



THE HASHEMITE KINGDOM OF JORDAN
ELECTRICITY DISTRIBUTION COMPANY (EDCO)

Tender No.(22/2024)

تمديد

توريد عدادات 1 و 3 فاز مع موديمات و

HES or Upgrading

Tenderer:

- Name: _____
- Address: _____
- Telephone/ Cellular: _____
- Fax: _____
- Website: _____
- E-Mail: _____
- Contact Person: _____

Director General

Electricity Distribution Company (EDCO)

P.O. BOX: 830878.

Amman - 11183 - Jordan.

The Hashemite Kingdom of Jordan.

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INVITATION TO TENDER

تمديد

(22/2024)

Dear Sir,

You are kindly requested to tender for the supply of the below mentioned materials as per the quantities and technical specifications enclosed herewith, by filling in the schedules, signing the form of tender, and forwarding the complete tender documents to the attention of **EDCO-Director General** addressed as seen on the cover page, to be **received not later than 2: 00 pm (local time) (1/ 5 /2024)**.

All bids must be accompanied with a bid bond of a value not less than **5%** of the highest alternative tender price, otherwise your tender will not be considered. The bid bond shall be enclosed in the same envelope of the tender and must be delivered to the above office **not later than 2:00 pm (local time) (1/5 /2024)**.

- **The winning bidders/bidder shall bear the announcement costs in the local newspapers, no matter how often the announcement has been posted.**

GENERAL CONDITIONS

- The below are general conditions of contract for the supply and delivery of plant and materials based on United Nations economic commission for Europe publication ref.: me/ 188 Geneva. March, 1953 And/or according to FIDIC 1999 if there is a constructions works.

1. Preamble

1.1. These General Conditions shall apply, save as varied by express agreement accepted in writing by both parties.

1.2. Definition of Terms:

The "**Purchaser**" shall mean "**ELECTRICITY DISTRIBUTION COMPANY.**" Hereinafter called "**EDCO**", and shall include **EDCOS** legal personal representatives and duly appointed engineers. The "**Engineer**" shall mean ". **ELECTRICITY DISTRIBUTION COMPANY** " or persons for the time being or from time to time duly appointed in writing by the purchaser to act as Engineer for the purpose of the contract.

The words "approved" and "approval" where used in these conditions or in the specification shall mean "**approved by**" and "**approval of**" the purchaser respectively. The "Vendor" shall mean the "Contractor" who's tender has been accepted by the purchaser and shall include the **Vendor's**. (Contractor's) legal personal representatives, successors and permitted assigns, "**F.O.B. Price**" shall mean the cost of the equipment delivered free on board the ship or truck or aircraft, all port charges and handling charges (also heavy lift if applicable) included .

The contractor must insure the material against all risks from the time it leaves the works until it is placed F.O.B "**CFR price**" shall mean F.O.B. price plus freight including unloading at the port of destination. All Marine Insurance will be affected by the purchaser.

NOTE:-The contractor must provide full details of the material to be shipped in good time for **EDCO** to arrange for Marine Insurance before the material is actually shipped.

2. Formation of Contract

- 2.1. The contract shall be deemed to have been entered into when the purchaser has sent an acceptance in writing before the time set in the tender for acceptance or any such later date extended by the tenderer at the request of the purchaser.
- 2.2. Notwithstanding that the contract and correspondence in connection with the contract shall be in the English language, the contract shall be and be deemed to be a Jordan contract and shall accordingly be governed by and construed according to the laws for the time being in force in the Hashemite Kingdom of Jordan.
- 2.3. **Power to Vary The Work:** no alternations, amendments, omissions, additions, suspensions, or variations of the work, (hereinafter referred to as "variations") under the contract as shown by the contract drawings or the specification shall be made by the contractor except as directed in writing by the purchaser, but the purchaser shall have full power, subject to the provision hereinafter contained, from time to time during the execution of the contract by notice in writing to instruct the contractor to make such variation without prejudice to the contract and the contractor shall carry out such variations, and be bound by the same conditions, as far as applicable, as though they said variations occurred in the specification. If any suggested variations would, in the opinion of the contractor, if carried out, prevent him from fulfilling any of his obligations or guarantees under the contract, he shall notify the purchaser thereof in writing, and the purchaser shall decide forthwith whether or not the same shall be carried out, and if the purchaser confirms his instructions, the contractor's obligations and guarantee shall be modified to such an extent as may be justified. The difference in cost, if any, occasioned by any such variations, shall be added to or deducted from the contract price as the case may require. The amount of such difference, if any, shall be ascertained and determined in accordance with the rates specified in the schedule of prices so far as the same may be applicable, and where the rates are not contained in the said Schedule, or are not applicable they shall be settled by the purchaser and the contractor jointly.

