware Update

- The meter shall allow local and remote update of firmware.
- Software for local operation, diagnostics and reporting on the operation of the meters, enabling full configuration, provisioning, diagnostics and readout of metering data and events from the meter.
- Configuration files from an older software version shall be operable in newer versions.
- The software for local operation of the meters shall enable export of metering data, events and configurations from the meters to text files (TXT, CSV, XML) with a documented structure.
- Upgrading of firmware should not stop and affect meter's metrology neither data transfer with MRS/HES.

3.10.7 Events

- Meter records total occurrence times of events, total duration, start time and end time of last 100 events like power off meter cover open, terminal cover open, over-voltage, under-voltage, etc.
- Meter records total occurrence times of events, occurrence time and reason of at least the last 30 events of contactor connected and reconnected
- Meter records total occurrence times of events and occurring time of at least the last 31 events of overload.
- Meter memorizes events related to metering, adjustment, and handling into the special memory registers. A record in the memory is generated for each event memorizing the type of event, time stamp and meter status when the event occurred.
- Event Log is not erasable via any external intervention.

3.10.8 Load Profiling

- **Energy& Demand Load Profile**
 - Interval: 5, 10, 15, 30, 60 min programmable.
 - Default interval: 15 minutes for 3-phases meters
 - Storage: More than 35 days every 15 minutes
 - Data capture object as follows:
 - Import & export active demand (kW)
 - Import & export reactive demand (kvar)
 - Import & export total active energy (kWh)
 - Import & export total reactive energy (kvarh)
- **Instantaneous Load Profile**
 - At least 15 programmable channels for meter Type 1
 - At least 24 programmable channels for meter Type 2
 - Interval: 5, 10, 15, 30, 60 min programmable.
 - Default interval: 15 minutes for 3-phases meters
 - Memory Storage: 45 days or up with interval every 15 minutes for meter Type 1
 - Memory Storage: 90 days or up with interval every 15 minutes for meter Type 2
 - Data capture object as follows:
 - Voltage by phase (V)
 - Current by phase (A)
 - Active power by phase (kW)
 - Reactive power by phase (kvar)
 - Power Factor (PF) total and by phase
 - Frequency (Hz)
- Measurement type for each channel can be chosen as follows:
 - Average;
 - Minimum;
 - Maximum.

3.10.9 Time of Use

The meter can measure active/reactive energy with TOU function. Meter supports 8 tariffs and 24 time shifts.

- Meter should be able to calculate and register costumer's active and reactive energy consumption in time intervals as bellow:
 - Four tariffs for active/reactive energy and record them for normal days and holidays separately.
 - Four tariffs for Max. Demand and record of highest Max. Demand on normal days and holidays separately;
 - At least 12 seasons tariff table shall be definable.
 - Season starting at 00:00 hours of the defined day in every year.
 - Holidays and weekdays shall be definable during a season.

3.10.9.1 Real Time Clock Daylight Saving Time and Winter Time

- Daylight saving automatic task scheduled to begin on the Friday before the last Sunday of March, and end on the last Sunday of October
- Meter is capable of converting daylight saving time and winter time. Upon permitted and authorized, through optical, RS485 communication port or AMI system.

3.10.10 Internal Diagnostic

- Indications to show the satisfactory performance of the diagnostic shall be provided in the meter.
- The meter shall have the capability to regularly perform a complete self-check of its circuits, initial memory locations, integrity of data and parity, and so on, against any malfunctioning.
- The meter should have self-check and diagnostic function. So, if an error appears in internal components (such as RAM, EEPROM, RTC ...etc.) meter should record and report it to the HES using remote/AMI communication port.

3.10.11 Communication Interface

- The meter must support the communication protocol: DLMS/COSEM
- Local Communications:
 - The meter must provide a local optical communications port to provide reading and meter configuration as well as firmware upgrade support, taken into consideration a unique authentication. The Optical port must comply with the IEC 62056-21 physical interface.
 - The meters will need to support a local communications port which can interface with other communications modules such a port would include RS-232, RS-485 (with multi-drop) or USB.

- Remote/AMI Communications Modules: Meters which support an AMI Automatic Metering Infrastructure interface will provide a modular interface or communications module which is tightly integrated. The communication module must be exchangeable which provides the ability for the ENDE to upgrade the communications technology in the field to newer technology in the future without removing the meter from service, thus protecting the meter investment
- The initial module to be integrated to the meters is a LTE/4G/3G/2G cellular modem with quad band.
- The meter could be able to support modems with other technology would include Power Line Carrier (PLC) supporting S-FSK, OFDM, or G3 modulation communications.
- All the communication interfaces are independent from each other, thus, failure of one communication interface will not affect the other.

3.10.11.1 Data interfaces

- Optical data interface: D0
- Electrical data interface: RS485, RS232
- Data protocols IEC 62056-21 DLMS
- Transmission rate: Up to 19200 baud (fixed or Mode C/E)

3.10.12 Communication module

- Modem: GSM/GPRS/EDGE/3G/4G/LTE
- Interface module: RS485, RS232
- Data protocols: IEC 62056-21/31/41 with DLMS
- Transmission rate 19200 baud (fixed or Mode C/E)

3.10.13 Input / Output

- The smart meters shall include, at least, the following type of I/O port for input/output operation:
 - Two Control inputs (digital inputs)
 - Two Control outputs (digital outputs)

3.10.14 Interoperability

- Meters shall be compliant with IEC-62056 DLMS/COSEM.

3.10.15 Firmware download

- The firmware of the meter can be downloaded local or remotely.
- Changes to the meter firmware shall not impact the meter functionality.

3.11 TECHNICAL REQUIREMENTS

3.11.1 General requirements

- The meter shall be designed and assembled with state-of-the-art microprocessor components to perform without any metrological degradation over a wide dynamic current range under harsh operating conditions.
- Each meter shall have a permanent, clear and unique serial number and shall be recorded both as printed numbers and barcode. Also recorded in permanent memory, and available for readout via the optical port. It must be impossible to change or delete the serial number.
- Meter should be protected against Electromagnetic Compatibility (EMC).

3.11.2 Meter design and construction

- The smart meter will be designed and assembled with state-of-the-art microprocessor components to perform without any metrological degradation over a wide dynamic current range under harsh operating conditions.
- The meter shall be BS Standard type.
- The Meters shall have an IP rating 54 or better according to IEC 60529.
- The cover shall be made of plastic and fitted in such a way that the internal parts of the meter are accessible only after breaking the meter cover seals.
- The plastic for the terminal block, meter cover, and base shall be flame-retardant and UV-stabilized, passing a glow wire test at 960°C.
- The terminal block may be integrated with the meter base.
- The terminal cover shall be sealed independently of the meter cover. The terminal cover shall enclose the actual terminals, the conductor fixing screws, the external conductors, and their insulation, whereby no part of the meter or cables shall be accessible from the front of the meter
- The seal of terminal cover must be installed visible and no access to the terminals shall be possible without breaking the seal(s).
- Each meter shall have a permanent, clear and unique serial number and shall be recorded both as printed numbers and barcode.
- All meters shall operate without undue vibration and with the least practicable amount of noise.
- All meters shall be designed to exclude vermin and insects from entering the equipment.
- The meters shall have conducting terminals suitable for termination of current and potential leads.
- The meter shall be IP54.

3.11.2.1 Three Phase Meter Measuring elements:

The meter must have four measuring elements, three of them on phase lines and the last one on neutral line, the function of the four measuring elements is to detect any tamper trial as piercing of the incoming conductor of any phase.

3.11.3 Mechanical Specification

3.11.3.1 Communication module compartment

- The communication module compartment is found under the sealable module cover.
- The modem module can be inserted.
- Mounting and removal can take place when the meter is under voltage.

3.11.3.2 Verification LED

- the meter shall be equipped with a test output device that is accessible from the front in the form of a flashing LED in proportion to the meter constant to test accuracy of the meter on site.

3.11.3.3 Clock and Calendar

- The microprocessor-based meter shall have a built-in clock and calendar having an accuracy of at least 0. seconds per day in accordance with IEC 62052-21 / 62054-21, without the assistance of an external time-synchronizing pulse. The clock shall be synchronized by time signals received through the local or remote communication interface and upon national standard.
- Shall permit to define a Calendar with holidays;
- Daylight saving T (DST).

3.11.4 Electrical

3.11.4.1 Three Phase Meter:

- Meter accuracy for Type 1 Meters: Class 0.5 for Active and Class 1 for reactive
- Meter accuracy for TYPE 2 Meters: Class 0,2 for Active and Class 1 for reactive
- Number of Phases: 3+N, 4 wire.
- Voltage reference for Type 1: 3x 57.7/100V ...3x230/400V (Autorange)
- Voltage reference for Type 2: 3x57.7/100V ...3x230/400V (Autorange)
- Meter input voltage range for normal operation should be from 80% to 120% of nominal voltage.
- Voltage circuit with power supply connected: $\leq 10\text{VA}$.
- Nominal (Maximum) Current for CT meters: 1(5)A.
- Nominal (Maximum) Current for CT/VT meters: 1(10)A.
- Nominal Frequency (fn): 50 Hz.
- Starting current: 0.1% In (IEC 62052-11).
- Current circuit at basic current Ib: $\leq 0.5\text{VA}$.
- Short time over current: according to IEC 62053-21.
- Starting current Ib: ≤ 0.004 .

Note: The maximum current as defined here, is the electrical rating of the meter and is not a software implemented feature. It is separate from, and in addition to any power limiting features that may be provided in the meter which are configured locally using laptop or Hand Held, remotely using AMI system.

3.11.5 Data Storage

The metering device must be able to store all program parameters and metering data on a **non-volatile memory**. The non-volatile memory shall be transferable to a new meter in case of malfunction of the current meter in use (meter black box).

3.11.5.1 Historical Data Transfer & Storage and Event Recording

- Meter shall save at least the last 12 months monthly historical metering data and it's programmable for monthly (billing) settlement date & time (freezing time). Default at factory for freezing time is 24:00 hour, end of each month.
- Meter shall save at least the recent 62 days' daily power consumption data by TOU. Default settlement time is 00:00.
- Meter shall record at least the last 20 power-off tripping events. Record content as below:
 - Accumulative tripping times
 - Tripping date/time
 - Recovery date/time after tripping
 - Meter tripping reason
 - a. Balance amount is zero.
 - b. Warning
 - c. Overload
 - d. Over current
 - e. Un-activation
 - f. Remote control
 - g. Fault by meter self-check
 - h. Neutral line failure
 - i. Over voltage
 - j. Low voltage
 - k. Reverse
 - l. Open terminal cover
 - m. Open meter cover
 - n. Bypass tamper
 - o. Phase loss
 - p. Phase reverse
 - q. Over temperature
 - r. Strong magnetic interference
- Meter shall record at least the last 20 grid power-off events. Record content as below:
 - Grid power-off accumulative times
 - Date/time of Grid power-off occurrence
 - Recovery date/time after grid power-off
 - When grid power--off, energy meter can send this information to main station management system automatically to achieve the automatic upload when power-off event to solve problems in time.
- Meter shall record at least the last 50 special events. Record content as below:
 - Occurrence date of special events
 - Occurrence time of special events
 - Special Event reasons
 - a. Meter control circuit fault

- b. Low clock battery voltage
- c. Internal register fault
- d. Internal clock fault
- e. Overdraft
- f. Meter software upgrade
- g. Meter clock calibration
- h. Open terminal cover
- i. Open meter cover
- j. Open communication module cover
- k. MD restoration
- l. Active power reverse
- m. Serious unbalance of current (more than 6.5%)
- n. Voltage loss
- o. Low voltage
- p. Over voltage
- q. Current loss
- r. Over current
- s. Phase loss
- t. Current loss
- u. Neutral Loss
- v. Reverse phase sequence for voltage
- w. Reverse phase sequence for current
- x. Three phases' voltage are in unbalance condition
- y. Three phases' current are in unbalance condition
- z. Over demand
- aa. Power factor is beyond the lower limit
- bb. Reverse split phase sequence for active power.

3.11.6 Environmental Specification

- Although temperature range and relative humidity must be compliant with the IEC 62052-11 for the smart meters, the following extra requirements will apply:
 - Normal working temperature: $-15^{\circ}\text{C} \sim +60^{\circ}\text{C}$
 - Extreme working temperature: $-30^{\circ}\text{C} \sim +70^{\circ}\text{C}$
 - Relative humidity $\leq 90\%$
- Protection class: As a minimum the casing shall ensure the degree of protection of IP54 according to UNE/EN 60529.

3.11.7 Dimensions and layout

- Smart meter dimensions shall be such that it can be placed inside the current customer services premise according to the IEC standards.

3.11.8 Connection diagram and terminal markings

- Each meter shall be clearly marked with the connection diagram, which shall be placed on the meter or cover of the terminal strap of the meter.

3.11.9 Battery

- The meter shall be provided with lithium battery as a backup.
- Maintain clock and calendar and anti-tampering features of the meters (Events Recording).
- Lithium battery, the capacity is 1200 mAh or superior.
- When low battery is detected, the meter must produce an alarm and display an indicator.
- Lifetime 10 years.
- Battery is replaceable.
- A Super Capacitor shall be used along with the battery. In that case, specify the continuous time of meter working with Super Capacitor and with electricity interruption.

3.11.10 Sealing

- Facilities for applying safety or security seals to metering devices, enclosures related to the metering system etc. shall be provided. The facilities shall be suitable for seals made up of multi strand steel wire with a circular lead seal, allowing the seal to be crimped using security sealing pliers.
- Meter cover seals: At least one visible seal has to be provided in such a way that the internal parts of the meter are accessible only after breaking the seal(s).
- Meter terminal seals: At least one visible seal have to be provided and no access to the terminals shall be possible without breaking the seal(s) of the terminal cover(s).
- Provision shall be made for sealing. The Supplier shall supply the net quantities plus 20% of meter seals.
- Where the terminals are contained inside the enclosure, they may be sealed with the same seal(s) as the enclosure.
- Where implemented, the seals shall be applied in such a way that it will not be possible to undo/loosen the mounting screws used to secure the Measurement Unit, without breaking these seals. It shall further be impossible to obtain access to the inside of the Measurement Unit or to the connection terminals without breaking the seals.
- The seals shall be applied in such a way that they will be easily visible when viewing an installed Measurement Unit from the front.

3.11.11 Bolts, Studs, Nuts, Screws, Washers, etc.

- The Supplier shall supply the net quantities plus 5% of all permanent bolts, screws and other similar items and materials required for installation of the goods at the site. Any such rivets, bolts, screws, etc., which are surplus after the installation of the equipment has been completed shall become spare parts and shall be wrapped, marked and handed over to the Purchaser.

3.11.12 Name plate and Marking

- All equipment shall be clearly and permanently labelled in English, specifically marked according to the relevant IEC standard, to the approval of the Purchaser.
- All meters and equipment for this project will be marked via print or label with the reference to the project code. The code must be visible once the equipment has been installed.
- Before production of labels and notices the Supplier shall submit to the Purchaser full scale drawing of the proposed labels

- Meters shall be provided with nameplate clearly visible and effectively secured against removal. Indelibly and distinctly marked with all essential particulars as per relevant standards along with the following:
 - Manufacturer's name
 - Meter Model/Version number and Serial Number
 - Number of phases
 - Month and Year of manufacture and guarantee expiry date
 - Reference voltage, frequency
 - Rated basic and maximum Current
 - Meter constant (imp/kWh)
 - "Property of "ENDE"
- The following shall be printed in bar code on the meter nameplate:
 - Manufacturer's meter code
 - Serial number
 - "ENDE" Property (to be given by the client)
 - Month/Year of manufacture.
- The Logo of ENDE shall be printed on the front side of the meter.

3.11.13 Storage and transportation

- Meters should be stored under temperature $-25^{\circ}\text{C} \sim +60^{\circ}\text{C}$, the humidity is $<85\%$.
- The meter should not be crashed during transportation and storage.

3.11.14 User Interface

3.11.14.1 Meter Display

The meter shall have an LCD display, comprising a minimum 8 segments and including 2 decimals. The minimum height of digits is 5mm. The display shall have 8 digits for the cumulative energy. General requirements:

The following features must be present in the display:

- Auto scrolling shall be used for changing displayed data;
- Use of OBIS codes for screen display.
- Displayed data time duration shall be programmable;
- Display sequences, parameter list and the display time should be programmable.
- Visual indication shall be provided to show Tamper conditions.
- An indicator must be displayed to indicate the commercial status of the customer account (example: active or inactive, etc.).
- The display shall be capable of showing the presence or absence of individual phase voltages in the Meter Unit.
- Meter shall provide unique indications if the load has been disconnected due to the following conditions:
 - No credit available (in case is working as pre-paid)
 - Power consumption exceeded the maximum power limit.
 - Electrical or other fault detected
- The following meter data information could be programmed to be displayed:
 - Default parameters:
 - Data and time

- Active tariff
- Phase existing or non-existing
- Breaker status
- Instantaneous value (V, I, kW, kVAr, $\cos\phi$)
- Total active energy
- Active energy for active tariff
- Maximum or Peak demand
- Total reactive energy
- Current tariff number;
- Quadrant indication;
- Failure indication and code (if any).

3.11.14.2 Display parameter (Push Button) Mode during power on:

- The display of the programmed parameters shall be scrolling one after the other through push button.
- Display must work on auto display mode.

3.12 METER TAMPER AND FRAUD MONITORING AND PROTECTION.

3.12.1 Protection against Abnormal Grid Voltage and Phase Missing

- The meter shall register the voltage variation out of range defined or a phase missing like special events and alarms.

3.12.2 Anti-tamper against Cover Opening Function

- The meter shall have activated the anti-tamper flag for cover opening (terminal cover or upper meter cover) after delivery from factory.
- The meter must have the capacity to detect, register and activate an alarm in case opening and closing of the meter terminal or upper cover and the meter box, even without power.

3.12.3 Anti-tamper for Reverse Power Consumption

- When Reverse Energy flow is detected, the meter will record an event.

3.12.4 Neutral Loss Disconnection Function

- When energy meter detects neutral loss, the event will be recorded.

3.12.5 Registration of events and alarms

The meter shall register, as a minimum, the following events:

- Power Failure
- The incoming phase and neutral interchanged;
- The load side interchanged with the input side;

- The load connected between either the incoming phase and load side neutral or between the incoming neutral and load side phase;
- Information on the status indicator to tamper with the device, including take off the terminal cover, opening the casing or activation of an external magnetic field.

Each event registered by the meters shall be described by the following attributes:

- Date and time of occurrence.
- Code of event.

3.12.6 Immunity against external influencing signals

3.12.6.1 Magnetic Field:

- Meter shall record accurate energy in case of any external influencing signals in line with IEC 62053-21.
- Meter shall log the event in its memory as “MAGNET TAMPER” with date and time stamp.
- A testing proof according to standard IEC 62053-21 must be presented.

3.12.6.2 Electrostatic Discharge (ESD):

- Meter shall be immune to ESD according to the standard defined IEC/EN 61000-4-2 together with the requirements given in IEC 62052-11 Ed2. Immunity to 35 kV ESD.

3.12.6.3 D.C. Immunity

- The meter shall not saturate on passage of direct current, which can cause the meter either to stop recording/ record inaccurately. DC injection shall be tested both in phase and neutral. Measurement by meter shall not get influenced by injection of Chopped signal/ DC signal/ DC pulse of low frequency. Meter shall log the event into memory as ‘DC Injection’ with date & time stamp. IEC EN 61000-4-4: Testing and measurement techniques-Electrical fast transient/burst immunity test.

3.12.6.4 Electromagnetic Compatibility (EMC).

Meter shall be protected according to the pass testing of following standards:

- IEC EN 61000-4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test

3.12.7 Internal Meter security:

The meter must guarantee, locally and remotely, three corresponding access levels with password:

- Reading the meter.
- Parameter Configuration of the meter.
- Firmware update.

Any changes to the meter parameters must be recorded in the meter event log with date and time.

The serial number, the year of manufacture and the type designation of the meter must be saved in the meter's internal memory and must be fully protected against modification. The system and the hardware

part must be designed in such a way as to prohibit the modification of the internal cumulative memory (energy consumption data).

3.12.8 Communication security

The meter must comply with the DLMS security requirements as described in the DLMS / COSEM Green Paper, Section 9.2 (OSI Model Layer 7).

In addition, the meter must use at least encryption and decryption methods, of the AES-128 or ECC-192 or equivalent type, for all data exchange operations through the meter interfaces, in particular for the exchange of data locally or remotely.

3.13 READING AND CONFIGURATION SOFTWARE

The software (s) for reading and configuring the meter must meet at least the following characteristics and functionalities:

- Software in English and Portuguese language;
- Can be installed on PC and on TSP / PDA/HHU;
- Supplied on CD-ROM or USB key;
- Works under the most recent versions of Windows;
- Allows the configuration and programming of meters by the ENDE administrator as well as the firmware update, the configuration of the modems, the setting of the meter relay and the parameterization / sequencing of the display data. Access to this programming must be protected by passwords;
- The software must allow reading of all the data saved in the meter, including configuration parameters, energy and power registers, alarms and events, load curves,
- The software must be able to record a configuration from a meter and use this same configuration to configure other meters;
- New software versions must allow the configuration and reading of meters supported by older versions. Configuration files generated by older versions of software must be supported by newer versions.
- The software must also make it possible to save all the configuration and reading data of the low voltage digital meters configured or read via the software (locally or remotely) on the PC's memory. These data can be easily consulted through adapted search criteria. The software must allow the export of these data in standard formats (Excel, PDF, ...) as well as the printing of reading and configuration reports;
- Manage different levels of access, with passwords and access rights defined by the administrator, in particular for reading, configuring and updating the firmware;
- Manage communications with:
 - Portable data entry equipment (PDA/HHU, etc.) or equivalent systems (loading and unloading);
 - Meter: by direct connection (programming and reading) and remotely.

The Supplier must deliver all the elements necessary for the installation of the software and its use (optical heads, cable connecting the PC to the RS485 port of the meter, documentation, etc.).

The installation of the meter configuration software must be protected by an activation key to be provided by the Supplier at the request of Utility. Access to the software must be password protected and installation will be the sole responsibility of the administrator with a password.

3.14 CT & VT TECHNICAL CHARACTERISTICS

The commercial current and voltage transformers shall comply with the International Standards according to the IEC roles. IEC 61869 for CT and VT and CT class according to the IEC Standard 62053-22.

3.14.1 Technical requirements for LV Current Transformers

The current transformer shall meet the following requirements or be better.

- For the CTs supply, the Bidder must comply with the following requirements:
- Bore diameter of the CT shall not be less than 40 mm. Ring type CTs shall have suitable clamp to fix the CT to panel Board, wherever required;
- The CTs shall be suitable for metering purpose;
- The CTs shall be of ring type or window type (bar type or bus-bar type CT's shall not be accepted);
- The secondary leads shall be terminated with Tinned Cooper rose contact terminals with arrangements for sealing purposes;
- Polarity (both for primary and second leads) shall be marked;
- The CTs shall be varnished, fiberglass tape insulated or cast resin, air-cooled type. Only super enamelled electrolytic grade copper wires shall be used;
- The CTs shall conform to IEC 60185.

The electrical parameters for low voltage CTs are described below:

- LV Current Transformer Nominal Voltage: 400 V
- Primary Current (A): 80, 60, 200, 250, 300, 400
- Secondary Current (A): 5
- Thermal Intensity I_{th} (A): $60 \cdot I_{1n}$
- Dynamic Intensity I_{din} (A): $2,5 \cdot I_{th}$
- Accuracy Class (%): 0,5
- Rated Burden (VA): 5
- Frequency (HZ): 50
- Insulation Class: E
- Degree of Protection: 30
- Operating Temperature (°C): Minus 5°C to 55 °C
- Power Frequency Withstand Voltage (kV): 3
- Highest System Voltage (V): 433
- Supply System: 3 Ph. Solidly grounded Neutral System.

3.14.2 Technical Requirements for MV and HV Current Transformers

The current transformer shall meet the following requirements or be better.

- The environmental service conditions are considered to be within those defined in paragraph 4.2 of the IEC 61869-1 standard, for a temperature category -5/40. For the case of seismic

supportability, the equipment object of this specification must withstand without damage, earthquakes with a value of 5 m/s^2 - Peak Acceleration Level in the Base (af) in horizontal direction, evaluated by the Calculated Amplitude Test Method, according to IEC 60068-3-3 or, alternatively, they must guarantee level II of qualification according to the Conventional Standard Amplitude Test Method of the same standard. In the vertical direction, the equipment must support earthquakes with a peak value acceleration of 3.7 m/s^2 .

- The pollution Levels to which the Outdoor Current Transformers may be subjected to, must be considered "strong", and therefore with minimum specific leakage line, as specified in section 6.6.1 of IEC 61869-1 standard, for coastal environment. Indoor current transformers must have a minimum specific leakage line that guarantees optimal operation under the normal service conditions prescribed in section 4.2 of IEC 61869-1 standard.
- The insulating material for the MV current transformers must be dry type, ensured by synthetic resins of high mechanical resistance, capable of also support the active parts. These resins must be resistant to flame propagation and non-hygroscopic, and must also resist the action of sunlight and aging, taking into account the type of installation and the environment service conditions.
 - Insulation levels: All electrical installations for the assembly of these transformers are considered in an exposed situation.
 - Isolation levels of the primary windings - The isolation of primary windings must be designed to withstand the stresses referred to in sections 5.3.2, 5.3.3 and 5.3.4 of the IEC 61869-1 standards.
 - Isolation levels between sections - For the interconnected terminals of each section, the insulation level at the industrial frequency should be 3 kV, according to section 5.3.4 of IEC 61869-1 standard.
 - Secondary winding insulation levels - Both the isolation of secondary windings, such as their insulation from the earth must be provided to withstand the short-term voltage (1 minute) at an industrial frequency of 3 kV effective value, according to section 5.3.5 of the IEC 61869-1 standard.
- All transformers must be designed to withstand continuously, under foreseeable service conditions, a 20% over-current in relation to the highest transformation ratio, without its limit of heating is exceeded.
- All transformers must be sized and manufactured to withstand the mechanical stresses (either static or dynamic), in particular those transmitted by their terminals. All 60 kV current transformers, the terminals must be designed to withstand 1250 N static stresses, according to section 6.7 of the IEC 61869-1 standard.
- All terminals must be clearly identified and referenced in accordance with in accordance with the provisions of section 6.13.201 of IEC 61869-2, preferably and whenever possible, by embossing on the insulator.
- The nameplate must be made in accordance to in section 6.13 of IEC 61869-1 and 6.13.202 of IEC 61869-2 standard. Every information contained on the nameplate, must strictly comply with current transformer function and contraction details. The nameplates must be placed in a very visible place and ensuring a good fixation of these to the body of the transformer.
- All metal parts that are part of the scope for current transformers specification, both for outdoor and indoor current transformer, must be effectively protected against corrosion. The expected life for these metallic parts must not be less than 15 years before first major maintenance, this is taken as degradation level Ri3 from EN ISO 4628-3, for steel, or equivalent for the case of other metals, when subjected to an atmosphere with a corrosivity category C33) according to (NP EN ISO 12944-2) standard.

The electrical parameters for MV and HV Current Transformers are described in the table below:

Primary Current (A): 40, 80, 60, 160, 2000

Secondary Current (A): 5

Rated Short time thermal current: 12.5kA, 16kA

Rated Burden: 5 VA

Accuracy Class: 0.5s

Security factor: $FS \leq 5$

3.14.3 Technical Requirements for MV and HV Voltage Transformers

The voltage transformer shall meet the following requirements or be better.

- Voltage transformer (VT), also known as capacitor voltage transformer (CVT), is a transformer used in power systems to step down extra high voltage signals and provide a low voltage signal, for metering or operating a protective relay. 90% to 110% of accuracy-rated voltage;
- The VT shall meet its basic accuracy requirement when tested according to requirement of (IEC 61869).
- The VT shall meet its basic accuracy requirement when its auxiliary voltage is varied $\pm 10\%$ from the nominal AC auxiliary voltage; and when varied $\pm 20\%$ from the nominal DC auxiliary voltage.

The electrical parameters for MV and HV Voltage Transformers are described below:

- Epoxy Resin Voltage Transformer Nominal Voltage (KV, indoor/outdoor): 15,30,60
- Primary Voltage (V): 15 000, 20000, 30 000, 60 000
- Secondary Voltage (V): 110
- Accuracy Class: 0,2 to 1,0
- Rated Burden (VA): 75 to 600
- Frequency (HZ): 50
- Insulation Class: E
- Degree of Protection: 30
- Operating Temperature ($^{\circ}\text{C}$): Minus 5°C to 55°C .

3.14.4 CT Quantity and Type

A total of 5,941 Currents transformer will be supplied according to the following distribution:

LV Current Transformers, 400 V, Class:0.5S, Three Phase	
CT Rate	Quantity
Ratio: 80/5A	130
Ratio: 160/5A	136
Ratio: 200/5A	14
Ratio: 250/5A	10
Ratio: 300/5A	12
Ratio: 400/5A	4
TOTALS	306

MV Current Transformers, 16 KA, Class:0.5S, Three Phase	
CT Rate	Quantity
Ratio: 250/5A	925
Ratio: 300/5A	183
Ratio: 400/5A	1,460
Ratio: 500/5A	235
Ratio: 600/5A	695
Ratio: 800/5A	169
TOTALS	3,667

MV Current Transformers, 12.5 KA, Class:0.5S, Three Phase	
CT Rate	Quantity
Ratio: 40/5A	12
Ratio: 80/5A	312
Ratio: 160/5A	688
Ratio: 2000/5A	98
TOTALS	1,110

Feeders CTs Outdoor, Class:0.2S, Three Phase	
CT Type	Quantity
HV CT, 60 KV, 600A~5000A/5A -	75
MV CTs, 30 KV, 600A~5000A/5A	142
MV CTs, 20 KV, 600A~5000A/5A	7
MV CTs, 15 KV, 600A~5000A/5A	638
TOTALS	862

3.14.5 VT Quantity and Type

A total of 862 Voltage Transformer will be supplied according to the following distribution:

Feeders VTs Outdoor	
VT Type	Quantity
(VT's) - 60000V / 110 V	75
(VT's) - 30000V / 110 V	142
(VT's) - 20000V / 110 V	7
(VT's) - 15000V / 110 V	638
TOTALS	862

SPECIFICATIONS FOR METER BOX

3.15 SCOPE OF SUPPLY

This specification covers the functional and technical requirements for the Meter Box components to be delivered and installed within the scope of the project.

The technical features of the Meter boxes shall be in conformity with international standards.

3.16 METER BOX

3.16.1 APPLICABLE STANDARDS

The equipment covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with the latest edition of the international standards and shall conform to the regulations of the local statutory authorities.

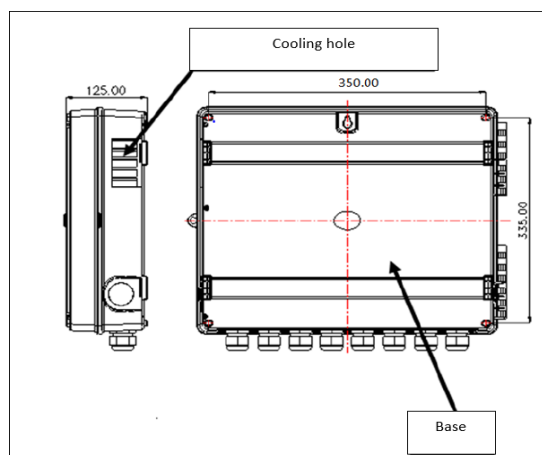
- IEC 60529 Degrees of protection provided by enclosures;
- IEC 62262 Degrees of protection by enclosures for electrical equipment against external mechanical impacts (IK code);
- IEC 85 Thermal evaluation and classification of electrical insulation;
- IEC 695-2 Resistance to heat and fire;
- IEC 60439-1 Double insulation;
- IEC 947 Low voltage Circuit Breakers;
- ISO 14782 Plastics – Determination of haze transparent materials.

In case any conflict between standards and this specification, this specification shall govern.

3.16.2 Box Technical Characteristics

- Design and construction of boxes: The meter box must be built in such a way that it does not suffer deformations caused by its transport or when exposed to the weather it is not damaged in the face of weather conditions and must resist environmental aggressiveness (saline corrosion and industrial);
- Expected useful life is 20 years;
- The meter box shall support outdoor and indoor wall installation or pole installation, hanging rod installation, easy installation.
- The meter box must ensure the protection of the equipment installed inside, as well as the protection of people against contact with live parts.
- It must belong to insulation class II, according to the specified in IEC 60439-1;
- It must be stable to ultraviolet (UV) 1;
- It should preferably be in the grey color;
- It must be non-flame propagating (self-extinguishing);
- Must have a 10mm diameter padlock slot;
- The door must be removable, in the open position, with current tools or without tools;
- The meter Box shall have roof tapering down to both the sides for easy flow of rainwater and shall have IP 54 or better degree of protection for affording protection against dust and water.

- The design of the meter box for 3-phase meter shall be such that it may facilitate easy wiring and access to the meter terminals. Suitable circular holes shall be provided at the bottom of the meter box for inlet and outlet cables with suitable gland size to accommodate three and half core armored aluminum, cable(s) up to 35 Sq.mm made of engineering plastic for the cable securely fixed to the bottom of the cupboard on both sides by chuck-nuts
- The box must be provided with appropriate holes, designed to allow the tubes to enter the interior, ensuring the retention and sealing (water tightness) of these tubes at their entry point;
- The meter must be fixed inside the box by means of a structure designed to support and fix the electrical equipment. Several meters may be installed in the same box provided that properly installed in a suitable structure.
- The meter box must have a door and lock with a universal type key (allowing to open all the boxes and cabinets provided);
- The identification of the meters, according to the place of consumption, must be represented inside the box visibly to the technician;
- The enclosure must have a nameplate placed in a visible place inside, with durable, indelible and very legible marking, which includes: Identification of the manufacturer and, if different, of the supplier; Year and week of manufacture according to ISO 8601 (1989), in truncated representation in the form YYWww (for example: 03W13, for the 13th week of 2013); Model reference so that it is possible to identify it in order to obtain all the corresponding information, from the manufacturer or from its catalogue; Indication of the type of box or cabinet;
- The fixing of the plates must not be done with screws, rivets or other similar device, in such a way that, due to their fall, the degree of protection of the box may be impaired;
- Each box must have a unique identifying number that must be printed on the outside in a durable, indelible and well legible form;
- The meter box for smart multifunctional meter shall have built-in 13-way test block.
- Meter boxes with circuit breakers with capacity compatible with the contracted load of each customer
- Measuring boxes must be constructed with the following dimensions:



- Contractor can propose measuring boxes with different dimensions for evaluation and approval of ENDE. Other appointments may also be required, if mentioned in the consultation with ENDE.