But the purchaser shall not become liable for the payment of any charge in respect of any such variations, unless the instruction for the performance of the same shall have been given in writing by him. In the event of the purchaser requiring any variation, such reasonable a proper notice shall be given to the contractor as will enable him to make his arrangements accordingly, and in cases where goods or materials are already prepared, or any designs, drawings, or patterns made or work done that requires to be altered a reasonable sum in respect thereof shall be allowed by the purchaser. Provided that no such variations shall, except with consent in writing of the contractor, be such as will involve an increase or decrease of the total price payable under the contract by more than 25 percent thereof. The power given to the purchaser to make any alteration, amendment, omission, addition or variation to, from or in any part of the works shall include power to vary from time to time the date for the completion of the works or any part thereof, **also the purchaser shall have the absolute right to increase the quantities in such manner that the increment does not exceed the amount of 25% of the total price payable under the contract, however; the same prices awarded and any other relevant conditions shall remain the same for this purpose. This right is valid during the delivery period of the ordered material, implementation of works, or (90) days from the date of the letter of award, which is come later.**

- 2.4. **Precedence:** In the event of any discrepancy or contradiction between the provisions of the conditions of contract and of the specification, the conditions of contract shall take precedence. Furthermore in case of discrepancy between unit and total prices then unit price will be considered.
- 2.5. **Prices:** the tender calls for firm prices, unless; otherwise mentioned in the special requirements schedule.

3. **Drawings and Descriptive Documents**

- 3.1. The weights, dimensions, capacities, prices, performance rating and other data included in catalogues, prospectuses, circulars, advertisement, illustrated matter and price lists constitute an approximate guide. These data shall not be binding save to the extent that they are by reference expressly included in the contract.

- 3.2. Any drawings or technical documents intended for use in the construction of the material or of part thereof and submitted to the purchaser prior or subsequent to the formation of the contract remain the exclusive property of the Vendor. They may not, without the Vendor's consent, be utilized by the purchaser or copied, reproduced, transmitted or communicated to a third party. Provided, however, that the said plans and documents shall be the property of the purchaser.
- a. If it is expressly so agreed, or
 - b. If they are referable to a separate preliminary development contract on which no actual construction was to be performed and in which the property of the Vendor in the said plans and documents was not reserved.
- 3.3. Any drawings or technical documents intended for use in the construction of the material or of part thereof and submitted to the Vendor by the Purchaser prior or subsequent to the formation of the contract remain the exclusive property of the Purchaser. They may not, without his consent be utilized by the Vendor or copied, reproduced, transmitted or communicated to a third party.
- 3.4. The Vendor shall, if required by the purchaser, furnish free of charge to the purchaser at the commencement of the Guarantee Period, as defined in clause 9, information and drawings other than manufacturing drawings of the material in sufficient detail to enable the purchaser to carry out the erection, commissioning, operation and maintenance (including running repairs) of all parts of the material. Such information and drawings shall be the property of the purchaser and the restrictions on their use set out in paragraph 2 hereof shall not apply thereto. Provided that if the Vendor so stipulates, they shall remain confidential.

4. Packing of the materials and shipping marks

- 4.1. All materials, equipment and goods shall be very well packed, in seaworthy containers and/or wooden cases, etc. These should protect the material during shipping, handling, unloading for a reasonable period of storage at Aqaba and latter storage at EDCO stores.
- 4.2. Packing for indoor materials should be done in such manner as to adequately ensure no ingress of moisture, during the shipping and storage periods.

- 4.3. Packing of fragile equipment (e.g. including instruments and porcelain) should be done in a way which ensures a reasonable resistance to impact breakage during transport.
- 4.4. Packing shall in general be adequate and in compliance with the best international practice.
- 4.5. A descriptive and fully itemized list shall be prepared for 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 and securely fastened to the outside of one end of the case. And its position adequately indicated by stenciling on the case. Where appropriate drawing showing the erection marking of the items concerned shall be placed inside the case.
- 4.6. **EDCO** will supply the successful tenderer with a drawing of its shipping mark for utilization.
- 4.7. All packing cases, crates, barrels and drums shall remain the property of the purchaser.

5. **Inspection and Tests**

All inspections and tests of the Plant and materials shall be performed to the extent and in the manner as stipulated in the Standards specified. Type test certificates shall be submitted for all important items supplied. They shall contain all major technical particulars which are mentioned in the Technical Data Sheets.

Routine test certificates showing the results of all tests performed on the individual Plant and materials shall be furnished to the Purchaser before dispatch of such equipment. The Purchaser reserves the right to have certain tests performed in the presence of his representative or an independent testing authority. A suitable program for such inspections and tests shall be agreed upon and adequate notice (at least 21 days) shall be given when the Plant and/or materials are ready for inspection or test and every facility shall provide by the Contractor to enable the Purchaser to carry out the necessary inspections and tests. The performance of any such inspections and tests in the presence of the Purchaser and/or an

independent testing authority does not relieve the Contractor from his Contractual obligations.

5.1 General Inspection Requirement

The whole of the material by the contract will be subject to inspection and testing by the engineer during manufacture and on completion. The approval of the engineer or the passing of any such inspection or test will not, however; prejudice the right of the purchaser to reject the material if it fails to comply with the specification when erected or to give complete satisfaction in service. The costs of all tests and inspection shall be borne by the contractor and shall be deemed to be included in the contract price. Before any material is packed or dispatched from the main or sub-contractor's works, all tests called for are to have been successfully carried out in presence of the engineer. Adequate notice shall be given when the material is ready for inspection or test and every facility shall be provided by the contractor and his inspection and his sub-contractors to enable the Engineer to carry out the necessary inspections and tests.

Triplicate copies of all principal test records and test certificates shall be supplied to the Engineer for all tests carried out in accordance with the provisions of the contract.

5.1.1 If expressly agreed in the contract, the purchaser shall be entitled to have the quality of the materials used and the parts of the instruments, both during manufacture and when completed, inspected and checked by his authorized representatives.

Such inspection and checking shall be carried out at the place of manufacture during normal working hours after agreement with the Vendor as to date and time.

5.1.2 If as a result of such inspection and checking the purchaser shall be of the opinion that any materials or parts are defective or not in accordance with the contract, he shall state in writing his objections and the reasons therefore.

5.1.3 Sub-Contractors: Within two months of acceptance of the tenders the contractor shall forward to the engineer a list of all sub-orders

placed or intended. The contractor shall submit three copies of all sub-orders or selected by the engineer for progress or inspection. One copy of all drawings referred to in the sub-order is to be submitted unless otherwise agreed by the engineer. The drawings and sub-orders submitted to the engineer will cover all major components which are subject to electrical and mechanical pressure or stress when the material is in operation and also auxiliaries and stores which will be dispatched to site direct from the sub-contractor's work. For the purpose of this clause inter-works orders are to be treated as sub-order. Sub-orders are to include a statement advising the sub-contractor that the items being order will be subject to inspection and test by the Engineer. It is important that all copies of such orders are clearly marked with the main contractor's name and the following reference:

ELECTRICITY DISTRIBUTION COMPANY. CONTRACT No. (22/2024)

Sub-Contractors are to comply with all the applicable requirements of this specification. Orders issued by the sub-contractor are also to include the main contractor's reference on their sub-order in addition to the above-mentioned heading.

5.2 **TESTS:**

All tests should meet the requirements of latest international standard mentioned in the contract or any relevant standard

5.2.1 Acceptance tests will be carried out and, unless otherwise agreed, will be made at the Vendor's works and during normal working hours. If the technical requirements of the tests are not specified in the contract, the tests will be carried out in accordance with the general practice obtaining in the appropriate branch of the industry in the country where the material is manufactured.

5.2.2 The Vendor shall give to the purchaser sufficient notice of the tests to permit the purchaser's representatives to attend. If the purchaser is not represented at the tests, the tests report shall be communicated by the Vendor to the purchaser and shall be accepted as accurate by the purchaser.