3.16.2.1 Meter Box Circuit Breakers

The main technical characteristics of the circuit breakers to be installed in the meter boxes of low voltage consumers are presented below:

Install Scene: Indoor

Rated Current (A): 250, 400, 800

Rated Voltage (V): 230/400

Rated ultimate short-circuit breaking capacity (Icu): 35 kA (250A), 50 kA (400A, 800A)

Rated service short-circuit breaking capacity (Ics): 17.5kA (250A) , 25kA (400A, 800A)

Number of poles: 4

Arcing distance(mm): ≤ 50 (200A), ≤ 100 (400A, 800A)

Mechanical and electric life: ≥ 10000 times (without load), ≥ 2000 times (with load)

Storage temperature: -25~+70oC

3.16.3 Meter Box and Circuit Breaker Quantity

Meter Box	Quantity
Meter Box for Type 1 meters	8,550
Meter Box for Type 2 meters	2,385
TOTAL	10,935

Circuit Breakers	Quantity
Meter Box Circuit Breakers 230/400 V – 250 A	264
Meter Box Circuit Breakers 230/400 V – 400 A	3
Meter Box Circuit Breakers 230/400 V – 800 A	24
TOTAL	291

SPECIFICATIONS FOR COMMUNICATION PLATFORM

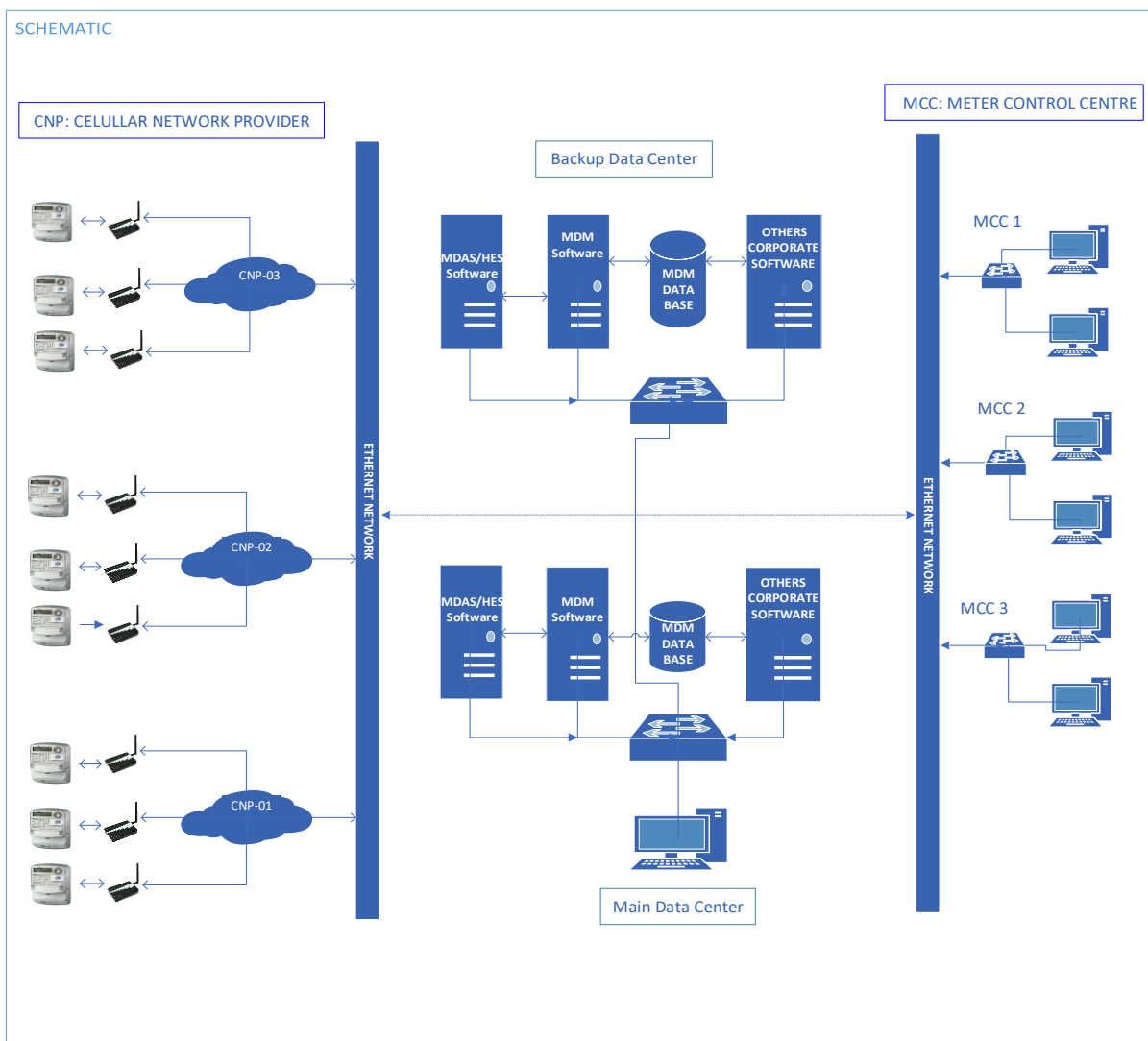
3.17 SCOPE OF SUPPLY

The Communication Components shall guarantee the reliable and fast bidirectional data transfer between AMI components. Technical solution for data transfer shall be such to have a capacity sufficient for AMI components to perform all the set tasks within specified times. Also, shall provide a corresponding code protection of transferring data (e.g. Protection against unauthorized reading, unauthorized command generation, ill-intentioned submission of false data, etc.).

The communication modules must be designed for normal operation on an aggressive environment with high humidity, dust and salinity; also, must be comply with IEC Electromagnetic Compatibility immunity levels.

3.18 SYSTEM COMMUNICATION NETWORK

The communication network will be designed according to the use of Cellular Network over Private APN services for the meter communication and the use of point-to-point lines to communicate the Data Center with Meter Control Centre(s). The following picture is an example of the basic design of network:



3.19 DATA AND ACCESS PROTECTION FUNCTION

- Access to data and functions to the equipment in the network has to be protected by authentication and authorization procedure.
- Create access logs, both for local or remote access through communication channels.
- Support communication encryption between all components.

3.20 COMMUNICATION MRS/HES to METER

3.20.1 Modem Quantity

Modem Type	Quantity
Plug & Play Cellular Modems (LTE/4G/3G/2G)	17,000
TOTAL	17,000

3.20.2 Cellular modem technical specification

- A modular modem with a bidirectional communication will be used to communicate meter with server.
- The Modems shall be in conformity with international standards and a testing certification from independent laboratory must be presented.
- The modems shall be tested successfully with the Country mobile operators.
- The modem must adjust automatically the cellular technology to the best available in the area: LTE/4G/3G/2.5G (Edge) /2G.
- The modem should utilize IP version 4 and is compatible with the Country mobile operators.
- If the antenna inside the modem does not meet the needs of signal coverage (only for limited areas), an external antenna should be used.
- The modem must support static or dynamic addressing of modem and APNs service.
- The modems shall be interchangeable and have a configuration and troubleshooting software.
- The modems shall be plug & play.
- The modems should have a built-in protection against unwanted access. Access from which communication is allowed; which is entered as a parameter in the communication module.
- The communication module has to be equipped with a function to maintain the communication channel active even if the equipment has not been used for a longer time (this time represents a parameter).
- All communication parameters located in the modem at the time of reset must remain saved.
- The modems should be delivery with all necessary accessories to work properly (connectors, cables, power Supply, antenna, etc.).
- The communication module must be energized from meter terminal.

3.20.2.1 Technical, Functional and Other Features

- GSM / GPRS/2G EDGE/3G/4G/LTE Quadband / class 10 / class 12
- Should support HSPA /W-CDMA minimum 3 Mbps downlink
- Data / SMS
- Protocols: TCP / UDP / FTP / HTTP / SMTP / POP3 / SNMP / SSL
- AT command set > 300
- Autorestore – timer reset
- Operating status LED
- SMA antenna connector (50 Ω)
- Operating (in °C) -30° ~ +70°
- Penta-band Antenna
- Quad-band 850/900/1800/1900/2100 MHz

3.20.3 Antenna Quantity

Antenna Type	Quantity
High Gain GPRS/3g/4G Antenna cable 100cm	2,000
High Gain GPRS/3g/4G Antenna cable 200cm	2,000
TOTAL	4,000

3.20.3.1 Antenna technical specification

- SMA interface Meter Extension Antenna with magnetic base
- High Gain GPRS/3g/4G Antenna
- Cable Length: up to 200cm
- Compatible with meter manufacture communication module.

3.20.4 Configuration software and licenses

- The modem must integrate the IP protocol stack with the required pre-installed license, which must be independent of the electricity meter and its serial number. In fact, the modems must be interchangeable between the meters without any configuration or need to enter a license key at the modem level or at the meter.
- Where possible, access, either locally or remotely, to the modem for configuration or parameter reading shall be protected by an authentication and authorization procedure.

3.20.5 Modem testing and inspection

The section VII Specification Requirements: **Quality Assurance & Testing** describe more in detail all testing procedure.

3.21 Operation life of Communication System components

- The Communication Component Operation life shall be 10 years.

SOFTWARE PLATFORM

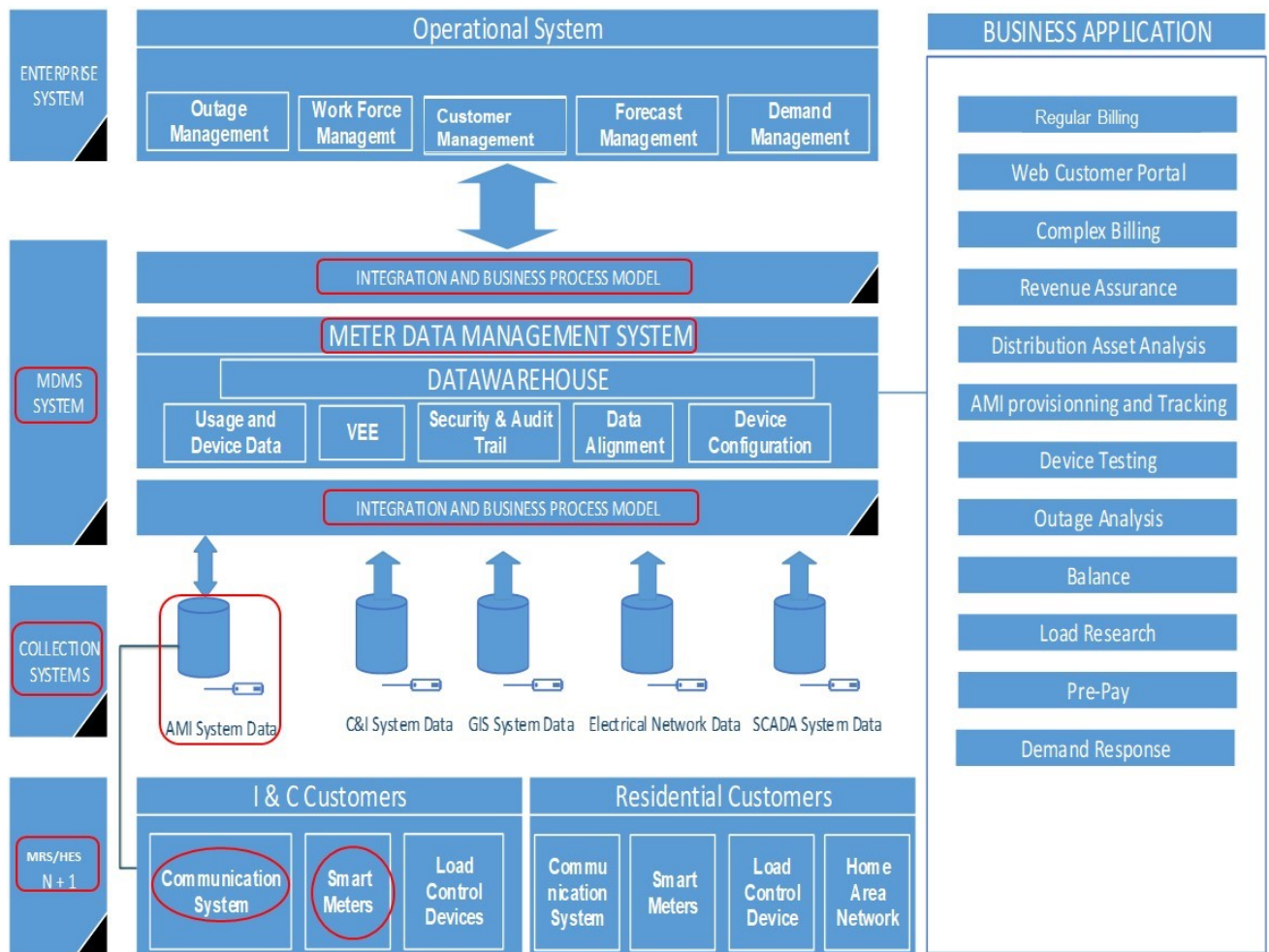
3.22 DESCRIPTION SOFTWARE PLATFORM

AMI software platform will allow the ENDE to operate the AMI infrastructure in a smart process way.

The software platform must meet the requirements define following and the characteristic defined in the **Meter Reading software (MRS/HES)** and **Meter Data Management Software (MDM)** sections.

The software platform could be any combination of software application package that work in an integrated environment and in complaint with all functionalities required in this document and according to the architecture specified in this document.

The Software platform will have the following basic design and components framed in red:



3.23 GENERAL SOFTWARE REQUIREMENTS

- The Supplier shall include the supplies and activities necessary and mandatory for software package to be fully operational, including:
 - Supply of all the application software;
 - Configuration of the database;
 - Implementation of the system including installation of facilities, hardware and software;
 - Commissioning tests support;
 - Implementation of the System Test;
 - Provision of instruction manuals for the System;
 - Initial training of the ENDE specialists, who will be responsible for the production activities, technical support and users of the features and tools of the software.

The Supplier must include in the proposal:

- All software licenses (including third-party software) necessities to use the AMI System, including OS and Data Base. The license conditions must clearly detail all the conditions of use, duration, upgrade conditions, etc.
- The acceptable Database are: Oracle, MS/SQL or HANA latest version and that communicate with SAP HANA latest version. The MDM database will be built on top of the MCC system, whose primary functions include the validation, estimation, and editing (VEE) of meter data that are later passed to other utility systems, as billing systems, even in case of disruption of meter data flows. MDM functionalities can usually be distributed over other systems instead of being present as separate systems. Also, as this MDMS will be connected to a SAP system, must be supplied by the Supplier interfaces that communicate with SAP and Vending System. The commissioning includes interface tests with the SAP, Vending System and MDM. All the tests must be done with ENDE team to validate that all commercial process that use the MDM database is working properly.
- The Meter Data Management software must support the loading, validation, editing, and estimation (VEE) of meter data - from meter configuration, to meter read and usage validation, to bill determinant calculations and other forms of usage calculations. Also, the MDM must support storage, archiving, retrieval & analysis of meter data and various other management information system along with validation & verification algorithms.
- The MDM software should also support the future requirement of the utility and should support the integration of other smart grid functionalities like Distribution Transformer Health Monitoring system, self-healing system, etc., as and when implemented by ENDE.
- MDM must have capability to import raw or validated data in defined formats and export the processed and validated data to various other systems sources and services in the agreed format. It shall act as a central data repository with interactive dashboard. MDM shall provide validated data for upstream systems such as SAP CCS (billing system), SAP CRM (customer care system), analytics, reporting, Load Analysis, Load Forecasting, Product Lifecycle Management (PLM), Outage Management System (OMS), etc.
- The acceptable OS are: Unix AIX, Linux or Windows Server 2016 and Up.

3.24 THE SYSTEM SIZING

1. The SYSTEM must be design to reading and archiving the daily data according to the quantities meter/customers specified in this document plus 25%. MDM will be implemented initially to support the collection and storage of data for meeting the performance level for the 15.000 consumers/ smart meters with facility of future expansion for 25.000 meters. MDMS shall have the ability to selectively choose which data to be maintained and which to be purged or archived as per requirement of ENDE.

- The Software License should consider the following criteria:
 - For MRS/HES Software:
 - Production Environment (Main Site): Support until 25,000 end points.
 - Contingency Environment (Redundant Site)
 - Developing and Test Environment
 - For MDMS Software:
 - Production Environment (Main Site): Support until 1,200,000 end points.
 - Contingency Environment (Redundant Site)
 - Developing and Test Environment.

3.25 GENERAL SOFTWARE CHARACTERISTICS

- Menu language must be English
- Password protection
- Data Backup procedure
- The Applications must be done over web interface.
- The system shall operate using at least the ORACLE database version 12C R2 or MICROSOFT SQL SERVER 2017 or HANA V2.0;
- The complete system documentation must be delivered in English.
- The system shall have at least the following layers bounded by independent programs: application server, database server, communication server and integration layer.
- The messages and screens of the system shall be exhibited in English;
- The System should have auditing trail and recording of transactions that were made: who made, when and where they were made;
- Capacity of increase of the hardware components as required for the improvement of performance (horizontal scalability);
- Ability to migrate to a hardware platform for better performance (vertical scalability);
- Scalability of the components considering the following aspects:
 - Processing Capacity;
 - Data storage;
 - Increase in the number of simultaneous clients without loss of performance;
- It shall have capacity for remote operation, through access from a local network or through the Internet in safe environments, enabling configurations, programming and control of the applications.
- The software must provide an N-tier architecture which must be illustrated and explained in the proposal.

- Utilize J2EE or .NET standards and support a service-oriented architecture (SOA).
- Provide Application Program Interfaces (APIs) developed in Web Service for third party applications and a robust, industry standard means for extracting data so that the data can be presented to other third party applications.
- Data integration with 3rd party applications using API through web service and fully compliant with IEC 61968 and IEC-61970.
- Be flexible in terms of the file format that is used to send interval and register data to the SAP Billing system.

3.26 SOFTWARE ADMINISTRATION FUNCTION

The System software package shall support the following functionalities across all applications.

- Defining of roles and user groups
 - Access control to System components
 - Administration of reporting functions
 - Execute a regular backup of all data at the desired time.
 - Defining of user/user group rights by grouping and privileges (permission) each group.
 - System reports in group to be assigned to user groups.
- The system software package shall provide such data access and target functionality that should ensure that only authorized users could use the system, within the scope of their authorizations according to the security level. Records must be kept about the users having system access, with specification of privileges for each user, as well as system access records (identification of successful and unsuccessful attempts).
 - When user privileges are changed, the system must register the security level change, time of the change and who executed the change.
 - The system should implement a security procedure on all access levels through the usage of users, groups of user, as well as their roles. Security procedure shall support the possibility of allocating users within specific or standard groups, whereby; roles are defined in the way enabling the application to individuals or groups of users.
 - Reports and Audit Trail.

3.26.1 Systems Administration and Management Functions Required

The MDM must be provide considering the management, administration, and security features at the overall system level in an integrated fashion.

The delivery of software for the hosting environment and installation and configuration of the MDM must take into account the EMDE hosting environments for IT infrastructure. All third-party software shall be delivered to the ENDE with software licenses and proofs of purchase. The following activities shall be executed to deploy and test the MDM:

Testing of the MDMS deployment infrastructure.

Testing of SAP connectivity using the designed interface with other systems.

Testing of the system in a development (“DEV”) environment, running in parallel with existing systems:

Migration of data from existing systems/other data sources into the system;
 Preparation of a standard set of reports and instruction on their use. Should an embedded report-writer be contained in the system, training in their use must be completed before deployment is signed off;
 Ensuring roles are defined in the system and that duty segregation criteria as set out by the ENDE meet requirements;
 Once approved in the DEV environment, copying the database into the Production (“PROD”) environment;
 System should then be copied back to DEV to enable users to perform training and familiarization.
 Completion of User Acceptance Testing (“UAT”) and sign-off by the authorized customer representative.

3.26.2 Operational Monitoring, Diagnostics, Troubleshooting

The stabilization period shall take at least 12 weeks (approximately 3 months), though could be extended for an additional 3 months, after the finalization of the deployment of the System on the ENDE’s infrastructure, and after successful testing by the Bidder.

The Bidder shall ensure that the System is fully functional during the stabilization period. In the stabilization period, the Bidder will not charge any additional fees for work/support required to troubleshoot and fix shortcomings detected in the System.

During this period, any update to the System, that is, any fix, patch or such other minor improvement, enhancement, modification or expansion of the Software and/or System which is generally commercially distributed by Bidder as part of the Maintenance and Support Services shall not impose a separate charge. In summary, during the project execution eventual adjustments or betterment in the software is a responsibility of the Bidder with no cost to ENDE

3.27 DATA ADMINISTRATION & SYNCHRONIZATION

3.27.1 Master Data

The Data Transfer and Master Data synchronization must suppose that there is many Systems and Data Base proprietary of different data information. This is the standard:

- The SAP CCS/CRM is the original repository and system of record for:
 - Commercial and Technical Master Data (Customer, account, contract, premise, address, and contact information, etc.) (Meter Number, Meter Type, etc.)
 - Data Reading and Billing Data – accounts and bill cycles
 - Rates or Tariff
 - Commercial events (collections, payments, cancel/re-bill, budget bills, Work order execution, etc.)
- AMI System may be the repository and system of record for:
 - Service point, meter data, meter register, meter channel definition, etc.

- Meter reading relationships – meters and data collection systems
- Billing determinants at the service point level (POSD)
- Raw meter reading data (including historical data)
- Device events (outage, tamper, diagnostic alarms, etc.), including historical data
- Endpoint, collector, cell relay, substation equipment, etc.
- Data collection relationships – endpoint and communications network
- Communications events (collector/cell relay diagnostics, etc.)
- Raw data as it comes from devices, prior to storage in historical repository
- Device events, prior to storage in historical repository
- Automatic Reading Schedule.

3.27.2 Master Data synchronization

The master data can be synchronized based on specific events or daily batch jobs. The integration will be determinate according to the SAP CCS/CRM system capabilities. At a minimum, the following transactions should be synchronized between the SAP CCS/CRM system and AMI system to provide for accurate Billing determinant calculations and operational reporting:

- New Customers with Smart Meter installation (new customer or replacement meter in old customer)
- Rate/Billing determinant change (tariff, billing date, etc.)
- Customer status change (active/no active)
- Billing data Read.

MDM software must integrate with different advanced metering systems and synchronize the data and processes in these systems with those in the backend SAP systems. All Integration processes must comply with specification: IEC 61968-9 – Interface Standard for Meter Reading & Control. ENDE will require any future metering solutions to comply to this standard integration specification and thereby ensure that their HES is able to integrate with this project component, the MDM.

3.27.3 Commands synchronization

The AMI system must also will run the two-way commands. The SAP CCS/CRM System systems issue control commands and AMI system leverages its service-oriented architecture (SOA) to receive this command and transfer it to the meter using a two-way control function.

3.28 DELIVERY INFORMATION

The following information must be delivery by the supplier with the proposal:

- Describe a detailed Project Component and controls plan for the MCC/MDMS. This component plan must demonstrate the definition, configuration, testing, acceptance, and transition to production for each of the MCC/MDMS Solution components. This must include implementing procedures for each Project Component control, proposed risk mitigations, project Component tracking, and progress reporting.

- Describe mechanisms that protect customizations during upgrade.
- Describe the upgrade process and skill-set required.
- Describe the product's approach to configurability.
- Describe transaction processing and performance considerations.
- Describe Backup Procedures.
- Describe Disaster Recovery and Fault Tolerance.
- Specified what programming languages were used to develop the meter data management system.

The following information must be delivery by the supplier that win the Bid as part of the contract documentation:

- Provide an entity relationship diagram as a logical representation of data.
- Provide a complete database dictionary that defines the contents of each record and field.
- Provide all the Manuals for the operation, administration and maintenance of all the applications involved in the solution during their initial supply and at every new update of the systems that will imply in modification thereof. It shall be included in this documentation at least the following technical documents in the system: Installation and Implementation Manual, User manual, Reference Manual.
- The complete system documentation must be delivered in English language.

3.28.1 Daily Backups and Replication

- A full daily backup must be created in a specified time; the time of day the backup is taken can be changed by the system administrator.
- A replication mechanism to an external server must be supplied for the System.
- Replication is Active-Active in main Data Center for Database Server and Active-passive for application server
- Replication is Active-Passive for backup data center.

3.28.2 Application Security

- Software delivered must be free of:
 - Viruses.
 - Trojan horses
 - Spam or malware code
 - Penetration testing approved.
- All software must have username and password for each user, the password must contain at least one upper case letter, one lower case letter, a number and one special character.

All the User Interface must have inactivity period time which is a period of timed specified by admin if the user does not work anything on the software.

3.28.3 Supply of Firewall for MDM

The supplier must provide an exclusive system to protect third party access to MDM firewall type to prevent unauthorized persons from accessing MDM data.

3.29 POINT OF SERVICE DELIVERY NUMBER (POSD)

To facilitate the integration of system and data consistency the system will use a unique integration data field. The field will represent a unique point of service delivery (POSD) at a specific location, the "service point" or installation that will be the link between AMI SYSTEM and the SAP CCS/CRM system.

The AMI system shall identify in a unique way all points in which electricity delivery to customers is executed. Unique POSD shall be awarded by SAP CCS/CRM and it shall represent a unique identifier of the point on which calculation of consumed electricity is performed, whereas, consumption information may be collected from several meters.

The electric ENDE is responsible for creating and maintaining the POSD database.

3.30 MANAGEMENT READING SYSTEM (MRS/HES)

3.30.1 Description

It is a software management platform that allows the Meter Control Center to perform remote measurement operations, upload of files, analyze, process and exchange data with the Meter Data Management (MDM) application.

3.30.2 Scope of supply

- The Software solution to manage the automatic meter data reading process including the administration of the communication network.
- The MRS/HES shall have the capacity to facilitate to ENDE transfers all meter registered data to the MRS/HES Server remotely in a planning scheduler and/or on-demand.
- The MRS/HES shall have functionalities that will allow the setting for a scheduled electric energy meter readings, in addition to allow on-demand access, at any time, to these same points of measurement.
- MRS/HES shall do real-time data acquisition from the deployed DCU & Meters and organize the data in the database in a Common Data Format. MRS will do Realtime monitoring, summary reports and Graphs. Online Alerts, dynamic formation for observation groups of suspicious meters or just area, zone, consumer indices etc. in normal circumstances.
- MRS will allows the MCC to perform remote measurement operations, upload of files, analyse, process and exchange data with the Information Systems to reduce commercial losses. The MRS must be a shelf, ready and fully operational product (1 or more), not including any development service, exception made for the integration with other Information Systems of the Utility, for the adaptations to their IT environments or for the new features later required by the Utility.

- The System must be fully integrated with MDM software offered.
- The System must be fully integrated with MDM software offered. This integration is On-Line integration using state of the art interface.
- The MRS/HES shall be supplied complete with all the required applications, databases and other items necessary for a perfect operation.
- The MRS shall be scalable and will allow the use of multiple instances provided they could be integrated into a single database. The Supplier must indicate the additional costs for the utility to be incurred in the system expansion (hardware, software licenses, etc.).
- With the implementation of the MRS/HES, the ENDE has to be able to remotely collect data from the meters for at least:
 - o Billing;
 - o Fraud detection
 - o Establish new tariff structures
 - o Improve the service quality index
 - o Eliminate operational costs of commercial procedures
 - o Control and management of costumers loads
 - o Resources in the field (transformers, cables, among others)
 - o Improve network expansion planning.
- The Supplier will be solely responsible for the execution of all the installation services, including integration services between MRS/HES and MDM.
- The Supplier will be responsible for the execution of all the installation services to make operable the MRS/HES System specified in this document.
- The Bidder shall include in its proposal all the applications and licenses to implement the MRS/HES, with all the characteristics and features defined in this specification. The licenses must be for the perpetual use of the Utility;
- The MRS/HES software license must be delivered with a three years maintenance and support included; the software must be delivered with a one-year maintenance and support contract which must be directly with the Software Manufacturer.
- The Supplier shall include the supplies and activities necessary and mandatory for MRS/HES to be fully operational, including:
 - o Supply of all the system application software;
 - o Configuration of the database;
 - o Implementation of the system including installation of hardware and software;
 - o Commissioning tests support;
 - o Implementation of the System Test;
 - o Development of the backup strategy and procedures for system backup and recovery in full and performing system recovery tests;
 - o Initial training of the ENDE specialists, who will be responsible for the production activities and technical support
 - o Initial training to users of the features and tools of the MRS/HES.
 - o Integration with MDM for data reading transfer function and command execution.
 - o The Supplier shall provide a Maintenance and Support services as is specified in section Maintenance & Support Services.

3.30.3 Architecture and System Requirements

- The GUI interface shall be integrated in such a manner that the same data entry can be used in all operations of the system, in order to avoid duplication of work.
- The messages and screens of the system shall be exhibited in English.
- The MRS/HES shall have the resources of auditing trail and recording of transactions that were made: who made, when and where they were made.
- It shall allow "hot standby" for:
 - Application servers
 - Communication servers
 - Database servers

3.30.4 General Features of the MRS/HES

- The system shall support that all data registered in the smart meter memory was collected daily. The following data collection are part of the data to be collected:
 - Daily consumption;
 - Reverse consumption;
 - The meter interval data;
 - Net metering data at daily and interval periods;
 - Voltage and current data;
 - Outage Counts Frequency and Duration;
 - Demand metering;
 - Demand resets;
 - On-request reads;
 - Hourly and daily energy register values, including:
 - Active, Reactive and Apparent Energy;
 - Energy in Import and Export;
 - Total Energy Registers, by phase and by tariff;
 - Values hourly and daily records of the Maximum Power and the number of resets of maximum power;
 - Meter interval data (load curves);
 - Registers of the total and phase power factor;
 - Value of the operating time register (hours or minutes of use or non-use);
 - Values and status of monthly billing records;
 - Daily net consumption data and by measurement interval;
 - Log of events related to power quality;
 - Alarms and status words of the meter;
 - Event Log;
 - Meter date and time (in the format DD-MM-YYYY HH: MM: SS);
- Real time clock synchronization;
- Set up and change of approved mean power limit to the meter;
- Change of voltage thresholds related to electricity quality;
- Setup, change, review and synchronization of reading programmers/sequence;

- MRS/HES software should support the execution of other administrative function like the change of meter parameters, reading sequence and priority, meter relay switch control, meter firmware software update.
- Setup, change, review and synchronization of programmer/sequence execution priorities;
- For reading, commands execution and data transfer following prioritization are supported:
 - According to the type of read meters:
 - Three-phase.
 - Direct metering groups.
 - Semi-indirect metering groups.
 - According to the amount of read meters:
 - Reading of individual meter
 - Reading of the group of meters
 - According to the Commands Type:
 - Meter Status verification
 - On Demand Read
 - Schedule reading
 - Parameters change
 - Connect/disconnect
 - Load Limit reset
- Setup and management of grouping of meter reading;
- Any programmable or not programmable command can be sent individually or to any group of any level;
- Shall allow the exportation of all meter data from the system to ASCII, TXT, XML, CSV or Excel files;
- Shall allow the allocation of account units for analysis groups and relocate them, when necessary;
- Shall generate summaries of the events with information about power, current and voltage, alarms, etc.;
- Shall have features that will allow performing the activities related to the disconnection and reconnection;
- Shall generate graphical reports and statistics related to active energy, reactive energy, demands and quality parameters;
- Shall generate statistics of periodic events (frequency and duration) per measurement points, per occurrences;
- The system shall preserve history information of all the parameters per meter point;
- The System shall support the setting for a scheduled electric energy meter readings, in addition to allow on-demand access, at any time, to these same meter;
- The MRS/HES system shall be able to monitor read meter data during data processing. Shall report the status of the reading process, percentage of advance, etc.;
- Shall permit to define a Calendar with holidays;
- Shall permit to define and schedule the meter reading according to the reading route;
- Shall show the Consumption charts (Hourly, daily, weekly, monthly) of active & reactive energy of the measurement point, with at least the following features and characteristics:
 - Automatically present the available reading period;

- Line type chart or bar type chart, with different colors for each type of quantities;
- Meter parameters entry and update
- Daylight saving time changes
- Interval data configuration
- Tariff programmed change
- Change of time of the registers, alarms and event are showing on meter display
- Change of sequence and selection of registers for display on meter display
- Change of electric power integration period
- Control over digital input/output digital port of the meter
- Change of registers within profile channel.
- Change of profile periods
- Change of voltage thresholds related to electricity quality
- Meter Firmware Update
- It shall allow at least the visualization of the data of the parameters of each meter, with, at least the following information:
 - Meter's operating system version
 - Inductive PF (power factor) and capacitive PF
 - Size of channels
 - Battery status
 - Composition of the channels to calculate the PF
 - The interval ranges of mass memory storage
 - Integration interval
- It shall allow the visualization of the data from all available channels on the meter in daily, weekly or monthly segmentation, for initial / final specified periods (day / month / year) in intervals of 5, 10, 15, 30 or 60 minutes, with exportation for, at least, the Excel format;
- It shall allow the visualization of the data registers from channels, from every point, with at least the following information:
 - Grand total
 - Total at the direct peak
 - Total at the reverse peak,
 - Total off-direct peak
 - Total off-reverse peak
 - Demand of the last interval
 - Maximum peak demand
 - Maximum off-peak demand
 - Accumulated demand at the peak
 - Accumulated demand off the peak
 - Reactive Energy Billing Unit
 - Reactive Power at Maximum Peak Demand
 - Reactive Power at Accumulated demand at the peak
 - Total exceeding reactive energy
- According to the capacity of the meter, it shall be possible to extract archives from all meter channels.