5.2.3 If on any test (other than a test site, where test on site are provided for in the contract) the material shall be found to be defective or not in accordance with the contract, the Vendor shall with all speed make good the defect or ensure that the plant complies with the contract. Thereafter, if the purchaser so requires, the test shall be repeated.

5.2.4 Unless otherwise agreed, the Vendor shall bear all the expenses of tests carried out in his works.

5.2.5 If the contract provides for tests on site, the terms and conditions governing such tests shall be such as may be specially agreed between the parties

5.2.6 **Material Tests:** The contractor shall provide test pieces as required by the engineer to enable him to determine the quality of the material supplied free of charge and any cost of the tests shall be borne by the contractor. If any test piece fails to comply with the requirements of the appropriate specifications for the material in question, the engineer may reject the whole of the material represented by that piece, the contractor's designers and

Metallurgists will be consulted before any material is so rejected. In

the event of the engineer being furnished with the certified particulars of the tests which have been carried out for the contractor by the suppliers of the material, he may, at his own discretion, dispense with the previously mentioned tests entirely.

5.2.7 Tests at Manufacture's Works: Works tests shall include all routine, electrical, mechanical and hydraulic tests in accordance with the relevant IEC standard or other standard may be approved except where departures there from and modifications thereto are embodied in this specification. For material not covered by an IEC or British standard or specifically mentioned in this specification the tests shall be agreed with the Engineer. After satisfactory completion of the witnessed tests at the works, the material shall be submitted for the engineer's approval preparatory to shipping. No item of material is to be dispatched to site until the Engineer has given his approval in writing.

5.2.8 Test Certificates: Triplicate sets of all principal test records test certificates and performance curves shall be supplied for all tests carried out in accordance with the provisions of this contract. These test records, certificates and performance curves shall be supplied for all tests, whether or not they have been witnessed by the engineer. The information given in such test certificates and curves shall be sufficient to identify the material or equipment to which the certificates refers and should also bear the contract reference and heading as given in clause 7.2 of this section.

5.2.9 Rejection of the materials: If Any item of material or component which fails comply with the requirements of this specification in any respect whatsoever at any stage of manufacture, test, erection or on completion at site may be rejected by the engineer either in whole or in part as he considers necessary, and after adjustment or modification if so directed by the Engineer, the contractor shall submit the item for the item for the further inspection and / or test.

In the event defects of such a nature that the requirements of this specification cannot be fulfilled by adjustment or modification shall be replaced by the contractor, at his own expense, to the entire satisfaction of the engineer.

5.3 Maintenance:

The contractor must submitted maintenance bond equal to (5%) of the Order amount to guarantee the efficient and good working of the material supplied under the contract for a period of 12 months (Gregorian) from the date of delivery of the material to EDCO SORES in accordance with the General conditions of contract.

6. Passing of Risk

Save as provided in paragraph 7.6, the time at which the risk shall pass shall be fixed in accordance with the International Rules for the Interpretation of Trade Terms (Incoterms) of the International Chamber of Commerce in force at the date of the formation of the contract.

7. Delivery:

- 7.1. Unless otherwise agreed the delivery period shall run from the latest of the following dates:
 - a. The date of the formation of the contract as defined in clause 2.
 - b. The date on which the Vendor receives notice of the issue of a valid import license where such is necessary for the execution of the contract.
 - c. The date of the receipt by the Vendor of such payment in advance of manufacture as stipulated in the contract.
- 7.2. Should delay in delivery be caused by any of the circumstances mentioned in clause 10 or by an act or omission of the purchaser and whether such cause occur before or after the time or extended time for delivery, they shall be granted subject to the provisions of paragraph 5 hereof such extension of the delivery period as is reasonable having regard to all the circumstances of the case.
- 7.3. If a fixed time for delivery is provided for in the contract and the Vendor fails to deliver within such time or any extension thereof granted under paragraph 2 hereof, the purchaser shall be entitled, on giving to the Vendor within a reasonable time notice in writing, to

Claim a deduction of the price payable under the contract. Such deduction shall be calculated at the rate of one half of one percent (0.5%) of that part of the price payable under the contract which is properly attributable to such portion of the plant as cannot in consequence of the said failure be put to the use intended for each complete week of delay commencing on the due date of delivery, but shall not exceed a maximum percentage deduction of ten percent. Such deduction shall be allowed when a payment becomes due on or after delivery. Save as provided in paragraph 5 hereof, such deduction of price shall be to the exclusion of any other remedy of the purchaser in respect of the Vendor's failure to deliver as aforesaid.

- 7.4. If the time for delivery mentioned in the contract is an estimate only, either party may after the expiration of two thirds of such estimated time require the other party in writing to agree a fixed time. Where no time for delivery is mentioned in the contract, this course shall be open to either party after the expiration of six months from the formation of the contract. If in either case the parties fail to agree, either party may have recourse to arbitration, in accordance with the provisions of clause 13, to determine a reasonable time for delivery and the time so determined shall be deemed to be the fixed time for delivery provided for in the contract and paragraph 3 hereof shall apply accordingly.
- 7.5. If any portion of material in respect of which the purchaser has become entitled to the maximum deduction provided for by paragraph 3 hereof, or in respect of which he would have been so entitled had he given the notice referred to therein, remains undelivered, the purchaser may by notice in writing to the Vendor require him to deliver and by such last mentioned notice fix a final time for delivery which shall be reasonable taking into account such delay as has already occurred.
- 7.6. If for any reason whatever the Vendor fails within such time to do everything that he must do to effect delivery, the purchaser shall be entitled by notice in writing to the Vendor, and without requiring the consent of any court, to terminate the contract in respect of such portion of the material and thereupon to recover from the Vendor any amount not exceeding that part of the price payable under the Contract which is

properly attributable to such portion of the material as could not in consequence of the Vendor's failure be put to the use intended.

- 7.7. If the purchaser fails to accept delivery on due date, he shall nevertheless make any payment conditional on delivery as if the material had been delivered. The Vendor shall arrange for the storage of the material at the risk and cost of the purchaser. If required by the purchaser, the Vendor shall insure the material at the cost of the purchaser. Provided that if the delay in accepting delivery is due to one of the circumstances mentioned in clause 10 and the Vendor is in a position to store it in his premises without prejudice to his business, the cost of storing the material shall not be borne by the purchaser.
- 7.8. Unless the failure of the purchaser is due to any of the circumstances mentioned in clause 10, the Vendor may require the purchaser by notice in writing to accept delivery within reasonable time. If the purchaser fails for any reason whatever to do so within such time, the Vendor shall be entitled by notice in writing to the purchaser, and without requiring the consent of any court, to terminate the contract in respect of such portion of the material as is by reason of the failure of the purchaser aforesaid not delivered and thereupon to recover from the purchaser any loss, suffered by reason of such failure up to an amount not exceeding the value of the material, the delivery of which has not been accepted.
- 7.9. If the winner contractor in the tender, refrained for supply the material or execution of works which award for him or failed to execute the contract on the limited time, or failed to replace the rejected material or works in another applying materials on his account, the tenders committee which take its previous design to award the tender for this supplier has the right to Confiscation the bid bond or the performance bond or part of them as commensurate with the material & works value.
- 7.10. If refrained bidder to comply with his offer or did not complete the necessary contract and signing of the purchase order and did not submitted the performance bond within 15 days from the date of the order, the tender s committee has the right to confiscated the bid bond.

Force Majeure

- Notwithstanding the provisions of clauses 7, 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.
- For purposes of this clause, "Force Majeure" means an event beyond the control the supplier not involving the supplier's fault or negligence. Such events may include, but are not restricted to, acts to the purchaser either in its sovereign or contractual capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions and fright embargoes.
- 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 all reasonable alternative means for performance not prevented by the Force Majeure event.

8. Payment:

8.1. **Terms of Payment:**

Subject to any deduction which the purchaser may be authorized to make under the contract or subject to any additions or deductions provided for under clause 2-3 above, The Company (EDCO) prefers to deal with the supplier on an **open account basis**, and the payment to be made as the following:

a. (10%) of the CFR contract value (as shown by the supplier's invoice/contractor invoice) on receipt of the following **legalized shipping** documents by EDCO:

- (Original Invoice + five copies)
- (Certificate of origin + five copies)
- (Bill of lading 3-negotiable + 5 non-negotiable)
- (Test certificate (where applicable) + 6 copies).
-

The original shipping documents must arrive to EDCO or to our bank before (5) days at least prior the materials arrival.

b. (80%) of the invoice value to be paid within 60 days of Receipt of EDCO's certificate of acceptance, Receipt of goods at EDCO stores.

c. (10%) of the contract value within 60 days from expiration of the guarantee period.