- It must have a screen for visualization of at least the last ten energy failures in the measurement, with date and time of the start of the fault, date and time of the end of the fault and detailed duration in days, hours, minutes and seconds;
- It shall allow at least the following changes:
 - Date;
 - Range of demand;
 - National holidays;
 - Multiplication constants;
 - Time segments;
 - Method of demand calculation;
 - Automatic replacement of demand;
 - Summer time;
 - Method of calculation of the quantity of energy corresponding to the reactive energy surplus;
 - Visualization of the display codes;
 - Condition of the serial output of the user;
 - Change condition of the meter breaker or contactor
 - Presentation format of the display quantities;
 - Micro-adjustment of the clock;
 - Reading;
 - Meter type operation (Pre-paid or Post-Paid)
- The MRS/HES system shall show the endpoint registers voltage variations in accordance with the meter parameterization and/or MRS/HES configuration.
- The MRS/HES system must support the change of the following list of meter parameters:
 - Daylight saving time changes.
 - Tariff program change.
 - Change of value presentation period on meter display.
 - Change of sequence and selection of registers for presentation on meter display.
 - Change of integration period.
 - Voltage threshold for phase presence decision.
 - Change of maximum power limit.
 - Change of switch position. Remote disconnection/connection of the customer.
 - Automatic or conditional repeated disconnection
 - Penalty time.
 - Change of registers within profile framework.
 - Change of profile periods.
 - Voltage thresholds related to electricity quality.

3.30.5 MRS/HES COMMUNICATION PERFORMANCE

In accordance with the recommended architecture, the modems supplied, the cellular communication available in Country and the software quality, the MRS/HES system shall be in the capacity to provide at minimum the following performance capacities:

3.30.5.1 Reading success of metered (registered) value in a given time frame:

The success performance will be sizing considering the time interval for all meter data collection according to the following condition:

- The System shall be capable of providing the meter data with over 98% or better success rate for the total meters in the project in a normal Gap of 4 to 6 hours.
- The system must support the data transfer of all meter data including interval data, meter registers and events log.

3.30.5.2 Reliability of data transfer

The Reliability of data transfer will be considered in function of the first time read success.

- The supplier shall show number consistently in the 90%-95% range of successful connection and data transfer in the first attempt of meter read. With retries, the system must achieve routinely over 99% successes.
- The System must have a data transmission system with automatic mechanism for retransmission and control of delivery.

3.30.5.3 System response speed (response time to command execution)

- The maximum total time for transfers the one-day registered data from one meter to MRS/HES in on-demand reading must not be over 4 minutes.
- The regular time for a direct command execution, like on demand read must be under 20-30 seconds.

3.30.6 MRS/HES SYSTEM PERFORMANCE WARRANTY

In complete production and operation, the System shall provide the following efficiencies:

- 99% for all daily reads

In case of the supplier considerer that the communication link provided by ENDE could not warranty this requirement, then should indicate the reason of this consideration and explain it in a technical way.

3.30.7 Generation Report / Charts

It shall allow the generation of graphs of the measuring point, with at least the following characteristics:

- Zoom functionality (increasing and decreasing), making possible amplifications for detailing specific areas of the graph and subsequent return to the initial conditions sizing;
- Support English version.
- The system shall have the availability to generate the graph of the load curve (daily, weekly, monthly) from the point of measurement with at least the following features and characteristics:

- Option to view the data recorded in any of the channels (as available in the meters);
- The period, in the initial execution conditions, shall automatically offer the available reading period;
- Possibility of choice of the date and of the time of the start and of the end of the analysis;
- Line chart or bar chart types, with different colors for each type of quantity;
- Ability to export data;
- Recommended to include Phasor Analysis, angles and magnitudes
- Remote connect/disconnect
- TOU
- The system must generate graphical reports and statistics relating to energy (Active, Reactive and Apparent), Maximum power, power quality parameters and any other data deemed necessary.
- The system must allow the display of consumption and maximum power graphs (hourly, daily, weekly and monthly data) relating to Active, Reactive and Apparent Energy meters with at least the following specifications and characteristics:
 - The period, under the initial conditions of execution, must correspond to the available reading period;
 - Linear type graphs, bar graphs or any other type of graph adapted to the data to be displayed (sector graph, areas,), with different colors for each type of size.

3.30.8 MRS/HES Reporting Capabilities

3.30.8.1 Analysis of statuses and alarms

- This type of reporting functions processes alarms and statuses of meters, event logs, with the making of corresponding reports after finding corresponding alarms, statuses and events.
- Result of such reports should be the daily, i.e. periodical report on the state clearly showing all alarms, statuses and events and on which meters, representing the basis for further action on these meters.
- Events and meter alarms
 - Terminal cover removal.
 - Main meter cover removal.
 - Modem cover removal.
 - Magnetic detection.
 - Bypassing neutral.
 - Battery-voltage status.
 - Memory status.
 - Date and time of last programming.
 - Firmware upgrades
- Abnormal meter conditions
 - Power ups and power downs with date and time stamp.
 - Individual phase failure with date and time stamp.
 - Over and under voltages based on a pre-set threshold with date and time stamp.

- Meter error.

3.30.8.2 Reports on electricity quality

- The reporting function would execute analysis of voltage circumstances on meters themselves since there are corresponding records in the electricity quality log recording voltage drop/overvoltage below/above defined voltage thresholds and supply interruptions. In this way, the function would indicate poor voltage circumstances with one or a group of customers, and it would represent the reason for the crews to go out into the field.

3.30.9 System Performance Reports

- This function must include at least the following reports:
 - Statistics and monitoring of reading success rates;
 - Statistics and monitoring of the success rate of the first reading attempt;
 - Statistics and monitoring of the success rate of the online meter.

3.30.9.1 Communication reports

- Successfulness statistics of communication between system elements represents a special whole within the reporting functions.

3.30.9.2 General

- All reports must be capable to be downloading to Excel, ASCII, XML, CSV or TXT file.
- Print/Print Preview option is mandatory with every report automatically generated in the form of PDF file.

3.30.10 Data Management

- Key information of MRS/HES systems is grouping of gathered meter data for the following purposes: Billing, reporting and analysis.
- The Automatic Meter Reading data will be transfers to the MDM System in the way (Batch or Online), periodization (daily or sub-daily) that ENDE internal process demand.

3.31 METER DATA MANAGEMENT SYSTEM (MDM)

3.31.1 Description

MDM (Meter Data Management) is the central repository system which communicates with the Head-End on one side and various enterprise applications on the other side. It renders the complexity of different head-ends and acquisition technologies transparent to the enterprise applications. It stores all the meter data collected from different smart meters and processes it as required by the enterprise applications. It also triggers commands and events required by

the business to the meters through the Head-Ends e.g. requests to connect and disconnect all signals and special requests coming from or going to the meters in the AMI System like flags, errors, outage alarms or messages for voltage events, pings.

MDM will support ENDE's service that enable the following process:

- Meter Data Collection
- Calculations – For billing purposes (and visualization to the customers).
- VEE – Validation, Estimation, (meter) Editing
- Analytics
- Event Management
- Holds lean entities of customers, contracts and geographical information.

The MDM system provides a joint infrastructure for data receipt on metered consumption from the implemented MRS/HES system, validate and estimate missing values, potentially calculates consumed electricity (i.e. Provides data necessary to the SAP CCS/CRM System), preserves and manages data, and it also provides access to subject data to all interested parties.

The use of appropriate middleware will enable the connection and integration of the MDM system with other business systems.

3.31.2 Scope of Supply

- The MDM software solution to integrate all meter data and related data to support the ENDE process like billing, fraud detection, electric issue detection, etc.
- The MDM will have the capacity to facilitate to ENDE customers using MDM Web Portal capabilities the internet access to the customer accounts data.
- The System must be fully integrated with ENDE SAP CCS/CRM System and with MRS/HES software offered.
- The MDM shall be supplied complete with all the required applications, databases and other items necessary for its perfect operation;
- The Supplier will be solely responsible for the execution of all the installation services, including integration services to make fully operable the Meter Data Management System "MDM" specified in this document;
- The Supplier will be responsible for the execution of all the installation services to make operable the MDM software like was specified in this document.
- The Bidder shall include in its proposal all the services and licenses to implement the MDM, with all the characteristics and features defined in this specification.
- The licenses must be delivered to Utility.
- The licenses must be perpetual.
- The MDM software license must be delivered with a three-year maintenance and support included; the rest of the software must be delivered with a three years maintenance and support contract which must be directly with the Software Manufacture

3.31.3 Architecture and System Requirements

- The GUI interface shall be integrated in such a manner that the same data entry can be used in all operations of the system, in order to avoid duplication of work;
- The messages and screens of the system shall be exhibited in English;
- The MDM shall have the resources of auditing trail and recording of transactions that were made: who made, when and where they were made;
- The System must be ready to execute in UNIX AIX, Linux or Windows Server Operative System.
- The Data Base for MDM is Oracle 12C and Up, MS/SQL 2017 and up, or HANA V2.2.
- The System must integrate an Enterprise Services Bus (EBS) to support a superior integration capability.
- The software must operate in a virtualized environment.
- The software must support High Availability (HA) execution Active-Active at Data Base level.
- Support data base capabilities like data partitioning, compression and data in memory.
- The MDM shall be supplied completely with all the required applications necessary for its perfect operation;
- Provide Application Program Interfaces (APIs) for third party applications integration and a robust industry standard for extracting data so that the data can be presented to other third party applications.
- Be flexible in terms of the file format that is used to send interval and register data to the Billing system.
- Permit to do user customization without modification of the software base code.
- Ability to run batch, on-line posting and inquiry processes simultaneously.
- System time synchronization between MDM and meter.
- It shall allow "hot standby" for:
 - Application servers
 - Database servers
 - Web Servers.

3.31.4 General Features of the MDM

- The MDM shall support logical and physical device names, and logical device names to customers or contracts including all their histories;
- Analysis of energy balance according to logical wholes, as well as generation of corresponding reports;
- The definition of Virtual meters and the use of it for Energy balance and Billing determinant.
- Must include customizable components: adaptors, interfaces, and web services
- The MDM system shall support:
 - Interaction and data exchange with Meter Reading Systems (MRS/HES).
 - Interaction and data exchange with Customer Information System (Billing System).
 - Interaction and data exchange with ENDE's Pre-Paid System

- Interaction and data exchange with other utilities system.
- Validation, editing and estimation of received meter data.
- Data storage, management and maintenance
- Interoperability in terms of full integration with other Information System
- Revision of changed data
- Security capabilities to define the system access configuration at functionality and data level.
- Calculation of consumed electricity for each point of delivery based on different price structures, including hourly and other specified tariff rate periods.
- Incorporation of data obtained in scheduler process or on-demand
- Data transfer from the MDM system to the SAP CCS/CRM System, as well as to other information subsystems within electric utility, shall be implemented through the (push) procedure (according to sequence) or the (pull) procedure (on request)
- Data transfer to the MDM system from the SAP CCS/CRM System, as well as to other information subsystems within electric utility, shall be implemented through the (push) procedure (according to sequence) or the (pull) procedure (on request)
- The MDM system shall be in capacity of:
 - Provide usable and intuitive, standard web-based user interface that uses standard web browser features.
 - Provide a “home page” or similar area that is always accessible and visible to end users while they are navigating to different screens. Homepage should be configurable to users’ login credentials.
 - Provide intuitive, context-based menus that enable users to easily navigate to related transactions while maintaining the current customer, account, or premise.
 - Provide hierarchical structures that enable the user to easily view and navigate to related data (e.g., the accounts that are linked to a particular customer or address).
 - Maintain and display alert information to inform the user when a situation merits special or urgent attention.
 - Provide account summaries for large accounts and drilldowns to help streamline the amount of data shown to the end user.
 - Provide numerous functions to minimize data entry, including data replication and merge functions.
 - Enable users to configure the application user interface based on customer defined business processes for its end users while maintaining upgradeability. And, provide ability to modify selected user display preferences to their specific requirements without requiring customization.
 - Provide a role-based security platform so that authorized users are granted access to view and/or change. And, enable users to configure the presentation of data to specific groups of end users based on roles/responsibilities.
 - Provide web-based, contextual online help with a fully searchable index, and, easily allow users to add customized help documentation linked directly to the user interface dialogue in context.
 - All interfaces can be configured via a standard User Interface that includes standard adaptors allowing rapid integration and intrinsic data validation to ensure clean data loads.

- Can be configured to pull in, normalize, and store data from any number of ENDE
- Effectively acquire, store and process meter reads, as it adds meters to its system, creating valuable load profile data for each meter on the distribution system.
- Obtain meter data from existing external systems like the Customer Information System for a more effective grouping and reporting.
- The MDM must support the following characteristic for VEE:
 - Capacity to Perform Validation, Estimation, and Editing (VEE) on all meter reads, to ensure “clean” data with no missing gaps.
 - Users also shall have the ability to create their own, custom VEE rules.
 - Standard validation – Must provide a set of standard validation includes referential integrity, data version control, missing interval, negative value, zero value, static value, spike and sum checks, which can all be configured individually.
 - Historical load validation – Load validation for both interval data and consumption data:
 - The system shall be capable of making comparisons against load profile models that are based on historical loads using the Interval Data.
 - The system shall be capable to compare against historical consumption using the Consumption Data.
 - The system shall provide a tool that allows the business analyst to build and maintain custom logic sets for validation purposes. It shall allow the analyst to build unlimited logic.
 - Estimation shall be provided for both interval data and consumption data.
 - For interval data, estimation shall be performed using a sophisticated algorithm, which allows for weather-sensitive regression, day-type, and similar-day estimations.
 - For consumption data, the estimate is derived from historical usage factors, and default values are used for the new meters.
 - The editing function shall have a tool for analysts can view meter data in graphs or reports. Questionable data are highlighted with a suggested estimate, and the analyst can choose to accept the estimate, accept raw data, or input an alternative estimate.
- The MDM operation and analytic capabilities:
 - The System shall provide a powerful analytic tool to generate a list of suspicious accounts or meters that require further field investigation by the revenue protection team.
 - Must have the capacity of using logic validation rules to identify theft of service and malfunctioning meters.
 - Capacity to combine individual logic validation rules to better pinpoint suspicious accounts.
 - Must allow standard validation rules; examining the results of various combinations of validation rules provides the first level in identifying potential energy theft.
 - The software shall compare and analyse customer, meter and account data to identify individual consumption patterns and detect suspect consumption behaviour. A set of logic tests shall be loaded during the implementation.
 - Allows an easy way to query and charge the data for analysis.

- Business Users shall have the ability to aggregate meters into meaningful collections, and then build logic rules against the meter data to look for outliers and meter anomalies.
- Automatically schedule and run a series of standard theft detection and logic validation rules to identify theft. These include:
 - Inactive Status
 - Pending disconnect
 - Tamper Flag on
 - Reverse Rotation flag on
 - Meter changes
 - Repeat customer
 - Drop in Monthly Usage
 - Zero Usage (systematic intervals)
 - Reverse Spike in Usage
 - Spike in Usage
 - Load Factor > 100%
 - High quantity On/Off condition
 - Abnormal Voltage Variation
 - Abnormal voltage condition
 - Abnormal current condition
- Allow combinations of logic rules to refine results. Allow the combination of meter read checks with SAP CCS/CRM System data elements to create further tests. Examples of these are:
 - Zero Monthly Consumption on Active Customers
 - Consumption on Inactive Customers or disconnects
 - Seasonal Customer Use
 - Decrease in monthly usage
 - High load factors
- Allow business users to create their own logic validation rules and iterative workflows to identify theft.
- The MDM other value technical characteristics:
 - Enable user-friendly querying and reporting using standard reporting tools.
 - XML Web Services that allows loading and extracting data elements from the database.
 - The MDM shall have a powerful scheduling, archiving, and maintenance administration tools, robust task monitoring and error messaging.
 - The MDM shall Supports a role-based security model.

3.31.5 Validation, Editing and Estimation (VEE)

- All meter data received by MDM system will be subject to VEE analysis. Automatic process of VEE analysis should be realized within MDM system. The VEE analysis process performs analysis of current meter data for finding possible anomalies, and in the case that anomalies are discovered, an error report is generated, as well as the request for data correction within the MDM system with the estimated value.

- In the course of VEE analysis within MDM system, it is necessary to hold the entire documents related to algorithm implementation used for the validation and estimation of meter data, whereas, applied algorithms have to be explained on real examples, with clearly defined data flows and definitions.
- MDM system should continuously validate meter data in search for possible anomalies. Various rules should be enabled within the MDM system for meter data validation coming from certain metering points or groups of metering points.
- MDM system should have automated estimations techniques to complete missing or invalid data.
- MDM system should enable meter data change by the MDM system operator. Review and change of meter data shall be restricted to certain metering points, for which a user has been identified as the primary authority for such data.
- VEE methods including but not limited to the following:
 - Control the integrity of the data file
 - Too many cycles zero
 - Comparison consumption with previous month
 - Comparing consumption with the same month of the previous year
 - The data values in the range defined by the user.
 - Peak power compared to the previous month.
 - Peak power compared to the same month of the previous year.
 - Gap detection
 - Maximum and Minimum
 - Status flag
 - Support defines the basic functions for authentication data (+, -, *, / mathematical functions such as square root, log, sin ...etc.)
 - Allows creation of formulas calculated based on the basic functions.
 - Data should be authenticated automatically after storage.
 - The replacement value can be estimated linearly between the non-plausible value immediately before and after the value of the time series. It is also possible to use historical values or values from the other meter.
 - Editing data must include the display of data in tabular and graphs.
 - Any type of editing data must be tracked.
 - List the productized Validation, Editing, and Estimation (VEE) Rules.
 - Automatically Edit Meter Data
 - Replace or change intervals
 - Copy and replace intervals
 - Add or delete intervals
 - Factor intervals.
 - Manually edit or estimate meter data.
 - Automatically estimate meter data:
 - Estimate by linear interpolation
 - Estimate by calculating average daily data
 - Estimate using interval data for the previous day.
 - Automatically synchronize register and interval data measurements
 - Configure VEE rules:

- Have pre-defined validation rules that can be adjusted using parameters
- Have the ability to define a new formula for validation rules
- Have the ability to define a new routine for editing or estimation
- Have the ability to define conditional eligibility for VEE rules
- Have ability for nested VEE groups and rules
- Have the ability to turn on and off the VEE rules
- Configure estimation routines for a specific group of meters / accounts
- Configure thresholds and boundaries for estimation on specific accounts by meter/customer, group, tariff/rate, or energy provider.
- Configure additional estimation methods than the ones included in base product.
- Support effective-dated validation rule.
- Apply different VEE rules by customers or other categories:
 - Apply different VEE rules for different classes of customers
 - Apply different VEE rules for different companies
 - Apply different VEE rules for different commodities (i.e. electric, water and gas)
 - Apply different VEE rules for different energy providers
 - Apply different VEE rules by data type or meter / AMI technology.
- Store results of VEE routines.
- Define complex validation rules that would execute a series of validation routines depending on the severity of exceptions.
- Account for special metering situations, including but not limited to check metering, sub metering, net metering, and virtual metering when performing VEE processing.
- Detect and report problems with historical metering data received from existing ENDE system(s) in order to facilitate remediation of data quality problems.
- Support complex daily and Billing cycle verification by performing regular checks for daily and Billing cycle quantities, including demand and coincident demand for active, reactive, and apparent quantities across monthly Billing time-of-day/use and interval data for a Billing cycle.
- Includes Advanced Validation, Estimation, and editing capabilities out of the box that are configurable with no development required.
- Includes enhanced outage processing to automatically stop estimations during a storm outage without AMI events and begin estimations again when meters start working again.
- Includes out of the box dynamic validation rules that can automatically compare measurements to historical statistics and allows user defined formulas for creating other comparisons.

3.31.6 Exception Management

- Ability to report on exceptions.
- Provides automated error handling for exceptions and processing errors that require manual intervention.
- Provide approval capabilities.
- Provide tool to manage/add meter error/event codes.
- Manage work items generated from VEE process (through resolution):

- Automatically process certain failed exceptions during validation routines once edited or estimated
- Generate work items for meter data requiring manual editing or estimation
- Provide super-users the ability to override the results of the automated VEE process (with proper security in place)
- Provide audit capabilities for changes (user id, time and reason)
- Provide capability to monitor and report consecutive estimates, and flag for 'Must Read'
- Provide search capability by error messages, data and functional areas, date ranges, error status, cycle, account number, meter number and recorder id
- Provide ability to manually rerun validation once meter data is edited or estimated
- Tie resolution of errors during VEE to work items associated with the error
- Keep historical records of prior VEE validation failures.

3.31.7 Revenue Protection

- The MDM system must provide a powerful analysis tool to generate the list of suspicious contracts or meters that require investigative field visits by anti-fraud teams (with geographic location data);
- Identify and report potential meter failures or tampering:
 - Identify and report missing reads
 - Identify and report "stopped" meters
 - Identify and report "slow" equipment
- Receive signals for tampering or meter removal
- Automatically generate request for meter investigation and send to the appropriate system.
- Configure business rules for identifying and reporting revenue protection incidents.
- Track multiple revenue protection events by meter / account (e.g. reverse rotation, stopped meter).
- Allow users to enter the Outage program with the start and stop day/times.
- Identify the meters whose power of do not meet the Outage program and report those meters.

3.31.8 Calculation of losses (Energy Balance)

- The MDM system must be able to calculate the losses of different electrical systems by comparing the energies measured by the totalizing meters of these systems (energy supplied to the system) and the energies measured by all the other meters installed in these Electrical Systems (energy consumed by the System).
- The MDM System must support the calculation of losses at the different electrical system levels.
- The MDM System must make it possible to define and configure the electrical systems that are the object of the calculation of losses, in particular in terms of designation, type, indicators (values to be calculated, limit values, etc.) and counting points.

- For each electrical system, the MDM must calculate the total energy supplied, the total energy consumed, the energy losses and the loss rate based on the comparison of energy meter data. supplied to the System in relation to the meter data of the energy consumed by the system.
- The MDM system must be able to display loss calculation results (total energy supplied, total energy consumed, energy losses and loss rates), in the form of tables and graphs, and generating the corresponding reports according to at least the following criteria:
 - Loss calculation results, cumulative and detailed, by time slot, by day, by month and by year over a period to be defined by the user;
 - Loss calculation results for an electrical system or group of electrical systems to be defined by the user;
 - Result of calculation of losses by level of tension, by region and by the organizational unit of the ENDE (Provincial Direction, Regional Direction, ...);
- The MDM system must allow the setting of the loss rate limit value for each electrical system in order to generate alerts and reports in the event of exceeding this limit value.

3.31.9 Billing Determinants

- Provides complex bill determinants out of the box including demand response, critical peak periods, and other interval data manipulation leveraging vector math. Complex calculations can be built without programming.
- Summarize interval data into Billing determinants:
 - Summarize interval data across multiple channels
 - Summarize interval data into time of use buckets
- Perform mathematical algorithm on interval data without customization
- Perform mathematical algorithm on interval data by business users
- Summarize interval data taking into consideration the effectiveness of the relationship between meter and account (for example, if the account has gone through a meter exchange mid-cycle, then the summarized usage should reflect it).
- Support net metering tariffs
- Store summarized usage, as well as business rules and effectiveness of the rules used for summarization (support for TOU, Real Time Pricing (RTP) and Critical Peak Pricing (CPP)):
 - Store summarized data
 - Update and store the status of the interval data once it has been summarized and sent to Billing
 - Associate each summarized usage with the TOU schedule that was used to summarize the usage at the time
 - Store summarized usage by hour and apply hourly commodity pricing
 - Maintain pricing changes (CPP, RTP) and associate usage with pricing.
- Configure customizable summarization and Billing rules:
 - Support demand-free days when calculating peak demand
 - Create custom formulas to calculate Billing determinants
- Allow users to maintain TOU schedules and maintain history

- Add and store generic third-party data to use in formulas for Billing determinants
- Allow users to maintain holidays
- Allow users to enter the daily system peak demand and the time when it occurred
- Aggregate interval data for Billing only when the interval data has successfully been validated and there is no missing usage in the Billing period
- For multiple Billing periods, eliminate the gap in Billing (i.e. the current Billing period will not process until the previous month bills)
- Support real time pricing calculations using hourly data
- Aggregate interval data units into billing determinant format/buckets as required by SAP CCS/CRM System. This shall include TOU buckets for On Peak, Off Peak, Shoulder Peak and Critical Peak.
- Support multiple TOU rate schedules and provide “what if” analysis on customers or groups of customers to verify system impact of rate changes.
- Support multiple standards for outbound interface (i.e. not locked into a pre-defined set of outbound interfaces, but rather have configurability)
- Support Daylight Savings Time.
- Support meter/register relationships such as 'deducting' meters and Totalizers, to prevent double-count consumption or the assumption there is theft.
- Support meter/register relationships such as power factor (kWh-kVARh) and load factor (kWh-kW) so that it can calculate power factor and load factor in order to determine if the read data for each meter is valid.
- Supports bill determinants alerts when billing may be impacted as part of usage correction or restatement.
- Support bill determinants for off cycle changes in Billing e.g. rate change and/or energy supplier changes.
- Support bill correction notification process with SAP CCS/CRM System when prior usage used for Billing has been changed or updated.
- Support for special Billing such as summary, pre-payment, budget, and handling of demand response events and customer load response in calculating Critical Peak Price Rebate Billing determinants.
- The billing data and calculation must be archived in order to support the restoration for the revision of billing calculations made in the past.

3.31.10 SERVICES / WORK ORDER PROCESSING

- Support automated generation of field work/service orders.
- The MDM System must offer the possibility of setting the types of events and alarms collected from the meters or resulting from consumption analyses (ex. Suspicious consumption) that will be used to define a service order.
- Alarms, Events and validation rules will be assigned a specific value (weight). The sum of these values (weights) will determine the priorities for working on suspected cases and assigning field service teams.

3.31.11 Data Warehouse Capabilities

- Enable production of managerial reports and enable business intelligence
- Reflect the MDM entities and maintain a frequent updating regime, at least once a day, to allow for up-to-date analysis of the accumulated meter reading data
- Enable import of external entities
- Provide interfaces to other ENDE systems
- Enable utilization of standard BI tools on the warehouse data.

3.31.12 Data validation prior to (VEE) analysis

- MDM system should perform, without restrictions, the validations of all data uploaded into MDM system.
- During every data transfer, MDM must verify if the combination 'POSD/Meter ID' is valid and is concurrent with data in the SAP CCS/CRM System.

3.31.13 Data exchange and Data Transfer between Systems

- MDM system should be able to receive, process and transmit different data types from/to other systems. The data will be load, transfer or exchange in different ways, formats and time cycles. For that reason, is critical that MDM technical Platform are based in a Service Oriented Architecture (SOA) for an easy integration with other application.

3.31.14 Report Generation Capabilities

- Ability to generate reports / investigation requests and take other utility-defined actions as appropriate.
- Compile missing reads report.
- Receive daily reports for exception and resource management.
- Generate reports / investigation requests and take other utility-defined actions as appropriate.
- Identify meters with a cumulative usage since the last Billing cycle greater than or less than a programmable threshold.
- Identify and report unbilled revenue:
 - Identify and report unbilled monthly usage and revenue by customer class
 - Identify and report unbilled monthly usage and revenue by rate class
 - Identify and report consumption on inactive meters
 - Identify and report under billed accounts
 - Perform analysis of potential energy diversion, using stored tamper events.
- Ability to distinguish between zero consumption due to a meter being removed, zero consumption due to a disconnection, and zero consumption due to an outage.
- Provide the ability for downloading by the customer to archive and self-manage if so desired. (e.g.: xls or .csv file)
- Confirmation of successful load data transfer by MRS/HES System

- Confirmation of all data changes in the database occurring due to the addition, migration or change in any of the metering points.
- Reports related to meter data. A report should provide information about meter events
- Unsuccessful meter data upload.
- Unsuccessful meter data receipt.
- Difference between the meter identifier and the identifier of POSD
- Lack of storage capacity in the database or on disk
- Computer network problems.

3.31.15 User Interface

- MDM system operator interface via web based
- MDM system should have an internal user interface enabling supervision, change and management of processes and data within the system.

3.31.16 Data Management

3.31.16.1 Data Grouping

Key information of MDM system is grouping of gathered meter data for the following purposes: Billing, reporting and analysis. Compared to accounting data, MDM system will group confirmed meter data according to tariff periods, established on a daily basis, at the level of electric utility.

With respect to data aggregation, the MDM system must perform the following functions:

- Supports a dynamic business environment through automatic procedures and an interactive interface (for the MDM system operator) allowing the definition of new data grouping requests;
- Allows complex data groupings including addition and subtraction functions, taking into account the fact that duplicate counting points and associated data are not included in the final result;
- Allows multiplier factor application to meter data;
- Enables the use of virtual metering points to which installed physical meters are attached and for which addition and subtraction functions are performed in conjunction with other metering points;
- Allows the aggregation of consumption data, Quality data and events to identify possible cases of fraud;
- Predefines frequently performed metered data groupings and stores such data in an appropriate format to prevent re-execution of the data collection following each usual request;
- Stores the versions of the data used for the grouping, on the basis of which it is possible to have a view in the MDM system. If the version of the metering point data is updated, the MDM system must validate the data based on the data versions stored in each previously

calculated bundle. If it is an old version of survey data, the MDM system must mark them as obsolete and must restart the consolidation of the most recent data.

3.31.16.2 Data Gathering and Processing

- Store meter data in one central repository that serves applications, users, and customers.
- Generate integrated data views across the data store.
- Support interfaces from various sources (including multiple collection and communication schemes).
- Support interfaces from multiple MRS/HES systems.
- Support interfaces from non-AMI devices (handhelds, manual reads, etc.).
- Ability to interface with and collect meter reads and other data systems.
- Collect data from non-meter sources, including customer premise equipment, distribution automation devices, Home Area Networks, etc.
- Accept and store the reads collected by the Billing system or other external systems through other interfaces.
- Accept and store billed meter read data that has been edited within the Billing system prior to Billing or re-Billing (e.g., rebate or rebill scenarios).
- Manage all types of data that MRS/HES sends to the system:
 - Store date and timestamp for all transactions
 - Store data by channel
 - Store interval data retaining the data resolution of the meter
 - Store data after conversion of pulses into engineering units
 - Store and manage consumption data (e.g. KWh, KVARh, etc.)
 - Store and manage demand data (e.g. KW, KVAR, etc.)
 - Store and manage other meter data (e.g. power quality, tamper flags, voltage, interruption index, etc.)
 - Store communication statistics.
- Manage metered and recorded data:
 - Store registered reads
 - Store recorded usage in each interval.
- Manage data related to the health and quality of the meter:
 - Store diagnostic data so that meter quality can be tracked
 - Store tamper events and other event flags
 - Store daily momentary interruptions for interval reads, aggregated to circuit level.
- Manage and store register and interval data from other types of endpoints (e.g. water, gas, etc.)
- Manage all versions of interval data (marked as such):
 - Store interval data in its original increment (i.e. raw data sent from AMI with missing intervals and bad data, potentially)
 - Store interval data aggregated per business rules (e.g. 15-minute interval data summarized into hourly interval)
 - Store interval data after validation

- Store interval after editing and estimation have been performed on the data
 - Store data used for calculating Billing determinants: weather, prices, TOU schedule, etc.
 - Store interval data used for Billing
 - Store aggregated interval data by customer class and rate class for at least 25 months.
- Support processing of interval data in high volumes:
 - Manage and store interval data for at least 25 months online and archive for 5 years
 - Manage and store interval data for up 1,000,000 meters daily.
- Support scheduled (on-cycle) data request and response for meter data (including status and diagnostic data).
- Support real-time (off-cycle and ad-hoc) data request and response for meter data (including status and diagnostic data). Allow users to request on-demand read via GUI (with appropriate access and priority granted to various users).
- Execute on-demand meter reads and device control functions through appropriately enabled data collection systems.
- Monitor and record the results of the on-demand requests.
- Execute on-demand read processes or create service orders to obtain required data from the meter reading systems.
- Collect Billing reads for all meters on a given Billing cycle in time to support Billing with minimal need for estimation.
- Receive and store rate and tariff information, including TOU and critical peak pricing capabilities.
- Receive and store any other data required to determine the schedule for automatic calculation of Billing determinants that are required to be sent to Billing and other systems.
- Receive and load historical metering data (as available) from existing ENDE system(s) as part of initial system deployment.
- Receive data from ENDE's pre-payment system.
- Transfer data from Pre-Paid System to remote pre-paid meters using the appropriate HES.
- Track meter data by Delivery Point ID a physical location identification number associated with an XY (GPS) coordinate.
- Track different types of meters (single register, multi-register) with different register types (kWh, kW, kVARh).
- Receive and store meter install and removal information, from SAP CCS/CRM System. In this way, the system can keep track of whether a meter is installed or not, and what the physical location (Delivery Point ID and XY coordinate) is at any time while installed.
- Accept data having date and time stamps in any format and for any time zone.
- Convert time data into a specified uniform date / time format and time zone.
- Collect and store unmetered usage.
- Support settlement activities:
 - Map meters to substations to support nodal pricing
 - Allow assigning capacity obligations based upon customer's actual demand

- Incorporate cancel/rebill history when generating actual usage for profiling purpose.

3.31.16.3 Data Versions

- MDM system should provide access to meter data by using the corresponding data version.
- Every time meter data are altered, MDM system should update only data related to that metering point at certain date of the year.
- The MDM system must assign versions for the original meter data as well as the derived data (example: billing data). The MDM system must provide an identification of the relationships between the versions of the derived data and the versions of the basic meter data.

3.31.16.4 Data Monitoring

The MDM system must monitor meter reading data during data processing to process event inputs. At a minimum, the MDM system should monitor how, when, and why the meter data changes were made and identify the people or processes that made the change.

MDM system shall make such information available in the form supporting the revision process from the reception of the meter data until the final generation of accounting data. It is necessary to record meter data versions used for creation of accounting data sent to Billing System, for keeping the records on change for revision needs.

MDM system should enable the usage of real meter data during revision, when they are available in the system, instead of data replaced or estimated, used for generation of accounting reports.

All newly arriving data will be processed through VEE analysis.

3.31.17 Functional Requirements for Data Storage

3.31.17.1 Reference Data

MDM system should receive and process incremental changes of metering point data from SAP CCS/CRM System. All changes must be recorded.

ENDE will be responsible for providing data on metering points, meters, network topology, customer data, as well as other reference data, for the purpose of their full synchronization.

3.31.17.2 Master Meter Data

MDM system should be capable to receive notifications on the addition of the new meter (either classic or advanced), meter changes, as well as change of information related to the metering point (POSD).

ENDE will be responsible for providing data on metering points, meters, network topology, customer data, as well as other reference data, for the purpose of their full synchronization.

3.31.17.3 Archive Data and Data Restoration

- An archiving procedure should be implemented enabling efficient data storage for the time of at least 5 years, and subsequent transfer to storage media providing permanent storage
- The Supplier shall be responsible for design and calculate the data storage system. The Supplier will be responsible to the correct server infrastructure based on the solution proposed. Bidders must provide operating system licenses, databases licenses, etc.
- ENDE will provide to the Bidders the technical characteristic of the ENDE IT Infrastructure to permit the calculation of the Licenses to be supplied.
- Data archiving requirements must be fully compliant with ENDE business processes, primarily with respect to the frequency and scope of the data to be archived, as well as the time required to download the data to from the archives.
- Billing data and metering data used by ENDE as a basis for the calculations will be stored for a certain period of time for additional review.

3.31.18 Historical Data

- MDM system should be able to store data for on-line availability. In addition to this, MDM system shall be able to store data for off-line availability, for providing historical reserve. MDM system should be able to provide all these data for the purpose of submission to all interested parties.
- On-line availability of meter data and old accounting data should be provided for at least 25 months.
- Off-line availability will primarily be used for the purpose of revision, but also for historical analysis of consumption trends.

3.31.19 Database for MDM

- Database should be able to store all meter data for a minimum time of five (5) years. The database should support data warehouse functionality including the concept of very large database (VLDB) like partitioning, Data In memory, Compression, etc.
- Database shall support of online backup and recovery.
- The database will be in HA with Active-Active configuration
- Backup of the original data and meter data after processing.
- Database licenses can be proposed in RUN TIME version and/or Enterprise Version
- The database should support a standby database on a different location to ensure disaster tolerant systems. All changes made in the primary database should be applied to a standby database on a different location. In case of a disaster the standby database can be activated and will operate without data losses.

3.31.20 Meter Data Storage

Meter data from different sources should be stored in the database in order to guarantee correct, repeatable and auditable results. Data from this storage should be used for all other systems connected to the MDM. In that sense:

- The MDM shall store all kind of meter data like interval/register data, Billing values, events, electricity parameters including all their histories in a unified format.
- The meter data should be stored for at least 25 months online.
- The MDM shall store also the historical values in case that the meter data changes due to validation or recalculation.
- The MDM shall store for every meter and for every register the following attributes
 - Timestamp valid from, Timestamp valid until,
 - Raw value,
 - Report value (after VEE),
 - Creation timestamp,
 - User or process who has created this value (acquisition, validation, user name, etc.).
- The MDM shall store cross sums where meter data calculation or aggregation can be stored.
- The data should be divided into several data segments in order to provide access to certain data segments only.

3.31.21 Event and Alarm Processing

- MDM shall be responsible to store all kind of events and alarms and initiate actions based on events and alarms.
- Once the alarm is registered and passed to the MDM appropriate and predefined actions will be processed and sending to SAP CCS/CRM System for the system action. This could be issue an inspection order for the meter maintenance, notification in the SAP CCS/CRM System or others.
- The MDM shall have the capability to define translation tables for every meter type or MRS/HES. This should unify the events in the MDM and ensure that same events will have the same codes. The MDM shall be configurable in that way that for every event and alarm a pre-defined action will follow.
- Display of communication events.
- Allow users to group and sort the information in the event, meters or days.
- Send an alert to the user via email.
- Allows users to define critical errors to warnings and report events.

INTEGRATION AND INTERFACES

The MDM provider will be responsible for the total services to integrate MDM with SAP and Prepaid System. For the basic interface the MDM provider must create the entire data export process (Download) in the MDM software package according to the data needs in the SAP business process and Prepaid System and will also create the entire import process (Upload) required in MDM to import from SAP and the Prepaid System the data required by the MDM and MRS business process and operation.

3.32 INTEGRATION OF AMI SYSTEM WITH OTHER SYSTEM

MDM (Meter Data Management) is the central repository system which communicates with the Meter Reading System (MRS/HES) on one side and various utility enterprise applications on the other side, including a second ENDE's Head End System and Pre-paid that will be implementing in a separated project. It renders the complexity of different head-ends and acquisition technologies transparent to the enterprise applications. It stores all the meter data collected from different smart meters and/or other metering systems and processes it as required by the enterprise applications.

AMI software package (MRS/HES and MDMS) supplied in this tender should be tightly integrated between them and the data transfer between them should be under on-line interface so that the information between them is updated immediately. The maintenance of that interface is the responsibility of the provider.

3.32.1 Data Exchange Methods

The AMI System shall be integrated with ENDE's enterprise systems using an APIs or Web services using the Open Interface data Exchange Protocol CIM according to the IEC 61968 and IEC 61970.

The data exchange with other applications can be performed the following methods:

- Exchange by file formats: Excel, Text.
- Send and receive data in XML format.
- The system shall be able to exchange data without restriction.

3.32.2 MRS/HES Integration Capacities – Interfaces

The MRS/HES supplied shall be integrated with the MDM System. In order to do that the Software must be compliant with the following technical requirement:

- Using an Open Interface data Exchange Protocol CIM according to the IEC 61968 and IEC 61970.
- The Application Program Interfaces (API's) must be done using Web Services.
- Support various file format data Import & Export.

- The integration capacity must be supported using different communication protocols like TCP/IP, HTTP, TMTP, FTP, SSL, etc.

3.32.2.1 MRS-MDM Interface

The Interface between MRS/HES and MDMS system must be fully On-line integration and MDM will supply to the MRS/HES with all information that MRS/HES requires to be fully operational and the MRS will supply to MDM system with all meter data acquired from Smart meters.

The MRS/HES – MDM interface will be maintenance by Supplier and any change or modification necessary for the correct operation of this interface will be on the responsibility of the supplier. The guarantee of this interface will be permanent during the project execution, warranty period and maintenance services periods.

3.32.3 MRS/HES Data and Information Exchange Functions with MDM system and other information system of electric utility

This portion identifies data elements that need to be transferred to and from MRS/HES system. Data transfer request should be executed consistently to and from MRS/HES system, information subsystems within electric ENDE and other interested parties.

3.32.3.1 Data to be charged into MRS/HES Systems

Data entered into MRS/HES system include but is not limit to:

- Customer and Meter data (Source: Customer Information System - SAP)
- Point of Delivery Service (POSD) data (Source: Commercial and Installation System - SAP).
- Information related to reading cycle and routes (Source: Billing system - SAP)
- Data on network resources on which meter have been implemented (Source: SAP)
- Geo Referential Data
- This data could be charged from the MDM System and not direct interface with original source is necessary.

3.32.3.2 Data Submitted from MRS/HES to MDM System

- The required path to transfer the meter data collected is from MRS/HES to MDM and after from MDM to SAP CCS/CRM System.
- The type of data to be transferred from MRS/HES to MDM/Billing System is the following:
 - Data on electricity accounting collected from Meters
 - Event and Alarms data collected by MRS/HES from Meters
 - The data could be transfer in a Batch or On-Line process depending of the interface model and the convenience of the process.

- In the definition of requirements in terms of automated data transfer between systems, it is necessary to anticipate submission of grouped accounting according to an accounting period, in accordance with the operation of electric utility.
- All data on electricity accounting submitted for billing purpose will be archive by the MRS/HES system.
- All data on electricity accounting shall be send to the MDM system and not direct interface with the Billing system will be necessary.
- Consumption data must be transferred at the end of each day;
- Interval data relating to the electricity consumption and electrical parameters (voltage, current, etc.) of the project meters. The interval data should be transferred daily.
- Reading meter data on request;
- The data must be transferred in daily batches (batch) or online depending on whether the data comes from an on-demand query or a batch process. This method of data transfer must refer to the same calendar day.

3.32.3.3 MRS/HES Master Data Update

The MRS/HES will maintain updated the Master Data (meter data, account data, etc.) using interface with the MDM or Billing System. Every time that a master data is changed in the Billing System it must be reflected to the MRS/HES database.

3.32.4 MDM Integration Capacities – Interfaces

The MDM shall be integrated with the MRS/HES supplied in this BID and with the ENDE's Pre-paid System and the MRS/HES of the Pre-Paid system and with SAP CCS/CRM System and with any other ENDE applications in the future. In order to do that the Software must be compliant with the following technical requirement:

- Using an Open Interface data Exchange Protocol CIM according to the IEC 61968 and IEC 61970.
- The Application Program Interfaces (API's) must be done using Web Services.
- Support various file format data Import & Export.
- The integration capacity must be supported using different communication protocols like TCP/IP, HTTP, TMTP, FTP, SSL, etc.

3.32.4.1 Interfaces

The MDM will have interfaces with the ENDE's SAP System ENDE and with the ENDE's Pre-paid System and the MRS/HES of the Pre-Paid system. The Supplier must deliver the adapters and/or provide the API's and Services to facilitate the MDM integration. The adapter or API must be Open Protocol and Standard Compliant.

- THE MDM supplier should considerer two different type of Interfaces with ENDE SAP Enterprise System:
 - The first type will be a basic off line interfaces based in the flat file export/import or using an intermediate table.

- This basic interface will be used in the beginning of the meter installations and like a backup procedure to the automatic on-line interface.
- The second type will be a fully Automatic On-line interface based in API's and Web Services.
- The Purchaser will cooperate and support the integration process adding the technical team necessary to enable the web services in the purchaser enterprise system and support the testing of the interface and the transfer to the production environment.
- The Purchaser will supply also the procedures to export and import the necessary data between AMI System and Purchaser Enterprise System.
- Follow the list of ENDE Software Application for MDM integration:
 - Customer Information and Billing System (SAP)
 - Pre-paid System including the Head End System.

3.32.5 MDM Data and Information exchange with MRS/HES system and other information system of electric utility

This portion identifies elements that need to be transferred to and from MDM. Data transfer request should be executed consistently to and from MRS/HES and other information systems of the ENDE.

3.32.5.1 General Characteristics for Data Transfer

Data to be load to the MDM system under following conditions:

- The data must be transferred using the corresponding interface. The master and operation data must be synchronized with the original system according to the ENDE necessity.
- If data transfer is completed unsuccessfully, MDM system will send an internal message. This information will be accessible to the MDM system operator through the user interface, while allowing easy sorting and searching of error reports.
- Priority should be based on time and date of meter data creation.
- MDM system should be capable to enable receipt and storage of all data on metered consumption every day for the previous daily reading period. In order to have successful data transmission, it is necessary for all process clocks on all computers within subject subsystems to be synchronized in terms of time.

3.32.5.2 Update master data

The MDM will hold some master data that will include **entities of the customer, contract and geographical information**, this data will be based on the relevant data in the SAP-ISU/CRM system.

An updating process shall be triggered by any change in the attributes of a smart meter in the SAP system. This process is expected to be performed automatically through On-line Interface. Alternatively, an automatic batch process (off-line interface) to import or load the master data changes must be provided.

Also, the master data could be updated manually through a special GUI screen.

3.32.5.3 Meter Manual Data Entry & Data Import

- MDM system should provide, in a secure way and under authorization only, the possibility of manual entry of meter data and other data.
- The MDM system must provide the possibility for the manual import of meter data and other data in certain situations (Example: The measured data are available by local reading but the meter no longer communicates with the MRS/HES system).
- Manually entered meter data shall be in the same format as the ones automatically entered into the MDM system by MRS/HES system, whereby, the same validation of message content is performed, as in the case of automatically transferred messages.

3.32.5.4 Data to be loaded into the MDM system

- Customer account Data, including the corresponding changes (SAP CCS/CRM System)
- Data on network resources on which points of service delivery (POSD) have been implemented (Geo Referential information, Electric Network Characteristic, etc.)
- Information Technical related to the electrical path of the POSD and meter connection (Transformer, Pole, Circuit, substation, etc.)
- The data required for energy accounting. Information related to tariffs and price structures (SAP CCS/CRM System)
- The Geographical information.
- Cycle information and read routes, including corresponding changes;
- The MDM shall be able to receive the master data of the device from the SAP/Billing system and create the meters in the inventory of the MDM. Information on the meters is synchronized with CIS/Billing system (SAP).
- The necessary History Data to support the data estimation process. ENDE shall submit all its historical data, necessary to fill the MDM system database.
- The Provider should supply templates for data import or alternative will supply intermediate tables with an explanation of each field to be fill out by the ENDE to do possible the data to be load.

3.32.5.5 Data Transfer to MDM from MRS/HES System

MDM system should receive and process data on metered consumption. Received meter data to be transferred to the MDM system from each advanced metering system (MRS/HES) include the following:

- Data on metered consumption for meters in the project, at daily level; data on consumption should be transferred at the end of every day beginning after MRS/HES collecting function end.
- Interval Data on metered consumption for meters in the project; Interval data should be at the end of every day beginning after MRS/HES collect the consumption data.
- Data such as all events and alarms of meters, etc.

- Data on metered consumption for meters in the Pre-Paid System; data on consumption should be transferred at the end of every day beginning after the HES of Pre-paid system collect the data.
- Interval Data on metered consumption for meters in the Pre-Paid System; Interval data should be at the end of every day beginning after MRS/HES collect the consumption data.
- It may be expected that the size of data transferred is restricted to the maximum number of entries. Transfer in terms of data size shall be restricted in terms of prevention of too long or re-emission of data during the transfer of large data amounts containing errors.
- Moreover, it is necessary for all data transferred via this data transfer method to be related to the same calendar day.

3.32.5.6 Data Transfer to MRS/HES from MDM System

- The MDM System must transfer to the MRS/HES System the following data:
 - Device (meter) and Point of Service Delivery -POSD- (source: Billing System- SAP system);
 - Customer data (source: CIS/Billing System – SAP System);
 - Cycle information and read routes (source: CIS/Billing System – SAP System);
 - Pre-Paid STS Code (Source: Pre-paid System)
- The data transfer must be done immediately (on line interface) every time that a new POSD is added to the Commercial system data base or when a customer change, meter change, tariff change or any master data change in any existing POSD.

3.32.5.7 Data Transfer to Pre-Paid System from MDM System

- The MDM System must transfer to the Pre-Paid System the following data:
 - Device (meter) and Point of Service Delivery -POSD- data (source: Customer Commercial System – SAP System);
 - Customer data (source: source: Customer Commercial System – SAP System);
- This data transfer must be done immediately (on line interface) every time that a new POSD is added to the Commercial system data base or when a new customer is added or customer change, meter change, tariff change or any master data change in any existing POSD.

3.32.5.8 Data and Command exchange between MDM, Commercial Information System (SAP), Pre-Paid System and MRS/HES

The MDM system should be capable to receive and send commands and data between MRS/HES, SAP System and Pre-Paid System for the following reasons:

- New Device (meter) and point of energy delivery (POSD) created on CIS/Billing System (SAP);
- Any change in data in point of service Delivery (POSD) already existing in CIS/Billing System (SAP);
- New Customer Data, or any changes to customers Data (SAP)

- New Cycle and read routes or any changes;
- On-demand reading orders required from Commercial System – SAP -;
- Connect/disconnect Orders from Commercial/Billing System (SAP);
- STS pre-paid code from Pre-Paid System
- New Data of any changes to the electrical network infrastructure on which the meter is installed;
- The data for the electricity accounting shall be transferred to SAP system under the scheduler defined in advance.
- All data on electricity accounting to be submitted to the SAP/Billing system will be archived by the MDM.
- In case when there is no consumption at some metering point, the MDM system will submit a zero value for metered consumption to SAP/Billing system. It should also be noted that zero value represents a valid consumption reading which has undergone the validation process and that it does not represent missing data.
- When for any reason meter data from the previous day shall be uploaded from MRS/HES, for the purpose of efficient data transfer, missing data are usually transferred with high priority.
- When missing accounting data then estimated values are sent to SAP/Billing System.

3.32.5.9 Data Exchange between MDM and Other ENDE Applications

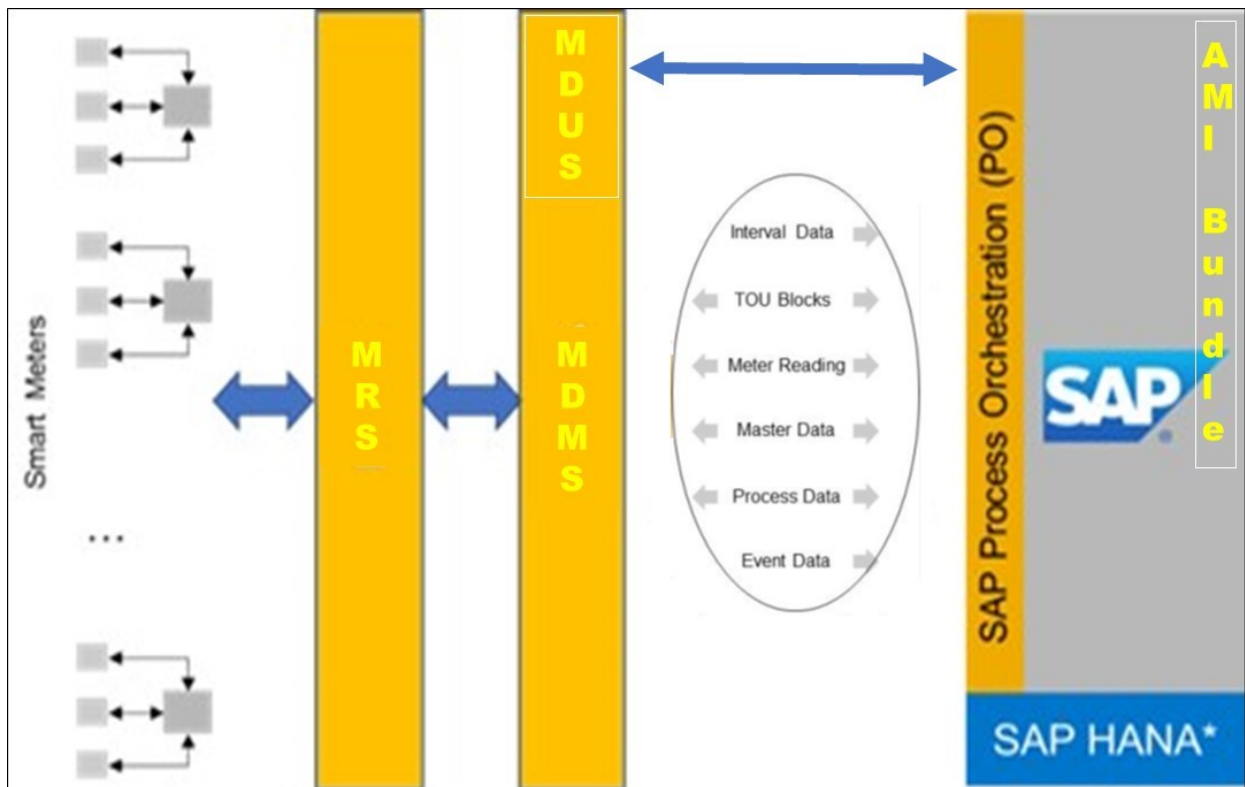
- The Purchaser will cooperate and support the Suppliers to build the interfaces so that the MDM can interface with the existing ENDE applications during the period of implementation of project.

3.32.6 Interface MDM - SAP

The AMI system, specially the MDM, must be integrated with the ENDE Customer Information System (SAP). The ENDE SAP system includes SAP-ISU and SAP-CRM to manage all the activities related to the customers and the services provide to them. The On-Line Interface should be done using and “state of the art” interface model. The Interfaces between the MDM and the SAP shall be based on "out of the box" solution where only small adjustments are necessary.

The SAP standard tool for interface with other systems is SAP-PI, therefore we expect that all interfaces with it will be implemented in the appropriate format using the best SAP practice. The MDM shall be integrated with SAP-ISU and SAP-CRM

It is a ENDE interest to use the SAP MDUS model already developed and included by SAP in the AMI ES Bundle. The reason is the understanding that the integration process will be easier and less time consuming.



However, any technical alternative will be accepted and analyzed as long as the interface has been developed using the Simple Object Access Protocol (SOAP) and in a Service Oriented architecture (SOA) model.

During the stage of preparation of the Inception Report and Contract negotiation, the parties will agree on the best way to develop these interfaces and will schedule these activities without affecting the time of development and production of the AMI system.

A Basic interface model using flat file exchange or using intermediate tables will be implemented to guarantee the basic information flow of master data, measurement data, alarms and events recorded by the meters.

This basic interface will have two objectives:

The first is to maintain the AMI system with the minimum master data required so that it can operate and provide the monitoring service of the Customers to whom the new meters will be installed and that from that moment we will identify as AMI Customers.

The second is to get the SAP system to use the data collected by the remote reading system to invoice those customers.

The first case will be based on a simple mechanism for exporting data from the SAP system through a process that must generate an Excel file or a flat file that will be placed in a path from where another process developed in the AMI System will read it for upload the data to the database of that system.

The process will take care of verifying two conditions every day:

1. New Smart meters installed daily in new or existing Customers whose standard meter is replaced by Smart meters for the first time. This converts those Customers to AMI Customers.
2. AMI Customers that receive change action on any of the SAP data entities, including the meter itself.

Once these conditions have been verified, the data from the different SAP entities connected to the Customer is selected and exported to an Excel or Txt file. Namely:

Business Master Data:

BP Number, Contract Number, Name, Address, Phone, Cellular, Condition of services (post-paid or pre-paid), Rate Category or Tariff, Invoice Group (Portion), MRU number, Reading Date, Billing Date, etc.

Technical Master Data:

Installation Number, Meter number, Meter Type, Meter Model, Register, Modem Id, IP address, CT/VT value, voltage of connection, etc.

The file generated by the SAP process will be scheduled at a fixed time every day and uploaded to MDM by a similar process scheduled one hour later. This single process will be used to add new Customers to the MDM system, as well as to update data of those previously loaded.

The second process will take care of transferring the billing readings from the MDM to SAP on the same day that customers have the billing date marked.

For this we will use the process that is currently used to transfer the meter data readings on field to SAP. In the AMI (MDM) system there must be a process that will be executed every day and that will take the customers whose bill reading date is that day and will look for the readings collected at midnight and generate the file that would be uploaded to the SAP system through the same process that is used today to upload the manual data read. This process should run at mid-morning in the AMI System and the file would be available before noon for SAP to take it within its regular process.

For the On-line Interface ENDE will be responsible for enabling the web services in the SAP environment, whether these are integrated in the AMI E/S Bundle or not.

The Bidder will be responsible for customizing the web services in the AMI system so that the data and commands that support the ENDE's business cases flow automatically whenever possible and convenient.

The SAP AMI ES Bundle business cases are the following:

Use Case list: (from SAP literature):

- UseCase1: Device Initialization Process
- UseCase2: Change Technical Master Data
- UseCase3: Discrete Meter Reading Process
- UseCase3a: SAP Requests Meter Readings from MDUS
- UseCase3b: Sending Meter Reading Results from SAP to MDUS
- UseCase4: Reading One Customer's Meter – On Demand Read
- UseCase5: Uploading Usage Data (EhP6onwards)
- UseCase6a: Remotely disconnecting and Reconnecting a Meter

- UseCase6b: Manually disconnecting and Reconnecting a Smart Meter
- UseCase7: External Profile Calculation
- UseCase8: Event Management
- UseCase9: Text Messaging to AMI Device

The implementation of these cases will depend of the ENDE business process requirements. Other cases not included in the interface can be necessary to complete the data interchange between SAP and MDM according to the ENDE business process.

3.33 SERVER REQUIREMENT

3.33.1 MRS/HES Application and Data Base Server requirement

The Bidders must supply the design of the database servers and application servers of the MRS system and supply the hardware necessary to meet the technical requirements of the MRS.

The proposed MRS/HES system should run in an environment of virtualization.

The bidders are responsible of estimated the size of the Virtual machine that the MRS/HES require for a proper performance level according to was required in the System Performance section. The estimation for MRS/HES server requirements should considered the following criteria:

- Production Environment (Main Site):
 - a. Support 25,000 meters with interval data reading daily.
 - b. High availability configuration.
- Contingency Environment (Redundant Site):
 - a. Support 15,000 meters with interval data reading daily.
- Developing and Test Environment.

The licenses of the virtualization system, the Operative System, Replication and Data Base are the responsibility of the Supplier.

3.33.2 MDMS server requirement

The Bidders must supply the design of the database servers and application servers of the MDM system and supply the hardware necessary to meet the technical requirements of the MDM.

The proposed MDM system should run in an environment of virtualization.

The supplier is responsible of estimated the quantity and capacity of the Virtual machine that the MDM require for a proper performance level according to was required in the System Performance section.

The provider will be responsible of supply all database licenses and additional extensions (Partitioning, In-memory, RAC ...) of database necessary for the operation of the MDM with the performance and reliability like has been required in this document.

The supplier is responsible of estimated the total capacity for Storage to guarantee the performance and data protection.

The estimation for MDM architecture should considered the following criteria:

- Production Environment (Main Site):
 - Up to 1,200,000 customers/Meters with interval data reading daily.
 - High availability configuration
- Contingency Environment (Redundant Site):
 - Up to 1,200,000 customers/Meters with interval data reading daily.
- Developing and Test Environment.
 - As supplier recommendation

The licenses of the virtualization system, the Operative System, Replication and Data Base are the responsibility of the Supplier.

3.34 SOFTWARE LICENSES & MAINTENANCE

Where any Supplier-provided applications software and/or software developed by a third-party, the Supplier shall be responsible for integrating, testing, and meeting the functional, security, and performance requirements of this software and for training and documentation like have been specified in this document.

All software licenses shall be issued directly in the name of Purchaser with a Maintenance and Support Services for years.

- For the MRS/HES software the correct licensee and support agreement must be included for the following components:
 - MRS/HES software Package
 - Any other software, including data base required for the correct MRS/HES software execution
- For the MDM software the correct licensee and support agreement must be included for the following components:
 - MDM software Package
 - Any other software required for the correct MDM software execution.
- Additionally, the following list of software must be included:
 - The Replication Software for all components (Database, Virtual Machine, Application).
 - Backup / Restore Solution software
 - The Virtual Machine Operative System (VMWare or similar)
 - Operative System for all Servers (Linux, Unix or Windows)
 - Database Software (Oracle, MS/SQL or HANA)
 - Firewall
 - Switch.

3.35 HAND HELD UNIT

The system must support the use of robust hand-held units to program and interrogate the metering devices in the field. The handheld unit must be able to perform the same functionality as the software provided that is used for metering device taking into consideration the security.

The Supplier must provide HHU which will be assigned to the technical teams of ENDE for the configuration, reading and diagnosis of meters in the field (locally) via direct connection to the communication ports of these meters. The minimum technical specifications of these mobile terminals are as follows:

3.35.1 Handheld Unit basic features.

- Intuitive user-friendly work using clear structure of menus and dialogs
- Ergonomic keyboard design with alpha numerical keys
- Designed for industrial applications.
- Integrated laser barcode scanner for collecting data. Must supports all barcode types used in industry and market
- User defined configuration of workplace layout enables optimization of operator's route in extensive systems
- High computing power for data acquisition, data manipulation and visualization
- High quality color graphic display.
- Communication and charging cradle included
- With built-in GPS receiver, SD card slot and built-in camera;
- Equipped with protection against falls and shocks.
- Charger included.

3.35.2 Handheld Unit Technical Characteristic

- RAM memory: 1 GB or more;
- Flash memory: 8 GB or more;
- Communication: Mobile network (LTE/4G/3G/EDGE/2G), LAN network via docking station or RJ45 cable, Bluetooth network and USB interface;
- Keyboard: Alphanumeric keyboard (physical or tactile) 38 keys minimum;
- Screen: Color, Touch, Minimum Resolution 800x400;
- Pointing Device: Stylus for touch screen;
- Battery: Main Battery 2600 mAh or more + Backup battery.
- Operation Temperature: -10 °C to +50 °C
- Storage Temperature: -30 °C to +70 °C
- Operating Humidity: 5 % to 95 % non-condensing
- Drop Resistance: Multiple 1.2 m (4-foot) drops to concrete
- IP 54 Category 2.

3.35.3 Handheld Unit quantity

Two hand handheld unit will be 58 (Fifty-eight).

3.35.4 Operation life of Handheld

The Handheld operational life shall be 10 years.

3.36 MCC SUPPLY AND INSTALLATION

3.36.1 MCC Requirements

The Metering Control Center is the functional area responsible of the operations around the Revenue Protection Program. Must be implemented with the objective of centralize the RPP/AMI operation in one team more specialized. This team will be responsible for the management and monitoring of the complete system operation. The Meter Control Center (MCC) will play a main function to help PNG Power to control the Non-Technical Losses and to have a correct billing data.

The operational organization of MCC will include three areas: Control of Energy, Meter Reading and On-Field Technical team.

A Meter Control Center (MCC) is based on AMM (Automated Meter Management) concept implying remote reading and simultaneous efficient supervision and management of other AMI components (Advanced Metering Infrastructure), high data processing speed in a multiuser environment (Client/Server architecture), connection with other information systems (Billing system, Customer Information System, etc.) and data transfer into MDM System.

The Meter Control Centre team has the responsibility of administration and operation of the AMI System, but also is responsible of the main activities and tasks like are the meter reading, data analysis, field operation execution or supervision, etc.

The MCC operators should be able to analyze the data and alarms received from the meters and should be able to conclude if it's a fraud, malfunction or faulty meter connection.

A Meter Control Center (MCC) is also based on a corresponding computer with telecommunication infrastructure enabling its continual and efficient operation - (systems provide the required redundancy, disturbance-free operation in case of power supply outage and like).

A Meter Control Centre (MCC) needs to function under the conditions of existing facilities, computer and telecommunication organization of the electric utility. The supplier shall provide all equipment as is specified in this document and provide the services to do the software platform available in the MCC. Also the supplier will operate the AMI System and will be responsible of the AMI system correct operation and the knowledge transfer process during the first 6 (six) months after AMI System commissioning and acceptance by ENDE.

The MCC will be executing the AMI and MDM administration and monitoring and analyzing the data. The MCC will be on charge of AMI and MDMS infrastructure administration, data analysis and field operation control of the tasks of revenue protection.

3.36.2 MCC Equipment & Furniture

Furniture:

- 05 TV LED 65"
- 16 Office desk
- 16 Office chairs
- 03 Cabinets

- Note: Cabinet dimension and type should be specified by ENDE.

The desktop computer shall consist of the following equipment:

- 16 CPU Inter Processor X86, Core i5 or superior, 8GB memory RAM Hibrid disk technology
- 16 color LCD (Liquid Crystal Display) monitors 21".
- 16 alphanumeric keyboards in Portuguese and a mouse.

MCC Printers quantity and characteristics:

- 08 Black and White Printer:
 - A minimum black and white print engine speed of 60 pages per minute.
 - A minimum from 600 DPI to 1200 dots-per-inch.
 - Paper input and output trays of at least 500-sheet capacity. The printer shall accommodate letter (8.5 by 11 inches), legal (8.5 by 14 inches), A4 (210 by 297 mm) and A3 (2100 by 594) paper.
 - Copy, Scan and Fax function supported.
 - Network connection capabilities
- 04 Colour printer:
 - A minimum color print engine speed of 40 pages per minute;
 - Resolution from 300 DPI up to 1200 DPI
 - Color calibration facilities
 - Copy, Scan and Fax function supported.
 - Network connection capabilities.

3.37 THIRD-PARTY SOFTWARE

3.38 ADDITIONAL APPLICATION MODULES

- The Bidder must include a description of any additional capabilities or functionality that the MDM and MRS/HES base software have and not listed in the bid document requirement.
- The Bidder must include a brief description of any additional modules available in the software and not included in the proposal.

SECURITY AND AUDITING

3.39 General provisions

- The bidder must detail in its technical offer all the security mechanisms provided in the AMI solution relating to the traceability, authentication and encryption of data exchanges between AMI components.
- The bidder must detail in its technical offer all the security mechanisms provided in the AMI solution relating to the redundancies and architecture of the AMI solution distributed between the two sites, main and backup;
- The bidder must detail in its technical offer the security requirements in terms of authentication process, security of exchanged and stored data (security of the communication flows between AMI solution components: MRS/HES, MDM and Meters, traceability of access and operations;
- Mobile administration software makes use of digital certificates issued by the head-end to authenticate field tools.
- The bidder must describe the password maintenance strategy.

3.40 Traceability

- Traceability of access and operations must be ensured at the level of each AMI System (MRS/HES, MDM) and must allow answering to: Who, What, and When.
- All access and user operations, including those with high privileges, of each component of the solution, regardless of their level of privileges, must be logged with the level of detail specified at these components with the possibility of exporting the traces at the level of an external system for correlation and analysis.
- Bidders must submit in their technical offers the following information:
 - Explain how data integrity is achieved and maintained in the system and describe the Bidder's referential integrity strategy;
 - Describe in detail the mechanisms adopted to maintain traceability of all modifications made (including remote access of the Supplier for maintenance purposes).

3.41 SECURE COMMUNICATION

- AMI Platform must provide privacy and authentication of data as it travels through the system.
- The system must use the security features that have been defined by the DLMS/COSEM standard.

3.42 ENCRYPTION

- All data transfer between systems shall be encrypted.
- The Advanced Encryption Standard (AES) must be used at the endpoint level.

- The passwords stored must be encrypted.
- Secure Sockets Layer (SSL) protocol should be used for IP based connection as well as secure sockets for HTTP and web services.

3.43 AUTHENTICATION

- The system must provide security levels based on value and function, so that designated users can only perform the functions assigned to it.
- Explain how the application's login facilities can be integrated with the network login facility and Microsoft Active Directory services.
- MDM and MRS/HES system should implement a security procedure on all access levels through the usage of users, groups of users, as well as their roles.
- User access by identifying the user with username and password.
- Every user of the application has access the application with a unique user name and a unique password.
- Without the valid combination of user name and password the access to the application should be denied.
- Create multiple user access priority level software / function / module / different data areas.
- Records should be kept about the users having system access, with specification of privileges for each user, as well as system access records (identification of successful and unsuccessful attempts).
- The user account is locked after a number of failed login attempts. The number of login attempts is set by the administrator as a system setup.
- When user privileges are changed, MDM and MRS/HES system should register the security level change, time of the change and who executed the change.

3.44 INTEGRITY

The system must provide a Checksum procedure to ensure that the transmitted is protected against unauthorized access, modification, removal or destruction.

GENERAL CONDITIONS

3.45 PLACES OF MANUFACTURE AND SUPPLIERS

The manufacturer's identity and places of manufacture, testing and inspection before shipment for the various portions of the Contracted goods shall be specified in the Technical Schedules and goods shall not be departed from without the agreement of the Purchaser.

All Suppliers and Sub-suppliers of components and materials shall be subject to the approval of the Purchaser. Information shall be given on each Sub-order sufficient to identify the material or equipment, to which the sub-order relates, stating that the material is subject to inspection by the Purchaser before dispatch.

3.46 PACKING, TRANSPORTATION AND STORAGE

Packing shall give adequate protection to the enclosed materials against mechanical damage during transport to its final destination, including rough handling during sea, rail and road transport and transition from one mode of transport to another.

Packing should be stout close-boarded wooden cases of adequate thickness, suitably braced and banded and lined internally with water-resistant material or equally solid enclosures.