If the bidder insists on L/C (letter of credit) as a method of payment, all L/C charges will be on his own expense, in all respects all banking charges are at vendor account, the terms will be as follows:

a. The L/C will be confirmed and irrevocable but has to be **acceptance** L/C, and the supplier has to send the following **legalized shipping** documents:

- (Original Invoice + five copies),
- (Certificate of origin + five copies),
- (Bill of lading 3-negotiable + 5 non-negotiable),
- (Test certificate (where applicable) + 6 copies).
- (Release of shipment (where applicable) – fax copy is accepted).

b. Payment will be released after submitting EDCO's certificate of acceptance to the bank within (30) days after receipt of goods at EDCO's stores.

In the case of a Jordanian Supplier (materials are delivered from local companies), payment will be made through presentation of the invoice as following:

- a. (90%) of the contract value to be paid within 30 days from date of receipt and acceptance of the materials at our EDCO stores.
- b. (10%) of the contract value within 30 days from expiration of the guarantee period (one year from the date of receipt and acceptance of the materials at EDCO stores)

NOTE:

- In case the supplier has better terms of payment than those mentioned above the purchaser will discuss such terms.
- Any deviation on the payment methods mentioned above, will negatively affect the evaluation of tenderer's offer.
- In case the payment by acceptance L/C, The performance bond should be valid for a period expiring at least one year after receipt of the last consignment in EDCO stores.
- EDCO has the right to request an additional bank guarantee equal to (5%) five percent to cover the guarantee period.

Currency of Payment: The contract price will normally be paid in the currency or currencies in which the price has been stated. The purchaser, however, reserves the right to make payments in the currencies of the countries of origin of goods and services at the exchange rates applicable at the time of payment of the contract price.

Shipping documents shall comprise the following documents: -

- 1) **Invoices** – one original, five copies.
- 2) **Shipping specification (packing list)** – six copies.
- 3) **Certificate of origin** – one original, five copies.
- 4) **Bill of lading** – 3 three negotiable, five non-negotiable.
- 5) **Test certificates (where applicable)** – six copies.
- 6) **Release of shipment (where applicable)** – fax copy is accepted.
- 7) **EDCO's Certificate of Acceptance** - fax copy is accepted

- 8.2. Any advance payments made by the Purchaser are payments on account and do not constitute a deposit, the abandonment of which would entitle either party to terminate the Contract.
- 8.3. If delivery has been made before payment of the whole sum payable under the Contract, plant delivered shall, to the extent permitted by the law of the country where the plant is situated after delivery, remain the property of the Vendor until such payment has been effected. If such law does not permit the Vendor to retain the property in the plant, the Vendor shall be entitled to the benefit of such other rights in respect thereof as such law permits him to retain. The Purchaser shall give the Vendor every assistance in taking any measures required to protect the Vendor's right of property or such other rights as aforesaid.
- 8.4. A payment conditional on the fulfillment of an obligation by the Vendor shall not be due until such obligation has been fulfilled, unless the failure of the Vendor is due to an act or omission of the Purchaser.
- 8.5. If the Purchaser delays in making any payment, the Vendor may postpone the fulfillment of his own obligations until such payment is made, unless the failure of the Purchaser is due to an act or omission of the Vendor.
- 8.6. If delay by the Purchaser in making any payment is due to one of the circumstances mentioned in clause 10, the Vendor shall not be entitled to any interest on the sum due.
- 8.7. Save as aforesaid, if the Purchaser delays in making any payment, the Vendor shall on giving to the Purchaser within a reasonable time notice in writing be entitled, and without requiring the consent of any Court, to terminate the Contract and thereupon to recover from the Purchaser the amount of his loss up to the value of the plant, the payment for which has been unreasonably delayed.

9. **Guarantee:**

- 9.1. Subject as hereinafter set out; the Vendor undertakes to remedy any defect resulting from faulty design, materials or workmanship.
- 9.2. This liability is limited to defects which appear during the period
(Hereinafter called the Guarantee Period) of **fifteen** months from date of dispatch ex-works or twelve months from the date of accepting the Materials at EDCO stores whichever shall be later.