Steelworks sections and similar items may be bundled provided that the ends are adequately protected and the enclosing bands or wires are robust.

Indoor electrical equipment must be enclosed in welded polythene envelopes inside packing cases and the envelopes shall be evacuated or have a desiccant inside.

All items in cases or crates shall be secured so that they are not free to move and cannot work loose in transport. If rotating parts are shipped within their bearings or mountings, they must be adequately braced and restrained to prevent relative movement. Loose items shall be placed in bags in a case, each bag having stitched onto it a label indicating the number and nature of its contents. Where a filler material is used in a case to restrict movement or provide additional protection, it must be inorganic and non-hygroscopic.

Steps shall be taken to ensure that moisture, mold, insects or rodents cannot damage insulated materials. Items that include materials liable to be damaged by moisture shall be packed in hermetically sealed containers in which silica gel, or some other approved desiccant has been inserted.

Cases shall be marked with large lettering to show which side of the case is to be up, and if the contents are fragile, marked "FRAGILE" in large letters with the international wineglass symbol. Packages shall be marked with their place of destination in such a way that rough handling or the effect of weather cannot remove or obliterate the marking. Each item shall be marked with its gross weight and, for all lifts over two tons, marks on the cases shall show the correct positions for the slings.

Special steps shall be taken to guard against theft during transport. No small items such as padlocks nameplates and so forth that could be torn off or unscrewed shall be accessible.

A descriptive and fully itemized list shall be prepared of the contents of each packing case. A copy of this list shall be placed in a waterproof envelope under a metal or other suitable plate securely fastened to the outside of one end of the case, and its position indicated by stenciling on the case. Where appropriate, drawings showing the erection markings of the items concerned shall be placed inside the case.

All packing cases, though not steel containers, shall remain the property of the Purchaser.

3.47 TOOLS

The Supplier shall supply in lockable boxes, for the Purchaser's use, any special tools that may be required for assembly, dismantling and adjustments to the equipment. The tools shall be unused and in new condition at the time of hand over. Suitable special spanners shall be provided for bolts and nuts, which are not properly accessible by means of an ordinary spanner.

A complete list of accessories, connectors and special tools required for the installation of the metering device and related equipment together with relevant drawings shall be submitted.

3.48 IMPLEMENTATION AND INSTALLATION SERVICES

3.48.1 Premises Inspection and Site Survey services

- The contractor realizes a premises inspection before meter installation
- A total of 15,000 customer premises will be inspected
- The premise inspection shall be done by the AMI Implementing bidder as per the meter inspection guidelines of the ENDE.
- The scope of inspection work shall include the cost of all labor, transportation and other incidental expenses in connection with the inspection performance
- The broad scope of site survey will include the following:
 - Validate the current meter place facility to install the new components.
 - Verify the quality and/or the electrical condition of the meter installation premises (cables and protection conditions, electrical parameters, etc.)
 - Take a picture (photo) and capture the Geo Referential address of the premises.
 - Conducting feasibility analysis of the cellular network signal to validate the connectivity quality at individual sites
 - Delivery a Report with the result of all inspections and including the list of issues (physical, electrical or communication signal) found during inspection and the recommendation to fixed the issues before a new meter installation
 - Delivery an Excel File with the data collected.

3.48.2 Meter Installation services at Consumer Premises

- The smart meter installation shall be done by the AMI Implementing bidder as per the meter installation guidelines of the ENDE.
- A total of 8,550 installations in Low Voltage consumers will be done
- A total of 6,450 installations in Medium Voltage consumers will be done
- The scope of installation work shall include the cost of all labor (electrical, civil and others), materials, tools, training and other incidental expenses in connection with additional labor requirement. The details are:
 - Transportation of meter from ENDE facility to consumer premise
 - Control the quality of the installation process
 - Manage the security risk
 - Any physical damages during installation to the premises and/or supplied equipment shall be the responsibility of the bidder
 - Removal of Old Meter
 - Installation of new smart meters
 - Provide or capture meter location through GPS
 - Digital photograph of meter reading before and after installation
 - Training on the Job to ENDE personnel in installation of Smart Meters
 - Provide daily, real-time project status updates of installations to ENDE
- Installation services shall be performed by high quality technician and the site installation personnel on this project will be subject to background checks and shall, always, carry a suitable ENDE issued ID for identification.

3.48.3 Meter Installation Services at Distribution Substation Feeders

- The smart meter installation shall be done by the AMI Implementing bidder as per the meter installation guidelines of the ENDE.
- A total of 862 Smart Meters will be installed in Substation Feeders at different voltage.
- A total of 862 CT/VT will be installed in Substation Feeder at different voltage.
- The scope of installation work shall include the cost of all labor (electrical, civil and others), materials, tools, training and other incidental expenses in connection with additional labor requirement. The details are:
 - Transportation of meter from ENDE facility to consumer premise
 - Control the quality of the installation process
 - Manage the security risk
 - Any physical damages during installation to the premises and/or supplied equipment shall be the responsibility of the bidder
 - Provide daily, real-time project status updates of installations to ENDE
- Installation services shall be performed by high quality technician and the site installation personnel on this project will be subject to background checks and shall, always, carry a suitable ENDE issued ID for identification.

3.48.4 CT Installations Services at Customers Premises

- The CT installation and replacement shall be done by the AMI Implementing bidder as per the CTs installation guidelines of the ENDE.
- The total of CTs to be installed or replaced in LV customers is 302
- The total of CTs to be installed or replaced in MV customers is 4,777
- The scope of installation work shall include the cost of all labor (electrical, civil and others), materials, tools, training and other incidental expenses in connection with additional labor requirement. The details are:
 - Transportation of CTs from ENDE facility to consumer premise
 - Control the quality of the installation process
 - Manage the security risk
 - Any physical damages during installation to the premises and/or supplied equipment shall be the responsibility of the bidder
 - Provide daily, real-time project status updates of installations to ENDE
- Installation services shall be performed by high quality technician and the site installation personnel on this project will be subject to background checks and shall, always, carry a suitable ENDE issued ID for identification.

3.48.5 Software Installation Services

- All software should be installed, configured and testing in the ENDE IT infrastructure by the Supplier.
- The supplier will conduct a Software test at contractors headquarter with the presence of an ENDE representative.
- supplier Software specialized team will install all software package.
- The scope of installation work shall include the cost of all labor to be necessary at AMI system site.

3.48.6 System Integration Services

- The provider will install and configure the necessary interfaces to integrate the AMI system with ENDE Enterprise System.
- Contractor Software specialized team will work together ENDE team to do integration test.
- The scope of integration work shall include the cost of all labor necessary in AMI System Site.

3.48.7 Training Services

- The provider will supply the training services according to the requirements defined in section TRAINING.
- The training services will be done on site and not remotely
- The supplier is responsible for all cost associated to the training section.

3.48.8 System Operation Services

- The provider will supply the System operation services according to the requirements defined in section System Maintenance & Support.
- The Operation services will be done on site and not remotely
- The supplier is responsible for all cost associated to the training section.
- The supplier will operate de MCC in the first 6 month after the commissioning.

QUALITY ASSURANCE AND TESTING

A quality assurance program shall be followed and both structured and unstructured tests shall be performed to ensure that the Supplier produces a well-engineered and contractually compliant System.

3.49 QUALITY ASSURANCE PROGRAM

- The Supplier shall submit for approval a program of quality control and inspection procedures to assure that the product during manufacture and on completion complies with the specified requirements. The program shall relate the quality control and inspection activities to the production cycle.
- The Supplier shall retain responsibility for quality control and inspection activities made by his sub-Suppliers and shall indicate on the program, which items are to be sub-contracted.
- The Supplier shall employ documented Quality Assurance (QA) techniques and practices throughout this project.
- The supplier will provide a Quality Control Manual for the installation of the AMI Components.
- This QA program shall cover the preparation of all deliverables, including documentation, meters, computer equipment, implementation services and software.
- The program shall provide for the minimization of defects, the early detection of actual or potential deficiencies, timely and effective corrective action, and a method to track all such deficiencies.
- The Supplier shall provide Purchaser with a copy of the quality assurance plan with the quality assurance standards, policies and procedures.
- The Supplier must maintain the quality assurance plan throughout the duration of the project.

3.50 TEST & INSPECTION

- Purchaser shall be allowed access to the Supplier's facilities during system design, manufacturing and testing and to any facility where meters or software is being produced.

- The Supplier shall provide facilities, equipment, and documentation necessary to complete all inspections and to verify that Meters, modems and Software package is being fabricated and maintained in accordance with the Specification.
- Purchaser shall be allowed to review and verify the functional characteristic of the software at the Supplier's facilities.
- All items (meter and software) to be delivered may be inspected by the Purchaser at the place of the supplier or manufacturer.
- Purchaser shall be allowed to inspect the Supplier's meters and software quality assurance standards, procedures, and records. Documents identified in the approved software quality assurance plan will be inspected to verify that the Supplier has performed the required quality assurance activities.
- The inspection rights shall apply to subcontractors that are developing new software, modems or meters for inclusion in the proposal.
- The proposal must include a plan for the development of the proof testing. The testing main objective is to check the system capacity to execute the different functions in the rougher scenarios as have been required in this document.
- Testing on Site as FAT will be done at total cost of the supplier.
- As part of the testing, the supplier must include a set of tests of the systems security features.

3.50.1 TEST RESPONSIBILITIES

- The Contractor shall at its own expense carry out at the place of manufacture all such tests and inspection to all equipment and software included in the project.
- The Employer will designate a team with until three persons shall be entitled to attend to the FAT tests and/or inspections.
- The Contractor shall bear all costs and expenses incurred in connection with such attendance including, but not limited to, all traveling and board and lodging expenses.
- Both Purchaser and the Supplier shall designate, in writing and prior to the start of the test, a test coordinator. The test coordinators shall:
 - Ensure that the tests are conducted in accordance with the requirements.
 - Have the authority to make binding commitments for their employer such as approvals of test results and scheduling for variance corrections or, as a minimum, to cause such commitments to be expeditiously made.
- Supplier shall be responsible for all site tests.
- The Purchaser shall support the site testing by supplying staff to monitor the tests. Purchaser expects that at least two Supplier staff will be on-site during these tests.
- A portion of the meters and a main function of the software provided must be incorporated in the tests.
- The Supplier shall provide facilities, equipment, and documentation necessary to complete all inspections and to verify that Meters and Software package is being fabricated and maintained in accordance with this Specification.

3.51 TEST DOCUMENTS

- Test plans, procedures, and records shall be provided by the Supplier for all tests to ensure that each test is comprehensive and verifies the proper performance of the elements under test.
- The test plans and test procedures shall emphasize the testing of each functional requirement, checking error conditions, and documenting the simulation techniques used.
- The test plans and test procedures shall be modular to allow individual test segments to be repeated as necessary.
- All test plans and test procedures (standard, modified standard, and custom functions) shall be submitted to Purchaser for approval and shall be subject to the approval process.

3.51.1 Test Plans

The test plans shall describe the overall test process, including the responsibilities of individuals and the documentation of the test results.

The following shall be included in the test plans:

- The schedule for the test.
- The responsibilities of Supplier and Purchaser personnel, including record-keeping assignments.
- Any forms to be completed as part of the tests and the instructions for completing the forms.
- Procedures for monitoring, correcting, and testing variances.
- Procedures for controlling and documenting all changes made to the hardware and software after the start of testing.
- The Supplier shall provide a detailed system test schedule that is consistent with project phasing.
- The test schedule shall cover all aspects and components of the elements in the proposal, including backup modes of operation, full integrated operation and engineering.
- The detailed test schedule shall be subject to Purchaser approval.

3.51.2 Test Procedures

The test procedures shall describe the methods and processes to be followed in testing each element. The test procedures shall include the following items:

- The name of the function to be tested.
- A list of test segments to be performed and a description of the purpose of each test segment.
- The set-up and conditions for each segment, including descriptions of the test equipment and data to be supplied by the Supplier and by Purchaser.
- Descriptions of the techniques and scenarios to be used to simulate system field inputs and controlled equipment.
- Step-by-step descriptions of each test segment, including the inputs and user actions for each test step.

- Forms for the recording of test results.
- The expected results for each segment, including pass/fail criteria.

3.51.3 Test Completion

A test shall be considered to be successfully completed only when:

- All errors and bad functionalities have been resolved to the satisfaction of Purchaser.
- All test transactions have been done successfully and the data and meter function is validating with a positive result by the purchaser.
- Purchaser acknowledges, in writing, successful completion of the test.

3.51.4 Test Suspension

If Purchaser believes, at any time, that the quantity or severity of errors merits suspension of any or all testing, the test shall be halted, remedial work shall be performed, and the affected tests shall be repeated from the beginning.

The repeat of the test shall be scheduled for a date and time agreed upon by both the Supplier and Purchaser.

3.52 METER ON SITE TEST

ENDE reserves the right to carry out all the functional tests as detailed in the Technical Specifications of the meters and to verify the conformity of the supplies by carrying out the tests in accordance with the IEC 62058-11-31 standard. / NM 06.4.024. ENDE reserves the right to carry out such tests either by an accredited laboratory or in the manufacturer's laboratory.

In order to enable ENDE to carry out all the necessary tests to verify the conformity of the meters with the standard specifications each bidder must attach to his proposal the following samples:

- Two (2) samples of each type of meter offered;
- Each meter sample must be provided with the proposed corresponding communication modem, cables and software for programming;

The aforementioned samples must be provided before the deadline for the submission of tenders. Failure to comply with this provision will result in the rejection of the corresponding offer.

The lack or insufficiency of the samples and the software required will lead to the rejection of the corresponding offer.

At the end of the judging phase of this invitation to tender, the samples relating to unsuccessful tenders will be returned to the corresponding tenderers upon their request.

3.53 FACTORY ACCEPTANCE TEST (FAT)

- The FAT test must include the complete solution package (equipment and software).
- Factory tests shall be made according to the applicable IEC Standards or as specified or according to standards approved by the Purchaser.
- The Purchaser shall be at liberty to demand any additional testing at the manufacturer's place, at site or elsewhere in order to verify that the equipment complies with the conditions of the Specifications.
- A test program shall be submitted to the Purchaser for approval at least 1 month ahead of the commencement of testing. It is the Supplier's responsibility to advise the purchaser when equipment and materials are available for inspection, at least 1 month in advance.
- Contractor will be responsible of all expenses to cover the FAT ensure that the tests are conducted in accordance with the requirements.

3.54 LOTS ON SITE METERS ACCEPTANCE TEST

The Meter On-Site tests shall comprise the same as the FAT routine test and will be carried out on randomly selected samples to each lot of meters delivered. The sample quantity shall be picked up at discretion of the Utility.

In case that meters fail to approve the test, the complete lot will be disqualified and the provider must replace the total lot of meters by a new lot. All cost associate to the change off meters will be under the responsibility of the supplier.

3.55 PRE-DEPLOYMENT TEST

- This test will be conducted with the successful bidder (Contractor) with the objective of testing the communication of the meters with the country telco operator(s).
- This test will be place in the contractor facilities in the city of Luanda
- This test will be executed previously to the start of the meter installations.
- This test will condition the second shipment of meters.
- The test will be done according to the following conditions and characteristics:
 - The contractor shall prepare a small meter network in his physical installation
 - The contractor shall prepare a MRS/HES system in his offices.
 - The contractor should install a communication APN with the TELCO provider in the ENDE datacenter located in its Headquarters Building;
 - The total of meters to be tested are Ten (10).
- Verify the two ways meter communication using cellular network and APN services from TELCOs
- Meter reading on scheduling basis and on-demand read.

The lack or insufficiency of the meters and the software required and failure to comply with this test will stop the deployment of the first meter Lot and the shipment of the second meter lot.

3.56 ON SITE SYSTEM ACCEPTANCE TEST (OSAT)

3.56.1 Goals of the OSAT

The goal of the OSAT is to confirm by ENDE (as “witness”) to SUPPLIER (as “test executor”) the completeness of the equipment delivered, software implementation and main functionalities and status of services and the fulfillment of the criteria written in the contract and its annexes.

System functionalities will be tested with real cases on a selection of installation and more specifically with the first 5% of meters (OSAT1). Additional OSATs (OSAT2 (15%), OSAT3 (25%), OSAT4 (40%)) will be done during the process of meter installations to be sure that system functionalities are not lost because new meters are added and a final (OSATF) will be done once the 100% of meters were installed.

- This test will be conducted by the contractor in collaboration with the ENDE team.
- This test will be executed during the project deployment after each of the following quantity of on field meter installation: 5%, 15%, 25%, 40% and 100% of total meters in the project.
- The supplier must conduct a complete and integrate system On-Site Acceptance Test which include:
- Testing of all components of the System (meter, MRS/HES, MDM and third-party software)
- Testing of master data load and transactional data download
- Testing of the meter remote operations like:
 - Meter data acquisition
 - VEE function
 - Any others functionality and features of the system
- Security test.
- Performance test
- Interface Test (Batch and/or On-line).

The Acceptance test must be considered a Payment Milestone and Project performance conditioning. In case that the supplier fail to execute successfully any of the acceptance test included during the Project Plan Definition, ENDE should have the option to stop the pending meters shipment, suspend the pending payment or any other task execution until the test was successful. After a reasonable time without correction of the test error the ENDE can cancel de contract.

3.56.2 Supplier Responsibilities

Before the start of the System On-site acceptance test the Supplier must complete the following task:

- Successful execution of Pre-Deployment Test

- Successful execution of Meters On-Site test
- Delivery the quantity of meter required for the test
- Delivery of Hand Held
- Delivery of CT/VT equipment
- Delivery the Meter Box necessary for the test
- Installation and configuration of the remote reading software
- Installation and configuration of the MDM software
- Installation and configuration of basic interfaces between MRS/HES-MDM-SAP/Billing systems.
- Creation of the facility for Upload to AMI System the data from purchaser existing system.
- Creation of the facility download meter from AMI System to be load on the purchaser billing system
- Installation of the percentage of meters required for the test, including meter box, CT or CT/VT when is necessary.

3.56.2.1 Functional Test

- Effective communication of Meter and MRS/HES system.
- Verification of Meter data acquisition in schedule basis or on-demand
- Verification of meter special alarm like: meter box open, phase disconnection, etc.
- Verification of proper data acquisition, processing, and storage from appropriate sources
- Verification of the VEE process correct execution for data loaded from meters.
- Verification of the interface between MDM - MRS/HES - SAP/Billing system.
- Verification of all user interface functions including login validation when isolated.
- Verification of communications maintenance capabilities including diagnostics, communications maintenance.
- Verification of the redundancy and failure recovery schemes of the System for the MRS/HES and MDM.
- Verification of the proper response of the System to at least the following abnormal situations:
 - Loss and restoration of processors and servers.
 - Loss and restoration of communication links.
 - Loss and restart of a complete software.
 - Loss and restoration of external subsystems.
 - Detection of and recovery from communication errors (simulated by Supplier).
- Verification of the backup execution.
- Review and explanation of system error logs and unexpected alarms generated during the test.
- Verification of the special functionality of the system like:
 - TOU tariff capability
 - Meter Power Limit violation
 - Hand Held operation
 - Any other features as was required in this document.

- Verification and reporting of the events registered by meter like are:
 - Loss and restoration of the Energy
 - Abnormal Voltage condition
 - Abnormal Harmonic Distortion

3.56.2.2 Performance Test

- **Reliability of data transfer from Meter to MRS/HES**

The reliability of data transfer will be calculated using only the first-time typing success. The supplier shall show number consistently in the 90%-95% range of successful code charge in the first attempt.

- With the second time typing the system must achieve 98% successes.

- **Reliability of data transfer and VEE process**

- The data must be charged, validated and estimated in a gap time of two (2) hours.

3.56.3 User Acceptance Test

The UAT is a subset of OSAT and the goal is that MCC users (Operator and Analyst) tests the GUI interface and verify the data quality, reporting and any other functionality.

3.57 MODIFICATIONS TO SYSTEM COMPONENTS DURING TESTING

The Supplier shall carefully control the test and operation environment so that all changes can be readily identified and that any changes installed for any purpose can be removed and the previous test environment restored.

Purchaser shall have the right to suspend testing, to revert to a previous version of any software or hardware, and to restart any testing previously performed if, in its opinion, changes have been made to the system under test without authorization.

TRAINING

The Supplier shall prepare and deliver a comprehensive training program on the operation and maintenance of Meter Programing Tool, Meter, MRS/HES and MDM.

Purchaser shall be permitted to make video and audio recordings of all training classes.

All training will take place at the level of the premises of the Buyer with the exception of training requiring specific logistics for training purposes. For training outside the premises of Utility, all costs (logistics, premises, catering participants.) will be borne by the Supplier.

- The proposal shall include the methodology of training clearly defined.
- The training project schedule must be supplied.
- The training must cover all elements of the solution offered.

3.58 TRAINING DOCUMENTS

The Supplier shall prepare a training plan in consultation with Purchaser.

The Supplier shall also be responsible for the preparation and production of all course material.

3.58.1 Training Plan

- The training plan shall support and be consistent with the implementation schedule.
- The Supplier shall define the training plan in a logical sequence of courses so that training on base system elements (such as the meter, modem, operating system, languages, database, and displays) is given before the training for specific elements (such as applications).
- The training program shall take into account the knowledge required by members of Purchaser project team in order to participate in the project.
- The training plan shall list each course to be taken, the dates for the course, and the expected number of students to attend.
- Training shall be scheduled so that there will not be long periods of time between training and the use of the acquired knowledge.
- Training Plan will include:
- Meter training to qualify Purchaser personnel to perform maintenance and perform diagnostic tests on the meters and communications equipment.
- Operator training to enable Purchaser Operators to develop the skills required for performing their duties in the new system environment and shall include comprehensive training on the features of the MRS/HES and MDM User Interface.
- System administration training to enable Purchaser personnel to adequately administrate the software configuration environment including system optimisation, parameter tuning, definition and control of user profiles, implementation and testing of new software versions, and system configuration management including the interpretation of configuration failure alarms and diagnostic of abnormal situations, the ability to perform the reconfiguration actions when failures occur and for systems expansions, etc.
- General User and Operator training shall be provided to prepare the Purchasers staff for operation of the Software.

3.58.2 Training coverages

The training should cover at least the following macro-themes:

- Training on all meter type offered;
- Training on communication modems;
- Training on Handheld Unit;
- Training on the MRS/HES System;
- Training on the MDM System.

3.58.3 Course Descriptions

Course descriptions shall be included with the training plan that shall provide the following information for each course included in the training plan:

- The course name (and number if applicable).
- A brief description of the course.
- A description of the intended audience, goals and objectives for the course.
- A description of the relation of the course to others in the training plan
- The duration of the course.
- A list of any prerequisite training or experience expected of the students.

3.58.4 Course Material

- The Supplier shall provide all necessary training materials, including course manuals and reference materials. These materials shall be provided in electronic format and also printed copies as below.
- Each trainee shall receive individual copies of the training materials and one additional set shall be provided for Purchaser archives. Each trainee shall have available individual computer facilities for visualisation and data input.
- Class materials, including documents sent before the training classes and class handouts, shall become the property of Purchaser.
- All documents and course materials and presentations regarding the General User and Operator Training and Database Building shall be supported in Portuguese.

3.59 INSTRUCTOR QUALIFICATION

- Course instructors shall have demonstrated technical competence in the subject and previous instructing experience in that course.
- The Bidders shall submit Qualification and experience of proposed Trainers.
- Where practical, subcontractors shall deliver training on their products directly. However, the Supplier shall remain responsible for selecting these courses, coordinating their delivery, and ensuring that all training objectives are met.

3.60 TRAINING LIST

- The training curriculum presented in this section is intended to describe the contents of the training when viewed as a whole. The subjects covered by individual courses may differ as long as the overall objectives are satisfied.

3.60.1 System Overview

- The system overview workshop shall be the first course in the training sequence for each main element of the proposal (Meter, MRS/HES, MDM, Hand Held, etc.).
- This class shall be scheduled in advance of the project start and shall provide ample opportunity for free interchange between the Supplier and Purchaser personnel.

3.60.2 Database Building and Administration

- The Database Administration course shall be designed to train Purchaser personnel in the administration and maintenance of the source database. The courses shall teach students how to prepare the input data to be incorporated to the MRS/HES and MDM operating environment, to build databases and displays and, to prepare the database administrator to maintain and modify the database and its structures.

At the end of this course, participants shall be able to:

- To know and maintain the existing database structures.
- To know and utilize the visualization and editing tools.
- To maintain the system's data dictionary and to implement changes to the database structure.
- To maintain the mechanisms of database synchronization.
- Understand the Supplier's terminology.
- Perform data entry and data validation.
- Produce database reports.
- Identify the types of data needed.
- Create a new data source.

3.60.3 Data Engineering Workshops

The objectives of the workshops are to develop the rules base for the Supplier to undertake the development of the database including the importation of the data from the various existing systems source data bases.

The workshops shall be scheduled after the databases building courses.

Topics to be covered in the data engineering workshops include the following:

- The most effective and expeditious way to move data from the existing system to and from the MRS/HES and MDM. Identification of the data, the proper source and times to be interchanged and the best procedure are main target of this Workshops.
- Discussion of application-specific modelling techniques.
- Discussions of the different approaches to storing and retrieving historical data.
- System Administration
- The Operating System (OS) administration course shall be designed to train the students in managing and maintaining MRS/HES and MDM at the operating system level.
- At the end of these courses, participants shall be able to:
- Manage and administer networks.
- Backup and restore all programs and data.
- Add servers, workstations, and peripherals to MRS/HES and MDM.
- Add users to MRS/HES and MDM, manage user accounts and permissions.
- Update the operating system software.
- Manage security configurations and updates.
- Configure requirements to allow remote monitoring of services, facilities and availabilities.
- Start up and shut down the MRS/HES and MDM and their components.
- Interpret and react to messages generated by error-monitoring functions and logs.

- Test field device and communication links.
- Use procedures for altering and replacing the operations database.
- Identify procedures for using diagnostics.
- Describe the backup functions required for normal maintenance.
- Retrieve and analyses system logs.
- Identify and manage in detail the local failover procedures and parameters.
- Security concepts.

3.60.4 Programming in the System Environment

This course shall instruct the students on the necessary skills for custom developing into the MRS/HES and MDM software environment and shall be oriented to the ENDE software engineers responsible for maintaining, expanding, or adding new functions.

At the end of this course, the participant shall be able to:

- Use and access to the systems level programming interfaces to facilitate the development of software by Purchaser.
- Describe the directory structure and locate applications and all supporting functions and software structures.
- Design and implement program data structures.
- Add new attributes to existing data structures.
- Use the trace and debug utilities.
- Describe the inter-program communication process.

3.60.5 General User and Operator Training

The objective of this course is to train Purchaser staff in preparation for development of training courses for Operators and external users.

This training course shall include:

- A system overview that presents MRS/HES and MDM configurations, applications, capabilities, and performance concepts.
- General operating procedures that cover basic user interface features, display and report capabilities, log-on steps, areas of jurisdiction, user access restrictions, error messages, etc.
- Use of real-time and study applications under a full range of typical operating conditions, including purpose, theory of operation, and the user interface features that support each application.

3.60.6 Develop of Interface System Implementation

This course shall instruct the students on the necessary skills for custom developing interfaces into the MRS/HES and MDM System and shall be oriented to the ENDE software engineers responsible for maintaining, expanding, or adding new functions.

At the end of this course, the participant shall be able to:

- Access Supplier and Subcontractor system level programming interfaces to facilitate the development of software by Purchaser.
- Use Supplier- and Subcontractor-provided programming interfaces.
- Plan the implementation of a new software function.

3.60.7 Meter Operator Training

The objective of this course is to train Purchaser staff in preparation for programming and configuring the meter also install in different conditions.

This training course shall include:

- Meter programming and configuration.
- On Field installation of Meter
- Meter testing
- Meter error detection and correction.
- Handheld Unit operation.

3.60.8 On-the-job Training

The On-the-job Training – OJT – will procure that the Purchaser staff work with the Supplier Staff in the development of the task and activities included in the project. The OJT will help to the supplier to provide a transfer of knowledge to the ENDE team in a reasonable time frame. The supplier shall support two streams of OJT training being Hardware and Applications as follows:

- Meters Installation and Inspections
- Applications:
 - Development and Integration of Purchaser Applications to the Supplier applications.
 - Historical database maintenance and application development.

The Purchaser staff will also be involved in system integration and testing and shall be trained to utilise the Supplier's standard software development, documentation, and quality assurance practices.

3.61 LOCATION AND NUMBER OF ATTENDANTS

The Supplier must present a details training course list including the course attendants number. ENDE will be responsible of the place location of training.

3.62 ADDITIONAL COURSES

The Supplier shall be responsible for the cost of additional courses and the travel and living expenses of students attending the courses where the need for such training is attributed to any of the following conditions:

- Significant delays in the project schedule caused by the Supplier.

- Changes to any software deemed necessary during the project to meet the requirements of this Bid.

PROJECT MANAGEMENT

3.63 PROJECT ORGANIZATION

The primary points of contact between Purchaser and the Supplier shall be their respective project managers.

3.63.1 Purchaser's Project Manager

Purchaser's project manager shall be responsible for representing Purchaser's interests throughout the project.

The project manager may also change such assignments from time to time. Supplier shall be formally notified of such actions by Purchaser in writing.

All correspondence with Purchaser shall be addressed to Purchaser project manager.

3.63.2 The Supplier's Project (Contract) Manager and Project Personnel

The Supplier's project manager shall not be removed or replaced without the approval of Purchaser except for conditions outside the control of the Supplier.

The project shall be staffed with a core project team. Additional personnel shall be assigned to work under the direction of the core team as required to effectively implement the solution. Core project team members shall have previous experience in a similar position on at least one other project that is similar in size and scope to this project.

3.64 PROJECT MANAGEMENT DOCUMENTS

3.64.1 General Plan

A Project general plan shall be submitted with the technical proposal.

The plan shall describe, in general way, the Supplier's plan for the submittal of all equipment, software and services including estimated time for each major task on the project.

The plan shall be subject to Purchaser approval.

3.64.2 Project Meetings, Agendas, and Minutes

Project meetings shall be held to review project progress, to ensure correct interpretation of the contract, to review technical and commercial issues, and to maintain co-ordination between Purchaser and Supplier.

Meetings shall be held at appropriate times, but shall be scheduled every month. The initial Kick-off Meeting must be done 15 days after contract signed.

Each meeting must be sanctioned by a report to be prepared by the Supplier and approval by purchaser.

3.64.3 Project Plan

Supplier shall provide as a component of the Kick-off meeting a preliminary project which will include all Quality Assurance Plan and Installation and Implementation tasks. This Plan, once approved in a final version, must be maintained with periodic updates included with the project progress reports.

At a minimum, the plan shall include the following:

- Methodology and Standards.
- Project Approach.
- Staffing plan (including resources, by role, required for both Purchaser and the Supplier).
- General description of project deliverables (references to the approved Hardware and Software list of deliverables).
- Project assumptions and potential risks.
- Support plans
- Supplier's subcontract management plan.
- Field Installation Support plan.
- A detailed implementation schedule or chronogram.
- The schedule shall include the following items, considering the phases of the implementation:
 - Hardware procurement, integration, and testing.
 - Delivery dates for Purchaser-furnished data, interface equipment, and software.
 - Software development on a per-function or per-interface basis.
 - Software unit testing.
 - Subsystem integration and testing.
 - Interface testing.
 - Preparation of test plans and procedures.
 - Variance correction and retest.
- The training and documentation schedules may be maintained outside the implementation schedule.
- The Supplier shall use the Microsoft Project application program to maintain the project schedule.
- Schedule monitoring shall be based on a comparison of completed tasks versus scheduled tasks and estimation of the required effort to complete the remaining tasks.

3.64.4 Project Management

3.64.4.1 Inception Report

In order to ensure the better execution of the proposed project plan the bidder shall furnish an inception report within 30 days of awarding the contract. The inception report shall contain the following:

- Detailed list of the subcontractor and personnel to be deployed to execute the contract
- Clearly spell-out the obligations to be executed by each part during the project execution (RACI matrix)
- Detailed methodology to be used for the delivery of the services including a master plan with all activities included.
- Detailed methodology to be used for the delivery of equipment including transportation method, logistic, etc.
- Detailed Functional design & specification of the ICT's equipment to be installed at every location.
- Break up of total time schedule for completion of supply and services in Gantt chart.
- The Gantt chart shall include milestone of approval of activities and resources
- Testing procedure as per the relevant clause of the specifications
- Detailed methodology of Training system
- Quality assurance program and security for equipment installation

During the elaboration time of the Inception Report, the contractor will visit ENDE facilities and will meet with ENDE representatives and designated project manager to discuss the main details of the project scope and adjust any technical point in reference to the project develop and the tasks to.

3.64.4.2 Project Progress Report

- A project progress report shall be prepared by the Supplier and sent to Purchaser each month.
- The progress report shall be submitted to Purchaser project manager no later than the 10th calendar day of each next month.
- The progress report shall include a general assessment of the progress on the project.
- The report shall include schedule variance information.
- The report shall identify unresolved contract and technical issues.
- The report shall have also a list of action items.
- The report must also identify risks that may cause deviations from the schedule;
- The report must also include a list of corrective actions to correct any deviations and risks.
- The Supplier must also attach to the Project Progress Report the updated Project Plan.

3.64.4.3 Project Correspondence

All requests and transmissions of information between the parties shall be made in writing, and shall be documented with letters of transmittal. All correspondence from each party shall be dated (with the date of transmittal, not the date of writing) and uniquely numbered.

Purchaser and the Supplier shall agree on official e-mails addresses for the project on both sides.

SYSTEM MAINTENANCE AND SUPPORT

3.65 SCOPE OF SUPPLY

The Support program is comprised of a set of **maintenance and support** intended to maintain the AMI System in adequate operational conditions and technologically updated along its entire life cycle. This strategy and the services as well as the conditions are detailed later in this section.

3.66 GENERAL REQUIREMENTS

Responsibility and requirements for the maintenance and evolution services of the System software will be consistent during System lifecycle (including renovation). Besides the basic responsibilities which will apply to the whole period, additional requirements shall be applied to each specific service, as defined below.

The Supplier shall be responsible for the maintenance services applied to all supplied software in compliance with the SLA Appendix A from the start of the project until the last day under Warranty period.

If at any time, the Supplier's technical support is not effectively resolving a problem according to the SLA, Purchaser may request the Supplier's staff or staff from the OEM or Third-Party software provider to be dispatched to the Purchaser's facility.

The Supplier's technical team shall be at the Purchaser's facility within 48 hours of Purchaser request to provide hands-on support towards the problem resolution. During all the contract period whenever maintenance is rendered, Purchaser shall not be responsible for any additional expenses connected to the technical support related to system maintenance and correction services, including travel expenses.

The Supplier shall maintain in Country, installation and maintenance support services with appropriate and qualified teams for the migration, test, maintenance and support activities until Warranty period for goods and services ended. This requirement can be met directly by the Supplier facilities and staff or by a qualified subcontractor previously approved by Purchaser.

3.67 SOFTWARE MAINTENANCE & EVOLUTION SERVICES

The Software maintenance & evolution services are required to maintain the AMI Software package in adequate operational conditions and technologically updated.

3.67.1 Deliverable Version

The delivered software shall be the latest version certified to execute on the Purchaser platform. In no event shall any third-party software be more than one version beyond the current version. Prior to the procurement of software, the Supplier shall submit to Purchaser a complete updated list of all third party software with a statement of the respective software lifecycle supporting this requirement.

3.67.2 Software Maintenance Services

Software Maintenance services are defined as the Supplier and Third-Party software maintenance interventions, replacements, modifications, fixes, patches, updates that shall ensure that the system continues to operate according to the contracted requirements. These services shall include corrective actions that are those that arise as a consequence of system errors, failures, vulnerabilities, performance or operational shortfall. The Services shall be subject to the SLA outlined in Appendix A.

These services shall be provided as part of the contracted Warranty services and available as an option as a part of a Maintenance & Support Service Agreement that would begin after the end of the Warranty period.

The term “software” shall include all firmware and software delivered under this Contract, as well as the associated configuration files, interface developed, installation kits, release media, documentation, and support media such as on-line help facilities and maintenance tools.

This maintenance may be performed by a maintenance contract with Third Parties or by Supplier staff, previously approved by Purchaser. The actions of other parties do not exempt the Supplier on any responsibility regarding maintenance as specified in the Technical Specification including the requirements in Appendix A.

Regarding Third Party software such as the operational systems (Windows, Unix AIX), Database Management System (Oracle, MS/SQL Server) and other similar software, the Supplier shall establish a maintenance support and evolution agreement with the Third-Party software vendors with adequate service levels according to the requirement of Appendix A as specified in this document. At the appropriate time the Supplier shall demonstrate to Purchaser that these agreements are in place. Purchaser may at its discretion opt to have such software support and evolution agreements directly with the Third Party vendors. In case that third party software was part of the base solution the support agreement presented can be between the Supplier and the Manufacturer. For any other software the support agreement must be presented at ENDE name.

In case that the customization was done by supplier, this shall guarantee portability between customized software and new releases of standard software.

The Supplier shall maintain an incident diagnostics and evaluation service that will support Purchaser in the system maintenance activities. A log of all events and maintenance actions, assigned personnel, as well as time relevant information i.e. expected solution time, shall be maintained. A web supported tool shall be maintained by the Supplier for this purpose. Authorized personnel shall have access to this site.

Purchaser will be responsible for the first level support of software, except during the time of System Operation Services, and for notifying the Supplier of any problem.

The Purchaser responsibility is limited to the performance of operational and maintenance documented procedures explicitly specified within the System Maintenance manual. The actions of Purchaser teams do not exempt the Supplier of any responsibility for software maintenance in compliance with the SLA and other requirements defined in the Contract. These procedures shall be part of the training as per the Training section in this Specification and the Contract.

While the MRS/HES and MDM systems are in operation the Supplier shall maintain the following maintenance support services complying all terms and conditions set forth in Appendix A:

- Help Desk support for the MRS/HES and MDM with 24/7 Hot-Line Service access. English Language.
- A track record of response times to attend Purchaser requests and the response time to replenish equipment spare parts shall be maintained.
- The Supplier shall comply with all terms and conditions set forth in Appendix A.
- The remote access costs referring to telecommunications are at the expenses of the Supplier.
- All travel expenses for maintenance services shall be the responsibility of the Supplier.
- Implementation of the patches and corrections provided by the manufacturers of the software that compose the environment of the MRS/HES and MDM;
- Installation of new versions and releases, including their analysis, their suitability for the use in the processes adopted by the Utility, their installation and follow up of the support activities, object of the contracts of maintenance of the mentioned software;
- Troubleshooting of hardware, software, network, and other operating systems for servers and workstations that may be related with the MRS/HES and MDM.

3.67.3 Software Evolution

The Supplier shall monitor all updates to software that are released during the maintenance period, and shall advise Purchaser as to the applicability of the updates to the delivered software.

Purchaser shall have rights of use for all new releases of the Baseline software products and other system software versions including Third Parties for those licensed applications, under the Software Maintenance agreement. This includes the Baseline and other applications executable, database, release notes, documentation and support. It also includes access to updates, patches and fixes to those licensed applications.

Purchaser shall receive the licenses and media for these new versions (updates and upgrades) of the Supplier and Third-Party software, and will have the right to install in the Software such new releases of the acquired system and applications. The new releases / versions that are considered relevant will be installed in the System with the support of the Supplier under the Maintenance and Support Services Agreement.

The Supplier shall provide with regularity system update and upgrade – which are conceived primarily as a continuous evolution process based on Supplier's system baseline evolutions and Third-Party software (new releases and versions). Purchaser will contract these software assurance services under the understanding that the Supplier will assume the obligation to continually evolve its baseline system.

The Supplier shall provide summaries of all changes made to software, including but not limited to security updates, performed during the maintenance period of support. These summaries shall describe the problem and solution for any maintenance action performed.

The Supplier shall routinely update the MRS/HES/MDM software package to incorporate any new versions of Third-Party software in order to guarantee that at any given time the version of a Third-Party software installed in the system is covered by OEM support.

3.68 Warranty

The Supplier shall warrant that the Purchaser's System, including all information technologies, materials, and other goods supplied and services provided, shall be free from defects in the design, engineering, materials, and workmanship that prevent the Software and any of their components from fulfilling the technical requirements or that limit in a material fashion the performance, reliability, or extensibility of the System and/or Subsystems.

The Supplier shall also warrant that the equipment, materials, and other goods supplied under the Contract will be new, unused, and incorporate all recent improvements in design that materially affect the MRS/HES and MDM' ability to fulfil the technical requirements.

The Supplier guarantees that, once Acceptance Test have been executed and the Certificate has been issued, these represent a complete, integrated solution to the Purchaser's requirements set forth in the Contract.

If, for reasons attributable to the Supplier, the software does not conform to the Technical requirements defined in the Contract or does not conform to any other aspects of the Contract,

the Supplier shall at its cost and expense make such corrections, changes, modifications, and/or additions to the System as may be necessary to conform to the Requirements and meet all functional and performance standards. The Supplier shall notify Purchaser upon completion of the necessary corrections, changes, modifications, and/or additions and shall request Purchaser to repeat the Acceptance Tests until the software achieves acceptance.

3.68.1 Warranty Period for System Implementation Services

“Warranty Period” means the period of validity of the warranties given by the Supplier as part of the project implementation beginning at the date of final acceptance of the system, when the Acceptance Test Certificate (AC) is issued by Purchaser. During this period the Supplier is responsible for defects with respect to the System (or the relevant Subsystem[s]).

The Warranty Period is one (1) year for System Implementation Services.

During the Warranty Period, the Supplier must begin the work necessary to remedy defects or damage within the timeframe.

During the warranty period, the Supplier will support the Maintenance Services applied to all software provided in accordance with the SLA requirements detailed in the SLA section (3.78).

3.68.2 Warranty Period for Goods (Hardware and Software)

“Warranty Period” for goods means the period of validity of the warranties given by the manufacturer to the equipment and software delivered in the project, including the Maintenance & Support Services as was defined previously.

Warranty Period for goods is required according to the following list:

- Warranty Period for Meter is three (3) years
- Warranty Period for Modems is one (1) year
- Warranty Period for Meter Battery is three (3) years
- Warranty Period for CT and CT/VT is one (1) year
- Warranty Period for Hand Held Unit is three (3) years
- Warranty Period for ICT Equipment is three (3) years
- Warranty Period for MRS/HES is one (1) year
- Warranty Period for MDM is one (1) year
- Warranty Period for all other software package is one (1) year

During the warranty period, the Supplier will support the Maintenance & support Services applied to all equipment and software provided in accordance with the SLA requirements detailed in the SLA section (3.78). In order to do that the supplier will maintain a small inventory of replacement part in his facility. The specify parts and quantity will be discussed and agreed during the Inception Report Elaboration.

If the AMI System or any Subsystem cannot be used or has any critical function unavailable by reason of defects, exceeding the time period allowed in the SLA, the corresponding maintenance contract penalties shall apply.

3.68.3 Maintenance service after Warranty

The Supplier shall offer software maintenance services after the end of the Warranty period, under a separate Maintenance & Support Service Agreement, and conforming with the requirements in Appendix A.

The maintenance & support service agreement will be by two additional years after end of warranty period and will be supported directly from software manufacturer.

All technical requirements and considerations as above referred for the Warranty period shall also apply to the Maintenance & Support Services Agreement.

Each software shall be separately accounted in the Software Maintenance agreement. The offers will be done on an annual basis.

3.69 SYSTEM SECURITY FOR MAINTENANCE

3.69.1 Security of Remote Access for Maintenance

All access from Supplier's facilities or Supplier's staff to Purchaser's for the purpose of maintenance shall be permitted during the Contract period and not to any component of the on-line production system. The Purchaser may authorise Supplier staff to access the real time environment purely on an as needs basis and under strict monitoring and control.

Such access shall be subject to the security requirements for remote maintenance access.

All actions performed remotely shall be subject to audit trail reporting and adhere to Purchaser software version and configuration control procedures.

The Supplier shall ask for permission for any remote access connection which shall be previously authorized by Purchaser.

Purchaser will have the right to block the remote access to the Supplier without previous advice if so necessary. In such case the Supplier shall send a maintenance team to the system site as needed.

3.70 OPERATION SUPPORT SERVICES

After final System acceptance test the supplier will support the ENDE team in the day-to-day operation by a period of 6 months.

- The services will be On-Site.
- The Supplier Team capacity shall have the following areas of expertise: MDM and MRS/HES software operation, Database administration, software and interface developing, telecommunication and networking)
- The minimum team for the local on-site support will be four (4) technicians.
- The supplier will be responsible of:

- Operate day to day the AMI system and guarantee the performance and reliability.
- Monitoring every components verifying the correct execution of all process defined and configured in the AMI System.
- Supporting the ENDE internal team and bring them the facilities to do possible the execution of the MCC operational and business process.
- Correcting all system errors.
- Updating of the software package in case new patches or version have released in the market.
- Developing reports and customize any function required by the MCC team to guarantee the exploitation of the system Data and functions.
- Training of the Job. Transfer the "best practice" for the system operation to the ENDE operation team.
- Training of the Job. Transfer the "best practice" for the system administration to the ENDE administration team.

PURCHASER RESPONSIBILITIES

3.71 GENERAL

Purchaser will be responsible for the following:

- Providing an expert Program Manager to support the project execution and to be a Counterpart of the Contractor Program Manager.
- Providing communications links to connect to the System LAN and WAN.
- Providing communications links to connect the MRS/HES to the Meters.
- Providing the network configuration and parameters for the addition of the AMI system to the existing ENDE networking.
- Reviewing and approving project deliverables.
- Reviewing and approving testing plan
- Providing detailed definitions of the existing databases containing the existing metering data to be imported to the MRS/HES and MDM System in Excel format.
- Providing documentation, interface details, engineering drawings, and schematic diagrams of systems to be directly interfaced with MRS/HES and MDM system.
- Providing the Environment for Interface development and testing.
- Providing the SAP/Billing system experts for web services customization
- Providing the SAP/Billing system experts to support the integration develop and Test.
- Providing the SAP/Billing Webservices for the interfaces.
- Working together with the Supplier to develop interface between supplied software and SAP/Billing Application
- Working with the Supplier to develop interface between supplied software and Purchaser Applications.
- Supervise the premises inspection and meter installation to be performed by the Supplier. Share with the Supplier the on-field installation and maintenance support services
- Prepare all documentation and execute all process required by the internal political and procedures to facilitate and control the supplier services execution (premises inspection, meter removal, meter installation, training and system support). Example: generate work order, access authorization, consumer communication, etc.
- Providing facilities as required for on-site training.
- Provide the adequate environment for the equipment installation and maintenance support services.
- Coordinating and supervising the Supplier's work to be performed at Purchaser facilities.
- Participating in site tests and approving test results.
- Providing Purchaser applications test data to Supplier for System testing.
- Providing authorizations and security means for suitable communications facilities, through a connection to the Internet by Purchaser Corporate Network for remote maintenance access.
- Provide the adequate environment for the equipment installation and maintenance support services.

DOCUMENTATION

The bidders must include in the proposal a technical documentation to facilitate the evaluation team the validation of the conformity of the proposed system with the bid requirements.

Must include also the following documents:

- Reference letter from a customer with similar project when the customer certifies that the solution is completed operational at this moment. A small description of the project (Total quantities of remote meter point of the project, Total quantities of point currently reading, frequency of reading, main information in data acquisition)
- The bidders must provide a complete definition of the technology. It must include a diagram of the system and brief resume of the technical process and capabilities. The diagram must show the HA model of the solution.
- The bidders must present the high availability architectures considering redundancy across all components to provide protection and tolerance from computer failures, storage failures, human errors, data corruption, lost writes, system hangs or slowdown, and site disasters
- The bidders must provide a complete definition of the services. It must include a resume of the main persons to be on charge of the project and a complete description of the task and activities of the project.
- The bidders must provide a valid international certification of the following items:
 - Meter manufacturer. ISO 9001 or equivalent.
 - Meter IEC standard compliant
 - Software Manufacturer. CMMI or equivalent
- The bidders must provide a complete description of the guaranties. It must include a detail of the guaranty cover range, the methodology to execute a guaranty, etc., for each component to be provided including the services.
- Complete documentation shall be provided for all equipment and software provided by the Supplier as part of this procurement.
- All documentation shall be in ENGLISH and shall be subject to review and approval by the Purchaser to guarantee an acceptable level of written ENGLISH is delivered.
- The documentation shall describe software, and interfaces and shall cover functionality, testing, configuration, installation, system start up, operations, and maintenance and all other deliverables.
- All documentation shall have an electronic copy and shall be suitable for integration in a web portal.

3.72 METER DOCUMENTATION

New meters must be provided with the corresponding general documentation such as, but not limited to, manufacturer information, product data sheet, hardware and test certificates (if applicable), manual (if applicable) and configuration and maintenance instructions.

In particular, this documentation must consist of at least the following documents:

- Installation guides for meters and modems;
- The technical guide for the commissioning and use of new meters and modems;
- The guide to the technical provisions to be observed at the premise level for the protection of new meters and modems;
- The user's guide for the software for reading and configuring meters and modems;
- Wiring and connection diagrams;
- The catalog of error messages;
- DLMS / COSEM certificate of the meter
- Training materials.

3.73 HANDHELD UNIT DOCUMENTATION

Handheld must be provided with the corresponding general documentation such as, but not limited to, manufacturer information, product data sheet, hardware and test certificates (if applicable), manual (if applicable) and configuration and maintenance instructions.

In particular, this documentation must consist of at least the following documents:

- The user's guide
- Technical & Support Guide
- Configuration Guide

3.74 SOFTWARE DOCUMENTATION

The Supplier must make available to the Purchaser the documentation relating to the software (MRS/HES, MDM and Meter Programming software component) such as, but not limited to, information on the manufacturer, the product data sheet, the manual for user and technician, the operations manual (if applicable) and the maintenance guides.

The system documentation must describe the software and interfaces and must consist of at least the following documents:

- Architecture and sizing files (general and detailed), must include:
 - Logical architecture of the system;
 - Layered system architecture
 - High availability and load balancing solution architecture
 - Database business data model;
 - System settings data model (if the application is configurable):
 - Parameters of field meters with sequential numbering;
 - Numbering ranges parameters;

- Other parameters.
- Physical architecture of the system:
 - Location of database data files;
 - Location of application configuration files and database;
 - Location of executable files, binaries, scripts and others;
 - Location of integration files, XML or other types of interface files with other systems;
 - Location of event log files and database file logs;
 - Location of event logs of batch processes;
 - Location of backup files;
 - Server network configurations (physical or virtual) for database, applications and integration middleware;
 - Connection settings between the web application and the database;
 - Application connection settings and web application servers;

Configurations of communication channels of interfaces with other systems.
- The design and detailed engineering study file of the telecommunications network;
- The study dossier of the global security of the AMI solution;
- The administration and operation manuals of the solution, must include:
 - Procedures for lifting and lowering the system;
 - Procedures for managing event logs, errors and database files;
 - Procedures for verifying and increasing the storage capacity of data filesystems, database log filesystems and event and error logs;
 - Procedures for creating and changing users, access profiles and assigning profiles to users;
 - Procedures for installing and uninstalling the system;
 - Integration
 - Procedures for monitoring event and error logs from interfaces with other systems;
 - Procedures for checking the average time of sending and receiving messages;
 - Procedures for verifying the percentage of messages sent and received successfully.
 - Report Server:
 - Procedures for monitoring data loads to the report server;
 - Procedure for extracting data from the report server through direct queries on the production database servers and historical servers.
 - History Server:
 - Procedures for monitoring old data loads to the history server;
 - Procedures for connecting the report server to the historical database server.
 - Batch Processes:

- Procedure for monitoring batch processes;
 - Procedures for checking the logs of batch processes.
- Disaster Recovery
 - Procedure for activating the disaster recovery site and reactivating the main system after recovery;
 - Procedure to monitor replication to the disaster recovery site;
 - Procedure for checking the replication error logs to the disaster recovery site.
- Load Balance
 - Procedures for activating and deactivating the application's load balance;
 - Procedure for monitoring the load balance;
 - Procedure for checking error logs;
 - Procedure for monitoring system performance:
 - List of sensors and performance thresholds (thresholders) of system elements (Application, Database, Network);
 - List of sensors and thresholds (thresholders) for use of resources in Application, Database, Network servers.
- Overall response time and response time of each system element (Application, Database, Operating System).
- Backup and restore procedures;
- The support plan and the incident management and maintenance procedures with the Supplier;
- Other documents required in these technical specifications.

3.74.1 Additional Documentation

Additional documents should be delivered by the award winner of the bid during the contract negotiation period and during the Inception Report elaboration period such are:

- Inception Report;
- Training materials;
- Technical Reference & Support Guide documentation that will include:
 - File Layout Information showing the file structure of MRS and MDM data files that can be used as a resource for reporting and interface develop.
 - An entity–relationship model and Diagram.

STANDARDS

All products to be delivered by the supplier must be manufacture under ISO 9001 Standards.

3.75 IEC STANDARDS

- IEC 62051 Series - STANDARDS FOR POSTPAID ENERGY METERS
- IEC 62052 Series - STANDARD FOR RULES OF GENERAL REQUIREMENTS, TESTS AND TEST CONDITIONS
 - IEC 62052-11 – General Conditions
 - IEC 62052-21 – Tariff and load control equipment.
- IEC 62053 Series - STANDARD FOR RULES OF STATIC METERS (Electronic) – ACCURACY
 - IEC 62053-21 - Safety requirements.
 - IEC 62053-22 - Particular requirements: static meters for active energy (classes 0.2S and 0.5S).
 - IEC 62053-24 - Particular requirements: static meters for reactive energy (classes 0.5 and 1).
 - IEC 62053-61 – Part 61: power consumption and voltage requirements.
- IEC 62054 Series - RULES FOR STATIC METERS (Electronic) – Tariff and Load Control
- IEC 62056 Series - RULES FOR EXCHANGE OF DATA RATE AND LOAD CONTROL. Including DLMS/COSEM Support
 - IEC 62056-21 Electricity metering: Data exchange for meter reading, tariff and load control- Part 21: Direct local data exchange;
 - IEC 62056-31 Electricity metering: Data exchange for meter reading, tariff and load control - Part 31: Local Area Network data exchange;
 - IEC 62056-61 Electricity metering: Data exchange for meter reading, tariff and load control- Part 61: Object identification system (OBIS).
 - IEC 62056-31: Use of local area networks on twisted pair with carrier signaling
 - IEC 62056-53: DLMS/COSEM application layer
 - IEC 62056-61: Object Identification System (OBIS)
 - IEC 62056-62: COSEM interface classes
 - IEC 62056-69: Mapping between the Common Information Model message profiles (IEC 61968-9) and DLMS/COSEM (IEC 62056) data models and protocols
 - IEC 62056-9-7:2013 Communication profile for TCP-UDP/IP networks
 - Other IEC 62056 parts deal with Electricity metering - Data exchange for meter reading, tariff and load control
- IEC 62057 Series - TEST EQUIPMENT STANDARDS
- IEC 62058 Series - ACCEPTANCE STANDARDS FOR METER INSPECTIONS IEC
 - IEC 62058-3 Acceptance inspection – Part 31: particular requirements for static meters for active energy (classes 0.2s, 0.5s, 1 and 2).
- IEC 62059 Series - RELIABILITY STANDARDS FOR METER (Protection Degree - Testing)

- IEC 60529 (2001) - Degree of protection provided by racks (IP Code).
- IEC 61000-4-30 Electromagnetic compatibility (EMC) – Testing and measurement techniques – Power quality measurement methods.
- IEC-61698 and IEC-61970 CIM standard
 - 61968-9, 61970-301,501 standards.
- IEC 62262 Degrees of protection by racks for electrical equipment against external mechanical impacts (IK code);
- IEC 85 Thermal evaluation and classification of electrical insulation;
- IEC 695-2 Resistance to heat and fire;
- IEC 60439-1 Double insulation;
- IEC 947 Low voltage Circuit Breakers;
- ISO 14782 Plastics – Determination of haze transparent materials.
- IEC 707 and 695-2-1/0.
- IEC 320-C14 (IEC 60320-3) Appliance couplers
- IEC 60439-1 Low-voltage switchgear and control gear assemblies
- IEC 61869-10/15 Instrument Transformers - voltage transformer
- IEC 61869-2/9 Instrument Transformers - current transformers
- IEC EN 61000-4-3 Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test
- IEC EN 61000-4-4 Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test

In case any conflict between standards and this specification, this specification shall govern.

3.76 APPENDIX A. System Maintenance Support Services Requirements

Table 1: Variance Priority Level

Variance Priority Level	Description
Critical	Critical Functions non-operational or unusable. Critical or material impact to the normal operations.
High	Critical Functions operational but without redundancy, and there are no possible circumventing actions.
Medium	<ul style="list-style-type: none"> Functions are operational but with limited functionality. There are no possible circumventing actions to prevent impacts to normal operation. Non critical functions are not operational.
Low	Functions are operational but there are some identified problems that need correction. There are no impacts on normal operation.
SIR	Functions are operational. A change or improvement was identified and requested.

Table 2: Service Quality Levels per Variance Priority Level

Variance Priority Level	Maximum Response time	Maximum Solution time	Guidelines
Critical	2 h	12 h	A schedule for the correction of critical priority variances shall be informed within two (2) hours and it shall be fixed within twelve (12) hours after Purchaser request. After this period the penalty clause will be considered.
High	6 h	1 day	A schedule for the correction of high priority variances shall be informed within six (6) hours and it shall be fixed within one (1) days after Purchaser request. After this period the penalty clause will be considered.
Medium	12 h	72 hours	A schedule for the correction of medium priority variances shall be informed within twelve (12) hours and it shall be fixed at the end of the next 72 hours of Purchaser request. After this period the penalty clause will be considered.
Low	2 working days	10 working days	The schedule for correction of all low variances shall be replied within two working days and it shall be fixed within five working days of Purchaser request. After this period the penalty clause will be considered.
SIR			Purchaser and the Supplier shall establish a mutually agreeable date for the correction.
Spare part replenishment	1 working day	3 weeks	Supplier shall initiate the provisions to replenish the spare part in the following working day after Purchaser notification and shall deliver the spare part within 3 weeks at Purchaser site. After this period the penalty clause will be considered.

Table 3: Table of Scaling Level according to Variance Priority Level

Scaling Level	Maximum Time from Purchaser request per Variance Priority Level			
	Critical	High	Medium	Low
Level 1	Until 4 hours to be solved	Until 8 hours to be solved	Until 24 hours to be solved	Until the end of 2 working day
Level 2	Until 6 hours	Until 12 hours	Until 36 hours	Until the end 4 working days
Level 3	Until 8 hours	Until 16 hours	Until 48 hours	Until the end 6 working days
Level 4	Until 10 hours	Until 20 hours	Until the 60 hours	Until the end 8 working day

After the period time in each Scaling Level is completed, the level shall be increased. The scaling level must be executed automatically by the supplier without purchaser advice.

Level 1: First Supplier Technical Level.

Level 2: Supplier Project Manager/Maintenance Manager scaling level. He/She will be in charge and can be called when the corresponding period in the above table is exceeded and the failure has not been fixed.

Level 3: Supplier General Manager/Superintendent scaling level. He/She will be in charge and can be called when the corresponding period in the above table is exceeded and the failure has not been fixed.

Level 4: Supplier Technical Specialist and Maintenance Manager On-Site level. They will be in charge and must assist in person to the Purchase Team when the corresponding period in the above table is exceeded and the failure has not been fixed.

Note: Failure of the Supplier to meet the contractual terms and conditions will cause the execution of contract penalty clauses.

3.77 APPENDIX B. ENDE's IT Infrastructure

No.	Main Site
1.	<p>Supply of 11 Blade Servers with the following total resources:</p> <ul style="list-style-type: none"> - 22 TB of RAM using RDIMMS (2 TB for each server) with a minimum transfer rate of 2933 MT/s; - 22 CPU with a minimum of 28 COREs for each server, with 2.8GHz; - Connectivity: 10/25/40GbE SFP, 32Gb FC; - KMM (Keyboard, Monitor and Mouse) of 1U.
2.	Provision of VMware VSphere Licenses for 14 CPUs, in addition to the 8 existing ones.
3.	Supply of two Fabric Interconnect and two Switches, for connection of the Chassis to SAN and LAN respectively, in failover and with FC feature. Or even provide Switch with the ability to Fabric Interconnect and at the same time access to LAN, which can be only two.
4.	<p>Supply of two (2) Failover Storages with the following requirements for each:</p> <ul style="list-style-type: none"> - Primary: All flash with a total effective capacity of 600 TB in RAID 5, including deduplication and compression, with a compression and deduplication rate of 3: 1 of the 200 useful TB; - Secondary (Failover): All flash with a total effective capacity of 200 TB in RAID 5, including deduplication and compression, with a compression and deduplication rate of 2: 1 of the 100 useful TB; - Connectivity with at least 8 FC ports and 4 iSCSI ports; FC: 32Gb NVMe-FC, 32/16/8 FC; Ethernet: 25/10/1GbE; - Ports: 25/10/1GbE; - Protocols: iSCSI, NVMe-FC, FC, vVols, SMB, NFS
5.	<p>Supply a Replication and Disaster Recovery Solution for Virtual Machines, for a minimum of 200VMs that offer the following features:</p> <ul style="list-style-type: none"> - Optimized bandwidth replication / WAN - Journaling-snapshot technology for Near Zero RTO and RPO, allowing to revert a VM to any point in time in a pre-configured window.
6.	Provision of a management and monitoring solution for the entire infrastructure, including other manufacturers existing in the ENDE-EP DATA CENTER.
7.	<p>Preparation and supply of all support documentation for the solution including:</p> <ul style="list-style-type: none"> - Documentation of functional specification of the solution (LLD - Low Level Design and HLD - High Level Design); - System Administration and Use Manuals.
8.	<p>Supply backup storage:</p> <ul style="list-style-type: none"> - Storage capacity of 300 TB with NL SAS disk.

9.	Supply of centralized backup software: - Provision of centralized backup management software VEEAM to be connected to the storage backup of previous point.
10	Supply 2 firewalls in failover with the following resources: - Maximum number of interfaces: Up to 24 x 10 Gigabit Ethernet (SFP+) interfaces; up to 8 x 40 Gigabit Ethernet (QSFP+) interfaces with 2 network modules; up to 24 x 1 Gigabit Ethernet ports (SFP) with network modules and fixed ports; - Throughput: minimum 19Gbps. - Maximum VPN Peers: 15.000; - Maximum new connection per second: 210K; - Interfaces: 8xSFP+ on chassis; Optional interfaces: 2xNM's 1/10/40G FTW

No.	Disaster Recovery Site
1.	Supply of 7 Blade Servers with the following total resources: - 14 TB of RAM using RDIMMS (2TB for each server) with a minimum transfer rate of 2933 MT/s; - 14 CPU with a minimum of 28 COREs each, with 2.8 GHz; - Connectivity: 10/25/40GbE SFP; 32Gb FC - KMM (Keyboard, Monitor and Mouse) of 1U.
2.	Supply of VMware VSphere Licenses for 8 CPUs, in addition to the 6 existing ones.
3.	Supply of a Fabric Interconnect and a Switch to connect the Chassis to SAN and LAN respectively, with FC feature. Or even provide Switch with Fabric Interconnect capability and at the same time with LAN access, which can be just one.
4.	Supply of one (1) Storage with the following requirements: - All flash with a total effective capacity of 300 TB in RAID 5, including deduplication and compression, with a compression and deduplication rate of 3:1 out of 100 useful TB; - Connectivity with at least 8 FC ports and 4 iSCSI ports; FC: 32Gb NVMe-FC, 32/16/8 FC; Ethernet: 25/10/1GbE; - Ports: 25/10/1GbE - Protocols: iSCSI, NVMe-FC, FC, vVols, SMB, NFS
5.	Supply a Replication and Disaster Recovery Solution;
6.	Preparation and supply of all documentation supporting the solution including: - Document of functional specification of the solution (LLD - Low Level Design and HLD - High Level Design); - System Use and Administration Manuals.

7	<p>Supply 1 firewalls in failover with the following resources:</p> <ul style="list-style-type: none"> - Maximum number of interfaces: Up to 24 x 10 Gigabit Ethernet (SFP+) interfaces; up to 8 x 40 Gigabit Ethernet (QSFP+) interfaces with 2 network modules; up to 24 x 1 Gigabit Ethernet ports (SFP) with network modules and fixed ports; - Throughput: minimum 19Gbps; - Maximum VPN Peers: 15.000; - Maximum new connection per second: 210K; - Interfaces: 8xSFP+ on chassis; Optional interfaces: 2xNM's 1/10/40G FTW
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Glossary

3G	Third generation of broadband cellular network	MCB	Miniature Circuit Breaker
4G	Fourth generation of broadband cellular network	MCC	Meter Control Center
5G	Fifth generation of broadband cellular network	MD	Maximum Demand
AES	Advanced Encryption Standard	MDAS	Meter Data Acquisition System
AMI	Advanced Metering Infrastructure	MDM	Meter Data Management System
AMR	Automatic Meter Read	MEP	Multipurpose Expansion Port
BIDDER	Goods and Service Provider	MICC	Mineral-Insulated Copper-Clad Cable
BS	Customer Billing System	MRS	Meter Reading System
CEN	Comité Européen de Normalisation	MV	Medium Voltage
CENELEC	Comité Européen de Normalisation Electrotechnique	NIC	Network Interface Card
CIS	Customer Information System	NMS	Network Management System
CMMI	Capability Maturity Model Integration	NTP	Network Time Protocol
CPU	Central Processing Unit	OS	Operating System
CRM	Customer Relationship Management	OSAT	On-Site Acceptance Test
CSI	Computer System Infrastructure	POSD	Point of Service Delivery
CT	Current Transformer	PT	Power Transformer
CUM	Cumulative	PV	Photovoltaic System
DBMS	Database Management System	QA	Quality Assurance
DCU	Data Concentrator Unit	QC	Quality Control
DMS	Distribution Management System	QR	Qualification Requirement
DT	Distribution Transformer	RAM	Random Access Memory
EBS	Enterprise Bus Service	RDBMS	Relational Database Management System
EDGE	Enhanced Data rates for GSM Evolution (2.5G Network based on GSM)	RF	Radio Frequency
ENDE	Electricity Distribution Company	RFB	Request for Bids
EMC	Electromagnetic Compatibility	RFP	Request for Proposals
ENDE	Empresa Nacional de Distribuição de Electricidade	RPO	Recovery Point Objective

ERP	Enterprise Resource Planning System	RPP	Revenue Protection Program
FAT	Factory Acceptance Test	RTC	Real Time Clock
GIS	Geographic Information System	RTO	Recovery Time Objective
GPRS	General Packet Radio Services (2G Network based on GSM)	SAIDI	System Average Interruption Duration Index
GPS	Global Positioning System	SAIFI	System Average Interruption Frequency Index
GSM	Global System for Mobile communications (2G Network)	SAN	Storage Area Network
GUI	Graphical User Interface	SCADA	Supervisory Control and Data Acquisition
HES	Head End System	SLA	Service Level Agreement
HHU	Handheld Unit	SNMP	Simple Network Management Protocol
HV	High Voltage	SOA	Service Oriented Architecture
IEC	International Electro Technical Commission	SQL	Structured Queried Language
IEEE	Institute for Electrical and Electronic Engineering	TCP	Transmission Control Protocol
IP	Internet Protocol or Index for Protection	TOD	Time of Day
ISO	International Organization for Standardization	TOU	Time of Use
ISP	Internet Service Provider	UDP	User Datagram Protocol
ISU	Industrial Specific Solution	UMTS	Universal Mobile Telecommunications System (3G Network based on GSM)
kVA	kilo Volt-Ampere	UPS	Uninterrupted Power Supply
kW	kilo Watt	VEE	Validation Estimation and Editing
LAN	Local Area Network	VM	Virtual Machine
LCD	Liquid Crystal Display	VT	Voltage Transformer
LED	Light Emitting Diode	WAN	Wide Area Network
LTE	Long Term Evolution. First release of 4G	XML	Extensible Mark-up Language
LV	Low Voltage		

4. Drawings

This bidding document includes drawings in the section above with the technical specifications

5. Inspections and Tests

The inspections and tests shall be performed according to the requirements defined in the QUALITY ASSURANCE AND TESTING section.