Or in case of turn key projects eighteen months from the date of setting to work.

- 9.3. In fixing this period due account has been taken of the time normally required for transport as contemplated in the contract.
- 9.4. In respect of such parts (whether of the Vendor's own manufacture or not) of the material as are expressly mentioned in the contract, the Guarantee Period shall be such other period (if any) as is specified in respect of each of such parts.
- 9.5. The Guarantee period is based on the continuous use of the plant in services for 24 hours every day.
- 9.6. A fresh Guarantee Period equal to that stated in paragraph 2 hereof shall apply, under the same terms and conditions as those applicable to the original material, to parts supplied in replacement of defective parts or to parts renewed in pursuance of this clause. This provision shall not apply to the remaining parts of material, the Guarantee Period of which shall be extended only by a period equal to the period during which the material is out of action as result of a defect covered by this clause.
- 9.7. In order to be able to avail himself of his rights under this clause the purchaser shall notify the Vendor in writing without delay of any defects that have appeared and shall give him every opportunity of inspecting and remedying them.
- 9.8. On receipt of such notification the Vendor shall remedy the defect forthwith and at his own expense. Save where the nature of the defect is such that it is appropriate to effect repairs on site, the purchaser shall return to the Vendor any part in which a defect covered by this clause has appeared, for repair or replacement by the Vendor, and in such case the delivery to the purchaser of such part properly repaired or a part in replacement thereof shall be deemed to be a fulfillment by the Vendor of his obligations under this paragraph in respect of such defective part.
- 9.9. The Vendor shall bear all the costs and risks of the transport of defective parts or equipment's and their replacements.
- 9.10. Where, in pursuance of paragraph 9 hereof, repairs are required to be

effected on site, the conditions covering the attendance of the Vendor's representatives on site shall be such as may be specially agreed between the parties.

- 9.11. Defective parts replaced according to this clause shall be placed at the disposal of the Vendor.
- 9.12. If the Vendor refuses to fulfill his obligations under this clause or fails to proceed with due diligence after being required so to do, the purchaser may proceed to do the necessary work at the Vendor's risk and expense, provided that he does so in a reasonable manner.
- 9.13. The Vendor's liability does not apply to defects arising out of materials provided, or out of a design stipulated, by the purchaser.
- 9.14. The Vendor's liability shall apply only to defect that appears under the conditions of operation provided for by the contract and under proper use. It does not cover defects due to causes arising after the risk in the material has passed in accordance with clause 6. In particular it does not cover defects arising from the purchaser's faulty maintenance or erection, or from alterations carried out without the Vendor's consent in writing, or from repairs carried out improperly by the purchaser, nor does it cover normal deterioration.
- 9.15. Save as in this clause expresses, the Vendor shall be under no liability in respect of defects after the risk in the material has passed in accordance with clause 6, even if such defects are due to causes existing before the risk so passed. It is expressly agreed that the purchaser shall have no claim in respect of personal injury or of damage to property not the subject matter of the contract or of loss of profit unless it is shown from the circumstances of the case that the Vendor has been guilty of gross misconduct.

9.16. All defective and/ or not complying materials shall be

Evacuated from

EDCO stores within a maximum of one month by the vender from the date of notifying him. All costs and expenses of transportation shall be borne by the vendor. Unless otherwise agreed.

Otherwise; EDCO has the right to deal with the defective materials in a proper way.

9.17. Gross misconduct "does not comprise any and every lack of proper care or skill, but means an act or omission on the part of the Vendor implying either a failure to pay due regard to serious consequences which a conscientious contractor would normally foresee as likely to ensue, or a deliberate disregard of any consequences of such act or omission.

10. Relief

10.1. The following shall be considered as cases of relief if they intervene after the formation of the contract and impede its performance: industrial disputes, and any other circumstances (e.g. fire, mobilization, requisition, embargo, currency restrictions, insurrection, shortage of transport, general shortage of materials and restrictions in the use of power) when such other circumstances are beyond the control of the parties.

10.2. The party wishing to claim relief by reason of any of the said circumstances shall notify the other party in writing without delay on the intervention and on the cessation thereof.