PART 3 - Contract

Section VIII - General Conditions of Contract

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Section VIII - General Conditions of Contract

1. Definitions

1.1 The following words and expressions shall have the meanings hereby assigned to them:

- (a) **“Bank”** means the World Bank and refers to the International Bank for Reconstruction and Development (IBRD) or the International Development Association (IDA).
- (b) **“Contract”** means the Contract Agreement entered into between the Purchaser and the Supplier, together with the Contract Documents referred to therein, including all attachments, appendices, and all documents incorporated by reference therein.
- (c) **“Contract Documents”** means the documents listed in the Contract Agreement, including any amendments thereto.
- (d) **“Contract Price”** means the price payable to the Supplier as specified in the Contract Agreement, subject to such additions and adjustments thereto or deductions therefrom, as may be made pursuant to the Contract.
- (e) **“Day”** means calendar day.
- (f) **“Completion”** means the fulfillment of the Related Services by the Supplier in accordance with the terms and conditions set forth in the Contract.
- (g) **“GCC”** means the General Conditions of Contract.
- (h) **“Goods”** means all of the commodities, raw material, machinery and equipment, and/or other materials that the Supplier is required to supply to the Purchaser under the Contract.
- (i) **“Purchaser’s Country”** is the country specified in the **Special Conditions of Contract (SCC)**.
- (j) **“Purchaser”** means the entity purchasing the Goods and Related Services, as **specified in the SCC**.
- (k) **“Related Services”** means the services incidental to the supply of the goods, such as insurance, installation, training and initial maintenance and other such obligations of the Supplier under the Contract.
- (l) **“SCC”** means the Special Conditions of Contract.
- (m) **“Subcontractor”** means any person, private or government entity, or a combination of the above, to whom any part of the Goods to be supplied or execution of any part of the Related Services is subcontracted by the Supplier.
- (n) **“Supplier”** means the person, private or government entity, or a combination of the above, whose Bid to perform the

Contract has been accepted by the Purchaser and is named as such in the Contract Agreement.

- (o) **“The Project Site,”** where applicable, means the place named in the SCC.

2. Contract Documents

2.1 Subject to the order of precedence set forth in the Contract Agreement, all documents forming the Contract (and all parts thereof) are intended to be correlative, complementary, and mutually explanatory. The Contract Agreement shall be read as a whole.

3. Fraud and Corruption

3.1 The Bank requires compliance with the Bank’s Anti-Corruption Guidelines and its prevailing sanctions policies and procedures as set forth in the WBG’s Sanctions Framework, as set forth in Appendix 1 to the GCC.

3.2 The Purchaser requires the Supplier to disclose any commissions or fees that may have been paid or are to be paid to agents or any other party with respect to the Bidding process or execution of the Contract. The information disclosed must include at least the name and address of the agent or other party, the amount and currency, and the purpose of the commission, gratuity or fee.

4. Interpretation

4.1 If the context so requires it, singular means plural and vice versa.

4.2 Incoterms

(a) Unless inconsistent with any provision of the Contract, the meaning of any trade term and the rights and obligations of parties thereunder shall be as prescribed by Incoterms **specified in the SCC**.

(b) The terms EXW, CIP, FCA, CFR and other similar terms, when used, shall be governed by the rules prescribed in the current edition of Incoterms specified in the **SCC** and published by the International Chamber of Commerce in Paris, France.

4.3 Entire Agreement

The Contract constitutes the entire agreement between the Purchaser and the Supplier and supersedes all communications, negotiations and agreements (whether written or oral) of the parties with respect thereto made prior to the date of Contract.

4.4 Amendment

No amendment or other variation of the Contract shall be valid unless it is in writing, is dated, expressly refers to the Contract, and is signed by a duly authorized representative of each party thereto.

4.5 Nonwaiver

(a) Subject to GCC Sub-Clause 4.5(b) below, no relaxation, forbearance, delay, or indulgence by either party in

enforcing any of the terms and conditions of the Contract or the granting of time by either party to the other shall prejudice, affect, or restrict the rights of that party under the Contract, neither shall any waiver by either party of any breach of Contract operate as waiver of any subsequent or continuing breach of Contract.

- (b) Any waiver of a party's rights, powers, or remedies under the Contract must be in writing, dated, and signed by an authorized representative of the party granting such waiver, and must specify the right and the extent to which it is being waived.

4.6 Severability

If any provision or condition of the Contract is prohibited or rendered invalid or unenforceable, such prohibition, invalidity or unenforceability shall not affect the validity or enforceability of any other provisions and conditions of the Contract.

5. Language

- 5.1 The Contract as well as all correspondence and documents relating to the Contract exchanged by the Supplier and the Purchaser, shall be written in the language specified in the SCC. Supporting documents and printed literature that are part of the Contract may be in another language provided they are accompanied by an accurate translation of the relevant passages in the language specified, in which case, for purposes of interpretation of the Contract, this translation shall govern.

- 5.2 The Supplier shall bear all costs of translation to the governing language and all risks of the accuracy of such translation, for documents provided by the Supplier.

6. Joint Venture, Consortium or Association

- 6.1 If the Supplier is a joint venture, consortium, or association, all of the parties shall be jointly and severally liable to the Purchaser for the fulfillment of the provisions of the Contract and shall designate one party to act as a leader with authority to bind the joint venture, consortium, or association. The composition or the constitution of the joint venture, consortium, or association shall not be altered without the prior consent of the Purchaser.

7. Eligibility

- 7.1 The Supplier and its Subcontractors shall have the nationality of an eligible country. A Supplier or Subcontractor shall be deemed to have the nationality of a country if it is a citizen or constituted, incorporated, or registered, and operates in conformity with the provisions of the laws of that country.
- 7.2 All Goods and Related Services to be supplied under the Contract and financed by the Bank shall have their origin in Eligible Countries. For the purpose of this Clause, origin means the country where the goods have been grown, mined, cultivated,

produced, manufactured, or processed; or through manufacture, processing, or assembly, another commercially recognized article results that differs substantially in its basic characteristics from its components.

8. Notices

- 8.1 Any notice given by one party to the other pursuant to the Contract shall be in writing to the address specified in the SCC. The term “in writing” means communicated in written form with proof of receipt.
- 8.2 A notice shall be effective when delivered or on the notice’s effective date, whichever is later.

9. Governing Law

- 9.1 The Contract shall be governed by and interpreted in accordance with the laws of the Purchaser’s Country, unless otherwise specified in the SCC.
- 9.2 Throughout the execution of the Contract, the Supplier shall comply with the import of goods and services prohibitions in the Purchaser’s Country when
 - (a) as a matter of law or official regulations, the Borrower’s country prohibits commercial relations with that country; or
 - (b) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Borrower’s Country prohibits any import of goods from that country or any payments to any country, person, or entity in that country.

10. Settlement of Disputes

- 10.1 The Purchaser and the Supplier shall make every effort to resolve amicably by direct informal negotiation any disagreement or dispute arising between them under or in connection with the Contract.
- 10.2 If, after twenty-eight (28) days, the parties have failed to resolve their dispute or difference by such mutual consultation, then either the Purchaser or the Supplier may give notice to the other party of its intention to commence arbitration, as hereinafter provided, as to the matter in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given. Any dispute or difference in respect of which a notice of intention to commence arbitration has been given in accordance with this Clause shall be finally settled by arbitration. Arbitration may be commenced prior to or after delivery of the Goods under the Contract. Arbitration proceedings shall be conducted in accordance with the rules of procedure specified in the SCC.
- 10.3 Notwithstanding any reference to arbitration herein,

- (a) the parties shall continue to perform their respective obligations under the Contract unless they otherwise agree; and
 - (b) the Purchaser shall pay the Supplier any monies due the Supplier.
- 11. Inspections and Audit by the Bank**
 - 11.1 The Supplier shall keep, and shall make all reasonable efforts to cause its Subcontractors to keep, accurate and systematic accounts and records in respect of the Goods in such form and details as will clearly identify relevant time changes and costs.
 - 11.2 Pursuant to paragraph 2.2 e. of Appendix 1 to the General Conditions the Supplier shall permit and shall cause its agents (where declared or not), subcontractors, subconsultants, service providers, suppliers, and personnel, to permit, the Bank and/or persons appointed by the Bank to inspect the site and/or the accounts, records and other documents relating to the procurement process, selection and/or contract execution, and to have such accounts, records and other documents audited by auditors appointed by the Bank. The Supplier's and its Subcontractors' and subconsultants' attention is drawn to Sub-Clause 3.1 (Fraud and Corruption) which provides, inter alia, that acts intended to materially impede the exercise of the Bank's inspection and audit rights constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility pursuant to the Bank's prevailing sanctions procedures).
- 12. Scope of Supply**
 - 12.1 The Goods and Related Services to be supplied shall be as specified in the Schedule of Requirements.
- 13. Delivery and Documents**
 - 13.1 Subject to GCC Sub-Clause 33.1, the Delivery of the Goods and Completion of the Related Services shall be in accordance with the Delivery and Completion Schedule specified in the Schedule of Requirements. The details of shipping and other documents to be furnished by the Supplier are specified in the SCC.
- 14. Supplier's Responsibilities**
 - 14.1 The Supplier shall supply all the Goods and Related Services included in the Scope of Supply in accordance with GCC Clause 12, and the Delivery and Completion Schedule, as per GCC Clause 13.
 - 14.2 The Supplier, including its Subcontractors, shall not employ or engage forced labor or persons subject to trafficking, as described in GCC Sub-Clauses 14.3 and 14.4.
 - 14.3 Forced labor consists of any work or service, not voluntarily performed, that is exacted from an individual under threat of force or penalty, and includes any kind of involuntary or compulsory labor, such as indentured labor, bonded labor or similar labor-contracting arrangements.

- 14.4 Trafficking in persons is defined as the recruitment, transportation, transfer, harbouring or receipt of persons by means of the threat or use of force or other forms of coercion, abduction, fraud, deception, abuse of power, or of a position of vulnerability, or of the giving or receiving of payments or benefits to achieve the consent of a person having control over another person, for the purposes of exploitation.
- 14.5 The Supplier, including its Subcontractors, shall not employ or engage a child under the age of 14 unless the national law specifies a higher age (the minimum age).
- 14.6 The Supplier, including its Subcontractors, shall not employ or engage a child between the minimum age and the age of 18 in a manner that is likely to be hazardous, or to interfere with, the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development.
- 14.7 Work considered hazardous for children is work that, by its nature or the circumstances in which it is carried out, is likely to jeopardize the health, safety, or morals of children. Such work activities prohibited for children include work:
- (a) with exposure to physical, psychological or sexual abuse;
 - (b) underground, underwater, working at heights or in confined spaces;
 - (c) with dangerous machinery, equipment or tools, or involving handling or transport of heavy loads;
 - (d) in unhealthy environments exposing children to hazardous substances, agents, or processes, or to temperatures, noise or vibration damaging to health; or
 - (e) under difficult conditions such as work for long hours, during the night or in confinement on the premises of the employer.
- 14.8 The Supplier shall comply, and shall require its Subcontractors if any to comply, with all applicable health and safety regulations, laws, guidelines, and any other requirement stated in the Technical Specifications.
- 14.9 The Supplier shall comply with additional obligations as **specified in the SCC**.

15. Contract Price

- 15.1 Prices charged by the Supplier for the Goods supplied and the Related Services performed under the Contract shall not vary from the prices quoted by the Supplier in its Bid, with the exception of any price adjustments authorized in the SCC.

16. Terms of Payment

- 16.1 The Contract Price, including any Advance Payments, if applicable, shall be paid as specified in the SCC.
- 16.2 The Supplier's request for payment shall be made to the Purchaser in writing, accompanied by invoices describing, as

appropriate, the Goods delivered and Related Services performed, and by the documents submitted pursuant to GCC Clause 13 and upon fulfillment of all other obligations stipulated in the Contract.

16.3 Payments shall be made promptly by the Purchaser, but in no case later than sixty (60) days after submission of an invoice or request for payment by the Supplier, and after the Purchaser has accepted it.

16.4 The currencies in which payments shall be made to the Supplier under this Contract shall be those in which the Bid price is expressed.

16.5 In the event that the Purchaser fails to pay the Supplier any payment by its due date or within the period set forth in the SCC, the Purchaser shall pay to the Supplier interest on the amount of such delayed payment at the rate shown in the SCC, for the period of delay until payment has been made in full, whether before or after judgment or arbitration award.

17. Taxes and Duties

17.1 For goods manufactured outside the Purchaser's Country, the Supplier shall be entirely responsible for all taxes, stamp duties, license fees, and other such levies imposed outside the Purchaser's Country.

17.2 For goods Manufactured within the Purchaser's Country, the Supplier shall be entirely responsible for all taxes, duties, license fees, etc., incurred until delivery of the contracted Goods to the Purchaser.

17.3 If any tax exemptions, reductions, allowances or privileges may be available to the Supplier in the Purchaser's Country, the Purchaser shall use its best efforts to enable the Supplier to benefit from any such tax savings to the maximum allowable extent.

18. Performance Security

18.1 If required as specified in the SCC, the Supplier shall, within twenty-eight (28) days of the notification of contract award, provide a performance security for the performance of the Contract in the amount specified in the SCC.

18.2 The proceeds of the Performance Security shall be payable to the Purchaser as compensation for any loss resulting from the Supplier's failure to complete its obligations under the Contract.

18.3 As specified in the SCC, the Performance Security, if required, shall be denominated in the currency(ies) of the Contract, or in a freely convertible currency acceptable to the Purchaser; and shall be in one of the format stipulated by the Purchaser in the SCC, or in another format acceptable to the Purchaser.

18.4 The Performance Security shall be discharged by the Purchaser and returned to the Supplier not later than twenty-eight (28) days

following the date of Completion of the Supplier's performance obligations under the Contract, including any warranty obligations, unless specified otherwise in the SCC.

19. Copyright

19.1 The copyright in all drawings, documents, and other materials containing data and information furnished to the Purchaser by the Supplier herein shall remain vested in the Supplier, or, if they are furnished to the Purchaser directly or through the Supplier by any third party, including suppliers of materials, the copyright in such materials shall remain vested in such third party.

20. Confidential Information

20.1 The Purchaser and the Supplier shall keep confidential and shall not, without the written consent of the other party hereto, divulge to any third party any documents, data, or other information furnished directly or indirectly by the other party hereto in connection with the Contract, whether such information has been furnished prior to, during or following completion or termination of the Contract. Notwithstanding the above, the Supplier may furnish to its Subcontractor such documents, data, and other information it receives from the Purchaser to the extent required for the Subcontractor to perform its work under the Contract, in which event the Supplier shall obtain from such Subcontractor an undertaking of confidentiality similar to that imposed on the Supplier under GCC Clause 20.

20.2 The Purchaser shall not use such documents, data, and other information received from the Supplier for any purposes unrelated to the contract. Similarly, the Supplier shall not use such documents, data, and other information received from the Purchaser for any purpose other than the performance of the Contract.

20.3 The obligation of a party under GCC Sub-Clauses 20.1 and 20.2 above, however, shall not apply to information that:

- (a) the Purchaser or Supplier need to share with the Bank or other institutions participating in the financing of the Contract;
- (b) now or hereafter enters the public domain through no fault of that party;
- (c) can be proven to have been possessed by that party at the time of disclosure and which was not previously obtained, directly or indirectly, from the other party; or
- (d) otherwise lawfully becomes available to that party from a third party that has no obligation of confidentiality.

20.4 The above provisions of GCC Clause 20 shall not in any way modify any undertaking of confidentiality given by either of the

parties hereto prior to the date of the Contract in respect of the Supply or any part thereof.

20.5 The provisions of GCC Clause 20 shall survive completion or termination, for whatever reason, of the Contract.

21. Subcontracting 21.1 The Supplier shall notify the Purchaser in writing of all subcontracts awarded under the Contract if not already specified in the Bid. Notification by the Supplier, for addition of any Subcontractor not named in the Contract, shall also include the Subcontractor's declaration in accordance with Appendix 2 to the GCC- Sexual exploitation and Abuse (SEA) and/or Sexual Harassment (SH) Performance Declaration. Such notification, in the original Bid or later shall not relieve the Supplier from any of its obligations, duties, responsibilities, or liability under the Contract.

21.2 Subcontracts shall comply with the provisions of GCC Clauses 3 and 7.

22. Specifications and Standards 22.1 Technical Specifications and Drawings

- (a) The Goods and Related Services supplied under this Contract shall conform to the technical specifications and standards mentioned in Section VI, Schedule of Requirements and, when no applicable standard is mentioned, the standard shall be equivalent or superior to the official standards whose application is appropriate to the Goods' country of origin.
- (b) The Supplier shall be entitled to disclaim responsibility for any design, data, drawing, specification or other document, or any modification thereof provided or designed by or on behalf of the Purchaser, by giving a notice of such disclaimer to the Purchaser.
- (c) Wherever references are made in the Contract to codes and standards in accordance with which it shall be executed, the edition or the revised version of such codes and standards shall be those specified in the Schedule of Requirements. During Contract execution, any changes in any such codes and standards shall be applied only after approval by the Purchaser and shall be treated in accordance with GCC Clause 33.

23. Packing and Documents 23.1 The Supplier shall provide such packing of the Goods as is required to prevent their damage or deterioration during transit to their final destination, as indicated in the Contract. During transit, the packing shall be sufficient to withstand, without limitation, rough handling and exposure to extreme temperatures, salt and precipitation, and open storage. Packing case size and weights

shall take into consideration, where appropriate, the remoteness of the goods' final destination and the absence of heavy handling facilities at all points in transit.

23.2 The packing, marking, and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the Contract, including additional requirements, if any, specified in the SCC, and in any other instructions ordered by the Purchaser.

24. Insurance

24.1 Unless otherwise specified in the SCC, the Goods supplied under the Contract shall be fully insured—in a freely convertible currency from an eligible country—against loss or damage incidental to manufacture or acquisition, transportation, storage, and delivery, in accordance with the applicable Incoterms or in the manner specified in the SCC.

25. Transportation and Incidental Services

25.1 Unless otherwise specified in the SCC, responsibility for arranging transportation of the Goods shall be in accordance with the specified Incoterms.

25.2 The Supplier may be required to provide any or all of the following services, including additional services, if any, specified in SCC:

- (a) performance or supervision of on-site assembly and/or start-up of the supplied Goods;
- (b) furnishing of tools required for assembly and/or maintenance of the supplied Goods;
- (c) furnishing of a detailed operations and maintenance manual for each appropriate unit of the supplied Goods;
- (d) performance or supervision or maintenance and/or repair of the supplied Goods, for a period of time agreed by the parties, provided that this service shall not relieve the Supplier of any warranty obligations under this Contract; and
- (e) training of the Purchaser's personnel, at the Supplier's plant and/or on-site, in assembly, start-up, operation, maintenance, and/or repair of the supplied Goods.

25.3 Prices charged by the Supplier for incidental services, if not included in the Contract Price for the Goods, shall be agreed upon in advance by the parties and shall not exceed the prevailing rates charged to other parties by the Supplier for similar services

26. Inspections and Tests

26.1 The Supplier shall at its own expense and at no cost to the Purchaser carry out all such tests and/or inspections of the Goods and Related Services as are specified in the SCC.

26.2 The inspections and tests may be conducted on the premises of the Supplier or its Subcontractor, at point of delivery, and/or at

the Goods' final destination, or in another place in the Purchaser's Country as specified in the SCC. Subject to GCC Sub-Clause 26.3, if conducted on the premises of the Supplier or its Subcontractor, all reasonable facilities and assistance, including access to drawings and production data, shall be furnished to the inspectors at no charge to the Purchaser.

- 26.3 The Purchaser or its designated representative shall be entitled to attend the tests and/or inspections referred to in GCC Sub-Clause 26.2, provided that the Purchaser bear all of its own costs and expenses incurred in connection with such attendance including, but not limited to, all traveling and board and lodging expenses.
- 26.4 Whenever the Supplier is ready to carry out any such test and inspection, it shall give a reasonable advance notice, including the place and time, to the Purchaser. The Supplier shall obtain from any relevant third party or manufacturer any necessary permission or consent to enable the Purchaser or its designated representative to attend the test and/or inspection.
- 26.5 The Purchaser may require the Supplier to carry out any test and/or inspection not required by the Contract but deemed necessary to verify that the characteristics and performance of the Goods comply with the technical specifications codes and standards under the Contract, provided that the Supplier's reasonable costs and expenses incurred in the carrying out of such test and/or inspection shall be added to the Contract Price. Further, if such test and/or inspection impedes the progress of manufacturing and/or the Supplier's performance of its other obligations under the Contract, due allowance will be made in respect of the Delivery Dates and Completion Dates and the other obligations so affected.
- 26.6 The Supplier shall provide the Purchaser with a report of the results of any such test and/or inspection.
- 26.7 The Purchaser may reject any Goods or any part thereof that fail to pass any test and/or inspection or do not conform to the specifications. The Supplier shall either rectify or replace such rejected Goods or parts thereof or make alterations necessary to meet the specifications at no cost to the Purchaser, and shall repeat the test and/or inspection, at no cost to the Purchaser, upon giving a notice pursuant to GCC Sub-Clause 26.4.
- 26.8 The Supplier agrees that neither the execution of a test and/or inspection of the Goods or any part thereof, nor the attendance by the Purchaser or its representative, nor the issue of any report pursuant to GCC Sub-Clause 26.6, shall release the Supplier from any warranties or other obligations under the Contract.

27. Liquidated Damages

27.1 Except as provided under GCC Clause 32, if the Supplier fails to deliver any or all of the Goods by the Date(s) of delivery or perform the Related Services within the period specified in the Contract, the Purchaser may without prejudice to all its other remedies under the Contract, deduct from the Contract Price, as liquidated damages, a sum equivalent to the percentage specified in the **SCC** of the delivered price of the delayed Goods or unperformed Services for each week or part thereof of delay until actual delivery or performance, up to a maximum deduction of the percentage specified in those **SCC**. Once the maximum is reached, the Purchaser may terminate the Contract pursuant to GCC Clause 35.

28. Warranty

28.1 The Supplier warrants that all the Goods are new, unused, and of the most recent or current models, and that they incorporate all recent improvements in design and materials, unless provided otherwise in the Contract.

28.2 Subject to GCC Sub-Clause 22.1(b), the Supplier further warrants that the Goods shall be free from defects arising from any act or omission of the Supplier or arising from design, materials, and workmanship, under normal use in the conditions prevailing in the country of final destination.

28.3 Unless otherwise specified in the **SCC**, the warranty shall remain valid for twelve (12) months after the Goods, or any portion thereof as the case may be, have been delivered to and accepted at the final destination indicated in the **SCC**, or for eighteen (18) months after the date of shipment from the port or place of loading in the country of origin, whichever period concludes earlier.

28.4 The Purchaser shall give notice to the Supplier stating the nature of any such defects together with all available evidence thereof, promptly following the discovery thereof. The Purchaser shall afford all reasonable opportunity for the Supplier to inspect such defects.

28.5 Upon receipt of such notice, the Supplier shall, within the period specified in the **SCC**, expeditiously repair or replace the defective Goods or parts thereof, at no cost to the Purchaser.

28.6 If having been notified, the Supplier fails to remedy the defect within the period specified in the **SCC**, the Purchaser may proceed to take within a reasonable period such remedial action as may be necessary, at the Supplier's risk and expense and without prejudice to any other rights which the Purchaser may have against the Supplier under the Contract.

**29. Patent
Indemnity**

29.1 The Supplier shall, subject to the Purchaser's compliance with GCC Sub-Clause 29.2, indemnify and hold harmless the Purchaser and its employees and officers from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of any nature, including attorney's fees and expenses, which the Purchaser may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright, or other intellectual property right registered or otherwise existing at the date of the Contract by reason of:

- (a) the installation of the Goods by the Supplier or the use of the Goods in the country where the Site is located; and
- (b) the sale in any country of the products produced by the Goods.

Such indemnity shall not cover any use of the Goods or any part thereof other than for the purpose indicated by or to be reasonably inferred from the Contract, neither any infringement resulting from the use of the Goods or any part thereof, or any products produced thereby in association or combination with any other equipment, plant, or materials not supplied by the Supplier, pursuant to the Contract.

29.2 If any proceedings are brought or any claim is made against the Purchaser arising out of the matters referred to in GCC Sub-Clause 29.1, the Purchaser shall promptly give the Supplier a notice thereof, and the Supplier may at its own expense and in the Purchaser's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim.

29.3 If the Supplier fails to notify the Purchaser within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Purchaser shall be free to conduct the same on its own behalf.

29.4 The Purchaser shall, at the Supplier's request, afford all available assistance to the Supplier in conducting such proceedings or claim, and shall be reimbursed by the Supplier for all reasonable expenses incurred in so doing.

29.5 The Purchaser shall indemnify and hold harmless the Supplier and its employees, officers, and Subcontractors from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of any nature, including attorney's fees and expenses, which the Supplier may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright, or other intellectual property right registered or otherwise

existing at the date of the Contract arising out of or in connection with any design, data, drawing, specification, or other documents or materials provided or designed by or on behalf of the Purchaser.

30. Limitation of Liability

- 30.1 Except in cases of criminal negligence or willful misconduct,
- (a) the Supplier shall not be liable to the Purchaser, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the Supplier to pay liquidated damages to the Purchaser and
 - (b) the aggregate liability of the Supplier to the Purchaser, whether under the Contract, in tort or otherwise, shall not exceed the total Contract Price, provided that this limitation shall not apply to the cost of repairing or replacing defective equipment, or to any obligation of the supplier to indemnify the Purchaser with respect to patent infringement

31. Change in Laws and Regulations

- 31.1 Unless otherwise specified in the Contract, if after the date of 28 days prior to date of Bid submission, any law, regulation, ordinance, order or bylaw having the force of law is enacted, promulgated, abrogated, or changed in the place of the Purchaser's Country where the Site is located (which shall be deemed to include any change in interpretation or application by the competent authorities) that subsequently affects the Delivery Date and/or the Contract Price, then such Delivery Date and/or Contract Price shall be correspondingly increased or decreased, to the extent that the Supplier has thereby been affected in the performance of any of its obligations under the Contract. Notwithstanding the foregoing, such additional or reduced cost shall not be separately paid or credited if the same has already been accounted for in the price adjustment provisions where applicable, in accordance with GCC Clause 15.

32. Force Majeure

- 32.1 The Supplier shall not be liable for forfeiture of its Performance Security, liquidated damages, or termination for default if and to the extent that its delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.
- 32.2 For purposes of this Clause, "Force Majeure" means an event or situation beyond the control of the Supplier that is not foreseeable, is unavoidable, and its origin is not due to negligence or lack of care on the part of the Supplier. Such events may include, but not be limited to, acts of the Purchaser in its

sovereign capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions, and freight embargoes.

32.3 If a Force Majeure situation arises, the Supplier shall promptly notify the Purchaser in writing of such condition and the cause thereof. Unless otherwise directed by the Purchaser in writing, the Supplier shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

33. Change Orders and Contract Amendments

33.1 The Purchaser may at any time order the Supplier through notice in accordance GCC Clause 8, to make changes within the general scope of the Contract in any one or more of the following:

- (a) drawings, designs, or specifications, where Goods to be furnished under the Contract are to be specifically manufactured for the Purchaser;
- (b) the method of shipment or packing;
- (c) the place of delivery; and
- (d) the Related Services to be provided by the Supplier.

33.2 If any such change causes an increase or decrease in the cost of, or the time required for, the Supplier's performance of any provisions under the Contract, an equitable adjustment shall be made in the Contract Price or in the Delivery/Completion Schedule, or both, and the Contract shall accordingly be amended. Any claims by the Supplier for adjustment under this Clause must be asserted within twenty-eight (28) days from the date of the Supplier's receipt of the Purchaser's change order.

33.3 Prices to be charged by the Supplier for any Related Services that might be needed but which were not included in the Contract shall be agreed upon in advance by the parties and shall not exceed the prevailing rates charged to other parties by the Supplier for similar services.

33.4 **Value Engineering:** The Supplier may prepare, at its own cost, a value engineering proposal at any time during the performance of the contract. The value engineering proposal shall, at a minimum, include the following;

- (a) the proposed change(s), and a description of the difference to the existing contract requirements;
- (b) a full cost/benefit analysis of the proposed change(s) including a description and estimate of costs (including life cycle costs) the Purchaser may incur in implementing the value engineering proposal; and
- (c) a description of any effect(s) of the change on performance/functionality.

The Purchaser may accept the value engineering proposal if the proposal demonstrates benefits that:

- (a) accelerates the delivery period; or
- (b) reduces the Contract Price or the life cycle costs to the Purchaser; or
- (c) improves the quality, efficiency or sustainability of the Goods; or
- (d) yields any other benefits to the Purchaser,

without compromising the necessary functions of the Facilities.

If the value engineering proposal is approved by the Purchaser and results in:

- (a) a reduction of the Contract Price; the amount to be paid to the Supplier shall be the percentage specified **in the PCC** of the reduction in the Contract Price; or
- (b) an increase in the Contract Price; but results in a reduction in life cycle costs due to any benefit described in (a) to (d) above, the amount to be paid to the Supplier shall be the full increase in the Contract Price.

33.5 Subject to the above, no variation in or modification of the terms of the Contract shall be made except by written amendment signed by the parties.

34. Extensions of Time

34.1 If at any time during performance of the Contract, the Supplier or its subcontractors should encounter conditions impeding timely delivery of the Goods or completion of Related Services pursuant to GCC Clause 13, the Supplier shall promptly notify the Purchaser in writing of the delay, its likely duration, and its cause. As soon as practicable after receipt of the Supplier's notice, the Purchaser shall evaluate the situation and may at its discretion extend the Supplier's time for performance, in which case the extension shall be ratified by the parties by amendment of the Contract.

34.2 Except in case of Force Majeure, as provided under GCC Clause 32, a delay by the Supplier in the performance of its Delivery and Completion obligations shall render the Supplier liable to the imposition of liquidated damages pursuant to GCC Clause 26, unless an extension of time is agreed upon, pursuant to GCC Sub-Clause 34.1.

35. Termination

35.1 Termination for Default

- (a) The Purchaser, without prejudice to any other remedy for breach of Contract, by written notice of default sent to the Supplier, may terminate the Contract in whole or in part:

- (i) if the Supplier fails to deliver any or all of the Goods within the period specified in the Contract, or within any extension thereof granted by the Purchaser pursuant to GCC Clause 34;
 - (ii) if the Supplier fails to perform any other obligation under the Contract; or
 - (iii) if the Supplier, in the judgment of the Purchaser has engaged in Fraud and Corruption, as defined in paragraph 2.2 a of the Appendix 1 to the GCC, in competing for or in executing the Contract.
- (b) In the event the Purchaser terminates the Contract in whole or in part, pursuant to GCC Clause 35.1(a), the Purchaser may procure, upon such terms and in such manner as it deems appropriate, Goods or Related Services similar to those undelivered or not performed, and the Supplier shall be liable to the Purchaser for any additional costs for such similar Goods or Related Services. However, the Supplier shall continue performance of the Contract to the extent not terminated.

35.2 Termination for Insolvency.

- (a) The Purchaser may at any time terminate the Contract by giving notice to the Supplier if the Supplier becomes bankrupt or otherwise insolvent. In such event, termination will be without compensation to the Supplier, provided that such termination will not prejudice or affect any right of action or remedy that has accrued or will accrue thereafter to the Purchaser

35.3 Termination for Convenience.

- (a) The Purchaser, by notice sent to the Supplier, may terminate the Contract, in whole or in part, at any time for its convenience. The notice of termination shall specify that termination is for the Purchaser's convenience, the extent to which performance of the Supplier under the Contract is terminated, and the date upon which such termination becomes effective.
- (b) The Goods that are complete and ready for shipment within twenty-eight (28) days after the Supplier's receipt of notice of termination shall be accepted by the Purchaser at the Contract terms and prices. For the remaining Goods, the Purchaser may elect:
 - (i) to have any portion completed and delivered at the Contract terms and prices; and/or

- (ii) to cancel the remainder and pay to the Supplier an agreed amount for partially completed Goods and Related Services and for materials and parts previously procured by the Supplier.

36. Assignment

36.1 Neither the Purchaser nor the Supplier shall assign, in whole or in part, their obligations under this Contract, except with prior written consent of the other party.

**37. Export
Restriction**

37.1 Notwithstanding any obligation under the Contract to complete all export formalities, any export restrictions attributable to the Purchaser, to the country of the Purchaser, or to the use of the products/goods, systems or services to be supplied, which arise from trade regulations from a country supplying those products/goods, systems or services, and which substantially impede the Supplier from meeting its obligations under the Contract, shall release the Supplier from the obligation to provide deliveries or services, always provided, however, that the Supplier can demonstrate to the satisfaction of the Purchaser and of the Bank that it has completed all formalities in a timely manner, including applying for permits, authorizations and licenses necessary for the export of the products/goods, systems or services under the terms of the Contract. Termination of the Contract on this basis shall be for the Purchaser's convenience pursuant to Sub-Clause 35.3.

APPENDIX 1

Fraud and Corruption

(Text in this Appendix shall not be modified)

1. Purpose

1.1 The Bank's Anti-Corruption Guidelines and this annex apply with respect to procurement under Bank Investment Project Financing operations.

2. Requirements

2.1 The Bank requires that Borrowers (including beneficiaries of Bank financing); bidders (applicants/proposers), consultants, contractors and suppliers; any sub-contractors, sub-consultants, service providers or suppliers; any agents (whether declared or not); and any of their personnel, observe the highest standard of ethics during the procurement process, selection and contract execution of Bank-financed contracts, and refrain from Fraud and Corruption.

2.2 To this end, the Bank:

- a. Defines, for the purposes of this provision, the terms set forth below as follows:
 - i. "corrupt practice" is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;
 - ii. "fraudulent practice" is any act or omission, including misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain financial or other benefit or to avoid an obligation;
 - iii. "collusive practice" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;
 - iv. "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;
 - v. "obstructive practice" is:
 - (a) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive, or collusive practice; and/or threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or
 - (b) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under paragraph 2.2 e. below.
- b. Rejects a proposal for award if the Bank determines that the firm or individual recommended for award, any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/ or their

- employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;
- c. In addition to the legal remedies set out in the relevant Legal Agreement, may take other appropriate actions, including declaring misprocurement, if the Bank determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement process, selection and/or execution of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;
 - d. Pursuant to the Bank's Anti-Corruption Guidelines and in accordance with the Bank's prevailing sanctions policies and procedures, may sanction a firm or individual, either indefinitely or for a stated period of time, including by publicly declaring such firm or individual ineligible (i) to be awarded or otherwise benefit from a Bank-financed contract, financially or in any other manner;⁷ (ii) to be a nominated⁸ sub-contractor, consultant, manufacturer or supplier, or service provider of an otherwise eligible firm being awarded a Bank-financed contract; and (iii) to receive the proceeds of any loan made by the Bank or otherwise to participate further in the preparation or implementation of any Bank-financed project;
 - e. Requires that a clause be included in bidding/request for proposals documents and in contracts financed by a Bank loan, requiring (i) bidders (applicants/proposers), consultants, contractors, and suppliers, and their sub-contractors, sub-consultants, service providers, suppliers, agents personnel, permit the Bank to inspect⁹ all accounts, records and other documents relating to the procurement process, selection and/or contract execution, and to have them audited by auditors appointed by the Bank.

⁷ For the avoidance of doubt, a sanctioned party's ineligibility to be awarded a contract shall include, without limitation, (i) applying for pre-qualification, expressing interest in a consultancy, and bidding, either directly or as a nominated sub-contractor, nominated consultant, nominated manufacturer or supplier, or nominated service provider, in respect of such contract, and (ii) entering into an addendum or amendment introducing a material modification to any existing contract.

⁸ A nominated sub-contractor, nominated consultant, nominated manufacturer or supplier, or nominated service provider (different names are used depending on the particular bidding document) is one which has been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.

⁹ Inspections in this context usually are investigative (i.e., forensic) in nature. They involve fact-finding activities undertaken by the Bank or persons appointed by the Bank to address specific matters related to investigations/audits, such as evaluating the veracity of an allegation of possible Fraud and Corruption, through the appropriate mechanisms. Such activity includes but is not limited to: accessing and examining a firm's or individual's financial records and information, and making copies thereof as relevant; accessing and examining any other documents, data and information (whether in hard copy or electronic format) deemed relevant for the investigation/audit, and making copies thereof as relevant; interviewing staff and other relevant individuals; performing physical inspections and site visits; and obtaining third party verification of information.

APPENDIX 2

Sexual Exploitation and Abuse (SEA) and/or Sexual Harassment (SH) Performance Declaration for Subcontractors*

[The following table shall be filled in by each subcontractor proposed by the Supplier, that was not named in the Contract]

Subcontractor's Name: *[insert full name]*

Date: *[insert day, month, year]*

Contract reference *[insert contract reference]*

Page *[insert page number]* of *[insert total number]* pages

SEA and/or SH Declaration
We: <input type="checkbox"/> (a) have not been subject to disqualification by the Bank for non-compliance with SEA/ SH obligations. <input type="checkbox"/> (b) are subject to disqualification by the Bank for non-compliance with SEA/ SH obligations. <input type="checkbox"/> (c) had been subject to disqualification by the Bank for non-compliance with SEA/ SH obligations, and were removed from the disqualification list. An arbitral award on the disqualification case has been made in our favor.
<i>[If (c) above is applicable, attach evidence of an arbitral award reversing the findings on the issues underlying the disqualification.]</i>
Period of disqualification: From: _____ To: _____

Name of the Subcontractor _____

Name of the person duly authorized to sign on behalf of the Subcontractor _____

Title of the person signing on behalf of the Subcontractor _____

Signature of the person named above _____

Date signed _____ day of _____, _____

Countersignature of authorized representative of the Supplier:

Signature: _____

Date signed _____ day of _____, _____

GCC 1.1 (p)	<p>The term SEA/SH where used in the Contract has the following meaning:</p> <ul style="list-style-type: none"> • “Sexual Exploitation and Abuse” “(SEA)” means the following: Sexual Exploitation is defined as any actual or attempted abuse of position of vulnerability, differential power or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another. Sexual Abuse is defined as the actual or threatened physical intrusion of a sexual nature, whether by force or under unequal or coercive conditions. • “Sexual Harassment” “(SH)” is defined as unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature by contractor’s personnel with other contractor’s, subcontractors’ or employer’s personnel.
GCC 4.2 (a)	The meaning of the trade terms shall be as prescribed by Incoterms. If the meaning of any trade term and the rights and obligations of the parties thereunder shall not be as prescribed by Incoterms, they shall be as prescribed by: <i>Not Applicable</i>
GCC 4.2 (b)	The version edition of Incoterms shall be <i>2020</i>
GCC 5.1	The language shall be: <i>English</i>
GCC 8.1	<p>For notices, the Purchaser’s address shall be: Attention: Mr. João Moreira Pinto Saraiva - Project Coordinator Unit Purchaser: Ministry of Energy and water Street Address: Rua Cónego Manuel das Neves, 234 – 10th floor City: <i>Luanda</i> Country: <i>Angola</i> Electronic mail address: <i>clarificationmeterstender@ende.co.ao</i> c/c: esiap.ucp.minea@gmail.com</p>
GCC 9.1	The governing law shall be the law of: <i>The Republic of Angola</i>
GCC 10.2	<p>The rules of procedure for arbitration proceedings pursuant to GCC Clause 10.2 shall be as follows:</p> <p>(a) Contract with foreign Supplier: GCC 10.2 (a)—Any dispute, controversy or claim arising out of or relating to this Contract, or breach, termination or invalidity thereof, shall be settled by arbitration in accordance with the UNCITRAL Arbitration Rules as at present in force.</p> <p>(b) Contracts with Supplier national of the Purchaser’s Country: In the case of a dispute between the Purchaser and a Supplier who is a national of the Purchaser’s Country, the dispute shall be referred to adjudication or arbitration in accordance with the laws of the Purchaser’s Country.</p>

GCC 13.1	<p>Details of Shipping and other Documents to be furnished by the Supplier are:</p> <p>For goods supplied from abroad:</p> <ul style="list-style-type: none"> • <i>Copies of supplier's invoices showing goods description,</i> • <i>Bill of lading</i> • <i>Copies of the packing list</i> • <i>Insurance certificate</i> • <i>Manufacturer's or Supplier's Warranty Certificate</i> • <i>Inspection certificate of the goods issued by the purchaser</i> • <i>Certificate of origin</i> • <i>Notarized ownership transfer to EDISCO certificate</i> • <i>Insurance certificate</i> • <i>Job licenses (For Local bidder)</i> • <i>Certificate of registration (For Local bidder)</i> • <i>Taxes deducted at source (For Local bidder)</i> • <i>Clearance from Tax department and customs (For Local bidder)</i> <p>For goods supplied from purchaser's country:</p> <ul style="list-style-type: none"> • <i>Copies of supplier's invoices showing goods description,</i> • <i>Insurance certificate</i> • <i>Manufacturer's or Supplier's Warranty Certificate</i> • <i>Inspection certificate of the goods issued by the purchaser</i> • <i>Certificate of origin</i> • <i>Notarized ownership transfers to EDISCO certificate</i> • <i>Insurance certificate</i> • <i>Job licenses (For Local bidder)</i> • <i>Certificate of registration (For Local bidder)</i> • <i>Taxes deducted at source (For Local bidder)</i> <p><i>Clearance from Tax department and customs (For Local bidder)</i></p> <p>The above documents shall be received by the Purchaser before arrival of the Goods and, if not received, the Supplier will be responsible for any consequent expenses.</p>
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GCC 14.9	<p>GCC 14.9.1 The Supplier shall have a code of conduct, and provide appropriate sensitization, for its personnel carrying out installation of the meters that include, but not limited to, maintaining a safe working environment and not engaging in the following practices:</p> <ul style="list-style-type: none"> (i) any form of sexual harassment including unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature with other Supplier's or Purchaser's personnel; (ii) Sexual Exploitation, which means any actual or attempted abuse of position of vulnerability, differential power or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another; (iii) Sexual Abuse, which means the actual or threatened physical intrusion of a sexual nature, whether by force or under unequal or coercive conditions; and (iv) any form of sexual activity with individuals under the age of 18, except in case of pre-existing marriage. <p>GCC 14.9.2 The Purchaser may require the Supplier to remove (or cause to be removed), from the site or other places where the installation of the meters is being executed, a Supplier's personnel that undertakes behaviors that are not consistent with the code of conduct stated in GCC 14.9.1. Notwithstanding any requirement from the Purchaser to replace any such person, the Supplier shall immediately remove (or cause to be removed) any such person, from the site or other places where the installation of the meters is being executed. In either case, the Supplier shall promptly appoint, as appropriate, a suitable replacement with equivalent skills and experience.</p>
GCC 15.1	The prices charged for the Goods supplied and the related Services performed " <i>shall</i> ," be adjustable.
GCC 16.1	<p>GCC 16.1—The method and conditions of payment to be made to the Supplier under this Contract shall be as follows:</p> <p>Payment for Goods supplied from abroad:</p> <p>Payment of foreign currency portion shall be made in <i>[insert currency of the Contract Price]</i> in the following manner:</p> <ul style="list-style-type: none"> (i) Advance Payment: Ten (10) percent of the Contract Price shall be paid within thirty (30) days of signing of the Contract, and upon submission of claim and a bank guarantee for equivalent amount valid until the Goods are delivered and, in the form, provided in the bidding document or another form acceptable to the Purchaser.

	<p>ii) On Shipment: Ten (10) percent of the Contract Price of the Goods shipped shall be paid through irrevocable confirmed letter of credit opened in favor of the Supplier in a bank in its country, upon submission of documents specified in GCC Clause 13.</p> <p>(iii) On Delivery: Thirty (30) percent of the Contract Price of Goods received shall be paid within thirty (30) days of delivery to the Project site or stores of the Goods and upon submission of claim with supporting documents.</p> <p>(iv) On Installation: Twenty (20) percent of the Contract Price of Goods received shall be paid within thirty (30) days of installation and upon submission of claim with supporting documents.</p> <p>(iii) On Acceptance: Ten (30) percent of the Contract Price of Goods received shall be paid within thirty (30) days of receipt of the Goods upon submission of claim supported by the acceptance certificate issued by the Purchaser</p> <p>Payment of local currency portion shall be made in _____ [currency] within thirty (30) days of presentation of claim supported by a certificate from the Purchaser declaring that the Goods have been delivered and that all other contracted Services have been performed.</p> <p>Payment for Goods and Services supplied from within the Purchaser's Country:</p> <p>(i) Payment for Goods and Services supplied from within the Purchaser's Country shall be made in Kwanza, as follows:</p> <p>(i) Advance Payment: Ten (10) percent of the Contract Price shall be paid within thirty (30) days of signing of the Contract against a simple receipt and a bank guarantee for the equivalent amount and in the form provided in the bidding document or another form acceptable to the Purchaser.</p> <p>(ii) On Delivery: Forty (40) percent of the Contract Price shall be paid on receipt of the Goods and upon submission of the documents specified in GCC Clause 13.</p> <p>(iii) On Installation: Twenty (20) percent of the Contract Price of Goods received shall be paid within thirty (30) days of installation and upon submission of claim with supporting documents.</p> <p>(iv) On Acceptance: The remaining thirty (30) percent of the Contract Price shall be paid to the Supplier within thirty (30) days after the date of the acceptance certificate for the respective delivery issued by the Purchaser.</p>
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GCC 16.5	The payment-delay period after which the Purchaser shall pay interest to the supplier shall be 60 days. The interest rate that shall be applied is 0.1 %
GCC 18.1	A Performance Security shall be required The amount of the Performance Security shall be 10% of the Contract Price.
GCC 18.3	If required, the Performance Security shall be in the form of: <i>“a Demand Guarantee”</i> If required, the Performance security shall be denominated in <i>the currencies of payment of the Contract, in accordance with their portions of the Contract Price</i>
GCC 18.4	Discharge of the Performance Security shall take place: <i>as per GCC 18.4</i>
GCC 23.2	The packing, marking and documentation within and outside the packages shall be: <i>All goods shall be stored in waterproof containers, with adequate packing to protect the goods during transportation and storage. Markings on the outside of containers shall include a commercial invoice describing the contents, a label clearly stating the name of the Purchaser, and the intended final destination.</i>
GCC 24.1	The insurance coverage shall be as specified in the Incoterms.
GCC 25.1	Responsibility for transportation of the Goods shall be as specified in the Incoterms.
GCC 25.2	Incidental services to be provided are: <ul style="list-style-type: none"> (a) furnishing of a detailed operations and maintenance manual for each appropriate unit of the supplied Goods; (b) performance or supervision or maintenance and/or repair of the supplied Goods, for a period of time agreed by the parties, provided that this service shall not relieve the Supplier of any warranty obligations under this Contract; and (c) training of the Purchaser’s personnel, on-site, in assembly, start-up, operation, maintenance, and/or repair of the supplied Goods.
GCC 26.1	The inspections and tests shall be: carried out in accordance with the “Quality Assurance and Testing” procedures outlined in the technical specifications under Section VII- Schedule of Requirements
GCC 26.2	The Inspections and tests shall be conducted at: <i>the locations specified in the “Quality Assurance and Testing” procedures outlined in the technical specifications under Section VII- Schedule of Requirements</i>
GCC 27.1	The liquidated damage shall be: 1.5% per week
GCC 27.1	The maximum amount of liquidated damages shall be: 24%
GCC 28.3	The period of validity of the Warranty shall be: as specified in <u>the WARRANTY</u> under Section VII- Schedule of Requirements For purposes of the Warranty, the place(s) of final destination(s) shall be: CIP -Luanda various locations

	<p>GCC 28.3—In partial modification of the provisions, the warranty period shall be 12 months from date of acceptance of the Goods or 18 months from the date of shipment, whichever occurs earlier. The Supplier shall, in addition, comply with the performance and/or consumption guarantees specified under the Contract. If, for reasons attributable to the Supplier, these guarantees are not attained in whole or in part, the Supplier shall, at its discretion, either:</p> <p style="padding-left: 40px;">(a) make such changes, modifications, and/or additions to the Goods or any part thereof as may be necessary in order to attain the contractual guarantees specified in the Contract at its own cost and expense and to carry out further performance tests in accordance with GCC 26.7,</p> <p style="text-align: center;">or</p> <p style="padding-left: 40px;">(b) pay liquidated damages to the Purchaser with respect to the failure to meet the contractual guarantees. The rate of these liquidated damages shall be 5%.</p>
GCC 28.5, GCC 28.6	The period for repair or replacement shall be: 21 days.
GCC 33.4	If the value engineering proposal is approved by the Purchaser the amount to be paid to the Supplier shall be Not applicable

Attachment: Price Adjustment Formula

If in accordance with GCC 15.1, prices shall be adjustable, the following method shall be used to calculate the price adjustment:

- 15.1 Prices payable to the Supplier, as stated in the Contract, shall be subject to adjustment during performance of the Contract to reflect changes in the cost of labor and material components in accordance with the formula:

$$P_1 = P_0 \left[a + \frac{bL_1}{L_0} + \frac{cM_1}{M_0} + \frac{dE_1}{E_0} \right] - P_0$$

$$a+b+c+d=1$$

in which:

- P_1 = adjustment amount payable to the Supplier.
- P_0 = Contract Price (base price).
- a = fixed element representing profits and overheads included in the Contract Price and generally in the range of five (5) to fifteen (15) percent.
- b = estimated percentage of labor component in the Contract Price.
- c = estimated percentage of material component in the Contract Price.
- d = Estimated percentage of transportation component in the Contract Price.
- L_0, L_1 = Labor indices applicable in the country of origin on the base date and date for adjustment, respectively.
- M_0, M_1 = Material indices for the major raw material on the base date and date for adjustment, respectively, in the country of origin.
- E_0, E_1 = Transportation indices on the base date of Bid submission and date for adjustment, respectively, in the country of origin. Transportation cost of the goods includes the unit transportation costs from origin to place of destination at the date of the bid submission.

The Bidder shall indicate the source of the indices for labor, materials and transportation, and the source of exchange rate (if applicable) and the base date indices in its Bid.

$$\begin{aligned} a &= 0.1 \\ b &= [0.30 - 0.45] \\ c &= [0.30 - 0.55] \\ d &= [0.10 - 0.15] \end{aligned}$$

Base date = thirty (30) days prior to the deadline for submission of the Bids.

Date of adjustment = 2 (*two*) weeks prior to date of shipment (representing the mid-point of the period of manufacture).

The above price adjustment formula shall be invoked by either party subject to the following further conditions:

- (a) No price adjustment shall be allowed beyond the original delivery dates. As a rule, no price adjustment shall be allowed for periods of delay for which the Supplier is entirely responsible. The Purchaser will, however, be entitled to any decrease in the prices of the Goods and Services subject to adjustment.
- (b) If the currency in which the Contract Price P_0 is expressed is different from the currency of origin of the labor and material indices, a correction factor will be applied to avoid incorrect adjustments of the Contract Price. The correction factor shall be: Z_0 / Z_1 , where,
 - Z_0 = the number of units of currency of the origin of the indices which equal to one unit of the currency of the Contract Price P_0 on the Base date, and
 - Z_1 = the number of units of currency of the origin of the indices which equal to one unit of the currency of the Contract Price P_0 on the Date of Adjustment.
- (c) No price adjustment shall be payable on the portion of the Contract Price paid to the Supplier as advance payment.
- (d) Any price adjustment for the application of this formula cannot exceed 20% of the original value

Section X - Contract Forms

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Notification of Intention to Award

[This Notification of Intention to Award shall be sent to each Bidder that submitted a Bid.]

[Send this Notification to the Bidder's Authorized Representative named in the Bidder Information Form]

For the attention of Bidder's Authorized Representative

Name: *[insert Authorized Representative's name]*

Address: *[insert Authorized Representative's Address]*

Telephone/Fax numbers: *[insert Authorized Representative's telephone/fax numbers]*

Email Address: *[insert Authorized Representative's email address]*

[IMPORTANT: insert the date that this Notification is transmitted to Bidders. The Notification must be sent to all Bidders simultaneously. This means on the same date and as close to the same time as possible.]

DATE OF TRANSMISSION: This Notification is sent by: *[email/fax]* on *[date]* (local time)

Notification of Intention to Award

Purchaser: *[insert the name of the Purchaser]*

Project: *[insert name of project]*

Contract title: *[insert the name of the contract]*

Country: *[insert country where RFB is issued]*

Loan No. /Credit No. / Grant No.: *[insert reference number for loan/credit/grant]*

RFB No: *[insert RFB reference number from Procurement Plan]*

This Notification of Intention to Award (Notification) notifies you of our decision to award the above contract. The transmission of this Notification begins the Standstill Period. During the Standstill Period you may:

- a) request a debriefing in relation to the evaluation of your Bid, and/or
- b) submit a Procurement-related Complaint in relation to the decision to award the contract.

1. The successful Bidder

Name:	<i>[insert name of successful Bidder]</i>
Address:	<i>[insert address of the successful Bidder]</i>
Contract price:	<i>[insert contract price of the successful Bid]</i>

2. Other Bidders **[INSTRUCTIONS: insert names of all Bidders that submitted a Bid. If the Bid's price was evaluated include the evaluated price as well as the Bid price as read out.]**

Name of Bidder	Bid price	Evaluated Bid price (if applicable)
<i>[insert name]</i>	<i>[insert Bid price]</i>	<i>[insert evaluated price]</i>
<i>[insert name]</i>	<i>[insert Bid price]</i>	<i>[insert evaluated price]</i>
<i>[insert name]</i>	<i>[insert Bid price]</i>	<i>[insert evaluated price]</i>
<i>[insert name]</i>	<i>[insert Bid price]</i>	<i>[insert evaluated price]</i>

[insert name]	[insert Bid price]	[insert evaluated price]
---------------	--------------------	--------------------------

3. Reason/s why your Bid was unsuccessful

[INSTRUCTIONS: State the reason/s why this Bidder's Bid was unsuccessful. Do NOT include: (a) a point by point comparison with another Bidder's Bid or (b) information that is marked confidential by the Bidder in its Bid.]

4. How to request a debriefing

DEADLINE: The deadline to request a debriefing expires at midnight on [insert date] (local time).

You may request a debriefing in relation to the results of the evaluation of your Bid. If you decide to request a debriefing your written request must be made within three (3) Business Days of receipt of this Notification of Intention to Award.

Provide the contract name, reference number, name of the Bidder, contact details; and address the request for debriefing as follows:

Attention: [insert full name of person, if applicable]

Title/position: [insert title/position]

Agency: [insert name of Purchaser]

Email address: [insert email address]

Fax number: [insert fax number] **delete if not used**

If your request for a debriefing is received within the 3 Business Days deadline, we will provide the debriefing within five (5) Business Days of receipt of your request. If we are unable to provide the debriefing within this period, the Standstill Period shall be extended by five (5) Business Days after the date that the debriefing is provided. If this happens, we will notify you and confirm the date that the extended Standstill Period will end.

The debriefing may be in writing, by phone, video conference call or in person. We shall promptly advise you in writing how the debriefing will take place and confirm the date and time.

If the deadline to request a debriefing has expired, you may still request a debriefing. In this case, we will provide the debriefing as soon as practicable, and normally no later than fifteen (15) Business Days from the date of publication of the Contract Award Notice.

5. How to make a complaint

Period: Procurement-related Complaint challenging the decision to award shall be submitted by midnight, [insert date] (local time).

Provide the contract name, reference number, name of the Bidder, contact details; and address the Procurement-related Complaint as follows:

Attention: [insert full name of person, if applicable]

Title/position: [insert title/position]

Agency: [insert name of Purchaser]

Email address: [insert email address]

Fax number: [insert fax number] **delete if not used**

At this point in the procurement process, you may submit a Procurement-related Complaint challenging the decision to award the contract. You do not need to have

requested, or received, a debriefing before making this complaint. Your complaint must be submitted within the Standstill Period and received by us before the Standstill Period ends.

Further information:

For more information see the [Procurement Regulations for IPF Borrowers \(Procurement Regulations\)\[https://policies.worldbank.org/sites/ppf3/PPFDocuments/Forms/DispPage.aspx?docid=4005\]](https://policies.worldbank.org/sites/ppf3/PPFDocuments/Forms/DispPage.aspx?docid=4005) (Annex III). You should read these provisions before preparing and submitting your complaint. In addition, the World Bank's Guidance "[How to make a Procurement-related Complaint](http://www.worldbank.org/en/projects-operations/products-and-services/brief/procurement-new-framework#framework)" [<http://www.worldbank.org/en/projects-operations/products-and-services/brief/procurement-new-framework#framework>] provides a useful explanation of the process, as well as a sample letter of complaint.

In summary, there are four essential requirements:

1. You must be an 'interested party'. In this case, that means a Bidder who submitted a Bid in this bidding process, and is the recipient of a Notification of Intention to Award.
2. The complaint can only challenge the decision to award the contract.
3. You must submit the complaint within the period stated above.
4. You must include, in your complaint, all of the information required by the Procurement Regulations (as described in Annex III).

6. Standstill Period

DEADLINE: The Standstill Period is due to end at midnight on [*insert date*] (local time).

The Standstill Period lasts ten (10) Business Days after the date of transmission of this Notification of Intention to Award.

The Standstill Period may be extended as stated in Section 4 above.

If you have any questions regarding this Notification please do not hesitate to contact us.

On behalf of the Purchaser:

Signature: _____

Name: _____

Title/position: _____

Telephone: _____

Email: _____

Beneficial Ownership Disclosure Form

INSTRUCTIONS TO BIDDERS: DELETE THIS BOX ONCE YOU HAVE COMPLETED THE FORM

This Beneficial Ownership Disclosure Form ("Form") is to be completed by the successful Bidder¹. In case of joint venture, the Bidder must submit a separate Form for each member. The beneficial ownership information to be submitted in this Form shall be current as of the date of its submission.

For the purposes of this Form, a Beneficial Owner of a Bidder is any natural person who ultimately owns or controls the Bidder by meeting one or more of the following conditions:

- *directly or indirectly holding 25% or more of the shares*
- *directly or indirectly holding 25% or more of the voting rights*
- *directly or indirectly having the right to appoint a majority of the board of directors or equivalent governing body of the Bidder*

RFB No.: [insert number of RFB process]

Request for Bid No.: [insert identification]

To: [insert complete name of Purchaser]

In response to your request in the Letter of Acceptance dated [insert date of letter of Acceptance] to furnish additional information on beneficial ownership: [select one option as applicable and delete the options that are not applicable]

(i) we hereby provide the following beneficial ownership information.

Details of beneficial ownership

Identity of Beneficial Owner	Directly or indirectly holding 25% or more of the shares (Yes / No)	Directly or indirectly holding 25 % or more of the Voting Rights (Yes / No)	Directly or indirectly having the right to appoint a majority of the board of the directors or an equivalent governing body of the Bidder (Yes / No)
[include full name (last, middle, first), nationality, country of residence]			

OR

(ii) *We declare that there is no Beneficial Owner meeting one or more of the following conditions:*

- directly or indirectly holding 25% or more of the shares
- directly or indirectly holding 25% or more of the voting rights
- directly or indirectly having the right to appoint a majority of the board of directors or equivalent governing body of the Bidder

OR

(iii) *We declare that we are unable to identify any Beneficial Owner meeting one or more of the following conditions. [If this option is selected, the Bidder shall provide explanation on why it is unable to identify any Beneficial Owner]*

- directly or indirectly holding 25% or more of the shares
- directly or indirectly holding 25% or more of the voting rights
- directly or indirectly having the right to appoint a majority of the board of directors or equivalent governing body of the Bidder]

Name of the Bidder: **[insert complete name of the Bidder]*_____

Name of the person duly authorized to sign the Bid on behalf of the Bidder: ***[insert complete name of person duly authorized to sign the Bid]*_____

Title of the person signing the Bid: *[insert complete title of the person signing the Bid]*_____

Signature of the person named above: *[insert signature of person whose name and capacity are shown above]*_____

Date signed *[insert date of signing]* **day of** *[insert month]*, *[insert year]*_____

* In the case of the Bid submitted by a Joint Venture specify the name of the Joint Venture as Bidder. In the event that the Bidder is a joint venture, each reference to “Bidder” in the Beneficial Ownership Disclosure Form (including this Introduction thereto) shall be read to refer to the joint venture member.

** Person signing the Bid shall have the power of attorney given by the Bidder. The power of attorney shall be attached with the Bid Schedules.

Letter of Acceptance

[use letterhead paper of the Purchaser]

[date]

To: *[name and address of the Supplier]*

Subject: **Notification of Award Contract No.**

This is to notify you that your Bid dated *[insert date]* for execution of the *[insert name of the contract and identification number, as given in the SCC]* for the Accepted Contract Amount of *[insert amount in numbers and words and name of currency]*, as corrected and modified in accordance with the Instructions to Bidders is hereby accepted by our Agency.

You are requested to furnish (i) the Performance Security within 28 days in accordance with the Conditions of Contract, using for that purpose one of the Performance Security Forms and (ii) the additional information on beneficial ownership in accordance with BDS ITB 45.1 within eight (8) Business days using the Beneficial Ownership Disclosure Form, included in Section X, - Contract Forms, of the Bidding Document.

Authorized Signature:

Name and Title of Signatory:

Name of Agency:

Attachment: Contract Agreement

Contract Agreement

[The successful Bidder shall fill in this form in accordance with the instructions indicated]

THIS AGREEMENT made

the *[insert: **number**]* day of *[insert: **month**]*, *[insert: **year**]*.

BETWEEN

- (1) *[insert complete name of Purchaser]*, a *[insert description of type of legal entity, for example, an agency of the Ministry of of the Government of {insert name of Country of Purchaser}, or corporation incorporated under the laws of {insert name of Country of Purchaser}]* and having its principal place of business at *[insert address of Purchaser]* (hereinafter called “the Purchaser”), of the one part, and
- (2) *[insert name of Supplier]*, a corporation incorporated under the laws of *[insert: country of Supplier]* and having its principal place of business at *[insert: address of Supplier]* (hereinafter called “the Supplier”), of the other part:

WHEREAS the Purchaser invited Bids for certain Goods and ancillary services, viz., *[insert brief description of Goods and Services]* and has accepted a Bid by the Supplier for the supply of those Goods and Services

The Purchaser and the Supplier agree as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract documents referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other contract documents.
 - (a) the Letter of Acceptance
 - (b) the Letter of Bid
 - (c) the Addenda Nos. _____ (if any)
 - (d) Special Conditions of Contract
 - (e) General Conditions of Contract
 - (f) the Specification (including Schedule of Requirements and Technical Specifications)
 - (g) the completed Schedules (including Price Schedules)
 - (h) any other document listed in GCC as forming part of the Contract
3. In consideration of the payments to be made by the Purchaser to the Supplier as specified in this Agreement, the Supplier hereby covenants with the Purchaser to provide the Goods and Services and to remedy defects therein in conformity in all respects with the provisions of the Contract.
4. The Purchaser hereby covenants to pay the Supplier in consideration of the provision of the Goods and Services and the remedying of defects therein, the Contract Price or

such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of *[insert the name of the Contract governing law country]* on the day, month and year indicated above.

For and on behalf of the Purchaser

Signed: *[insert signature]*

in the capacity of *[insert title or other appropriate designation]*

In the presence of *[insert identification of official witness]*

For and on behalf of the Supplier

Signed: *[insert signature of authorized representative(s) of the Supplier]*

in the capacity of *[insert title or other appropriate designation]*

in the presence of *[insert identification of official witness]*

Performance Security

Option 1: (Bank Guarantee)

[The bank, as requested by the successful Bidder, shall fill in this form in accordance with the instructions indicated]

[Guarantor letterhead or SWIFT identifier code]

Beneficiary: *[insert name and Address of Purchaser]*

Date: *_ [Insert date of issue]*

PERFORMANCE GUARANTEE No.: *[Insert guarantee reference number]*

Guarantor: *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that *_ [insert name of Supplier, which in the case of a joint venture shall be the name of the joint venture]* (hereinafter called "the Applicant") has entered into Contract No. *[insert reference number of the contract]* dated *[insert date]* with the Beneficiary, for the supply of *_ [insert name of contract and brief description of Goods and related Services]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of *[insert amount in figures]* (_____) *[insert amount in words]*,¹ such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating that the Applicant is in breach of its obligation(s) under the Contract, without the Beneficiary needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire, no later than the Day of, 2...², and any demand for payment under it must be received by us at this office indicated above on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

¹ The Guarantor shall insert an amount representing the percentage of the Accepted Contract Amount specified in the Letter of Acceptance, and denominated either in the currency (ies) of the Contract or a freely convertible currency acceptable to the Beneficiary.

² Insert the date twenty-eight days after the expected completion date as described in GC Clause 18.4. The Purchaser should note that in the event of an extension of this date for completion of the Contract, the Purchaser would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Purchaser might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months] [one year], in response to the Beneficiary's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee."

[signature(s)]

Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.

Option 2: Performance Bond

By this Bond *[insert name of Principal]* as Principal (hereinafter called “the Supplier”) and *[insert name of Surety]* as Surety (hereinafter called “the Surety”), are held and firmly bound unto *[insert name of Purchaser]* as Obligee (hereinafter called “the Supplier”) in the amount of *[insert amount in words and figures]*, for the payment of which sum well and truly to be made in the types and proportions of currencies in which the Contract Price is payable, the Supplier and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS the Supplier has entered into a written Agreement with the Purchaser dated the _____ day of _____, 20 ____, for *[name of contract and brief description of Goods and related Services]* in accordance with the documents, plans, specifications, and amendments thereto, which to the extent herein provided for, are by reference made part hereof and are hereinafter referred to as the Contract.

NOW, THEREFORE, the Condition of this Obligation is such that, if the Supplier shall promptly and faithfully perform the said Contract (including any amendments thereto), then this obligation shall be null and void; otherwise, it shall remain in full force and effect. Whenever the Supplier shall be, and declared by the Purchaser to be, in default under the Contract, the Purchaser having performed the Purchaser’s obligations thereunder, the Surety may promptly remedy the default, or shall promptly:

- (1) complete the Contract in accordance with its terms and conditions; or
- (2) obtain a Bid or Bids from qualified Bidders for submission to the Purchaser for completing the Contract in accordance with its terms and conditions, and upon determination by the Purchaser and the Surety of the lowest responsive Bidder, arrange for a Contract between such Bidder and Purchaser and make available as work progresses (even though there should be a default or a succession of defaults under the Contract or Contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the Balance of the Contract Price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term “Balance of the Contract Price,” as used in this paragraph, shall mean the total amount payable by Purchaser to Supplier under the Contract, less the amount properly paid by Purchaser to the Supplier; or
- (3) pay the Purchaser the amount required by Purchaser to complete the Contract in accordance with its terms and conditions up to a total not exceeding the amount of this Bond.

The Surety shall not be liable for a greater sum than the specified penalty of this Bond.

Any suit under this Bond must be instituted not later than twenty-eight (28) days following the date of completion of the Supplier's performance of its obligations under the Contract, including any warranty obligations.

No right of action shall accrue on this Bond to or for the use of any person or corporation other than the Purchaser named herein or the heirs, executors, administrators, successors, and assigns of the Purchaser.

In testimony whereof, the Supplier has hereunto set his hand and affixed his seal, and the Surety has caused these presents to be sealed with his corporate seal duly attested by the signature of his legal representative, this _____ day of _____ 20_____
_____.

SIGNED ON _____ on behalf of

By _____ in the capacity of

In the presence of

SIGNED ON _____ on behalf of

By _____ in the capacity of

In the presence of

Advance Payment Security Demand Guarantee

[Guarantor letterhead or SWIFT identifier code]

Beneficiary: *[Insert name and Address of Purchaser]*

Date: *[Insert date of issue]*

ADVANCE PAYMENT GUARANTEE No.: *[Insert guarantee reference number]*

Guarantor: *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that *[insert name of Supplier, which in the case of a joint venture shall be the name of the joint venture]* (hereinafter called "the Applicant") has entered into Contract No. *[insert reference number of the contract]* dated *[insert date]* with the Beneficiary, for the execution of *[insert name of contract and brief description of Goods and related Services]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, an advance payment in the sum *[insert amount in figures]* () *[insert amount in words]* is to be made against an advance payment guarantee.

At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of *[insert amount in figures]* (_____) *[insert amount in words]*¹ upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating either that the Applicant:

- (e) has used the advance payment for purposes other than toward delivery of Goods; or
- (f) has failed to repay the advance payment in accordance with the Contract conditions, specifying the amount which the Applicant has failed to repay.

A demand under this guarantee may be presented as from the presentation to the Guarantor of a certificate from the Beneficiary's bank stating that the advance payment referred to above has been credited to the Applicant on its account number *[insert number]* at *[insert name and address of Applicant's bank]*.

The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Applicant as specified in copies of interim statements or payment certificates which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of a copy of the interim payment certificate indicating that ninety (90) percent of the Accepted Contract Amount, has been certified for payment, or on the

¹ *The Guarantor shall insert an amount representing the amount of the advance payment and denominated either in the currency(ies) of the advance payment as specified in the Contract, or in a freely convertible currency acceptable to the Purchaser.*

[insert day] day of *[insert month]*, 2 *[insert year]*, whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No.758, except that the supporting statement under Article 15(a) is hereby excluded.

.

[signature(s)]

Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.