10.3. The effects of the said circumstances so far as they affect the timely performance of their obligation by the parties, are defined in clauses 7 and 8. Save as provided in paragraph 7.5, 7.7, and 8.7, if by reason of any of the said circumstances, the performance of the contract within a reasonable time becomes impossible, either party shall be entitled to terminate the contract by notice in writing to the other part without requiring the consent of any court.

10.4. If the contract is terminated in accordance with paragraph 3 hereof, the division of the expenses incurred in respect of the contract shall be determined by agreement between the parties.

10.5. In default of agreement it shall be determined by the arbitrator which

party has been prevented from performing his obligations and that party shall bear the whole of the said expenses.

Where the purchaser is required to bear the whole of the expenses and has before termination of the contract paid to the Vendor more than the amount of the Vendor's expenses, the purchaser shall be entitled to recover the excess. If the arbitrator determines that both parties have been prevented from performing their obligation, he shall apportion the said expenses between the parties in such manner as to him seems fair and reasonable, having regard to all the circumstances of the case.

- 10.6. For the purposes of this clause "expenses" means actual out of pocket expenses reasonably incurred, after both parties shall have mitigated their losses as far as possible. Provided that as respects material delivered to the purchaser the Vendor's expenses shall be deemed to be that part of the price payable under the contract which is properly attributable thereto.

11. Limitation of Damages:

- 11.1. Where either party is liable in damages to the other these shall not exceed the damage which the party in default could reasonably have foreseen at the time of the formation of the contract.
- 11.2. The party who sets up a breach of the contract shall be under a duty to take all necessary measures to mitigate the loss which has occurred provided that he can do so without unreasonable inconvenience or cost. Should he fail to do so, the party guilty of the breach may claim a reduction in the damages.

12. Rights at Termination:

Termination of the contract from whatever cause arising shall be without prejudice to the rights of the parties accrued under the contract up to the time of termination.

Arbitration and Law Applicable:

- 13.1. If Any dispute, question or controversy shall arise between the purchaser and the contractor concerning this contract the matter in dispute shall be referred to an arbitration committee composed of three (3) arbitrators

- 13.2.** One arbitrator shall be nominated by the purchaser and one by the contractor, and the third arbitrator shall be appointed by both parties.
- 13.3.** If either party fails to appoint his arbitrator within one month of the appointment of the arbitrator by the other party, or if the two parties fail to agree on the third arbitrator within two months of the date of the request to refer the dispute to arbitration, such arbitrator shall be appointed by the president of the highest court in Jordan at the request of either or both parties.
- 13.4.** The decision of the arbitrators shall be final and binding on both the purchaser and the contractor. Any such reference shall conform to the statutory enactment or regulation governing arbitration as may be in force in Jordan at the time. The assessment of costs incidental to the reference and award respectively shall be at the discretion of the arbitration committee.

TENDERING INSTRUCTIONS

1. The Tender shall be made in one copy of the accompanying form; however, all blanks and schedules shall be filled up in ink, and signed without alteration to the form of tender. If any such alteration were made, or if these Instructions were not fully complied with, the tender may be rejected. The tenderer; however, is at liberty to add any further details that he may deem desirable and, in the event of his so doing, shall print or type such details and annex the added matter to the tender submitted by him. Such additional details shall not be binding upon the purchaser unless they shall be subsequently incorporated in the contract.
2. One copy of the tender, and its accompanying documents, filled up as directed, together with the drawings, catalogs, and relevant documents called for, must be enclosed in a secure envelope endorsed **(Tender for Contract No. (22/2024))**.
3. All correspondences in connection with this tender and all matters accompanying the tender that are relevant to its examination shall be in English language and expressed in metric units.
4. The tender is to be held open for acceptance or rejection for a validity period of (90) days from the time fixed for opening the tenders.
5. Tenders received prior to the time fixed for opening of tenders will be securely kept, unopened. Tenders received after that time will be rejected. The purchaser bears no responsibility for premature opening of tenders not properly addressed or identified.
6. Tenders may be withdrawn by formal request received in writing from the tenderer prior to the time fixed for opening. If for any reason the tender should be withdrawn after the time fixed for opening and before expiry of the said validity period, the purchaser has the right to retain the full value of the tender bond.
7. The successful tenderer shall abide by the commercial and professional regulations as required by the Ministry of Industry & Trade, Engineering Association and other relevant Institutions in Jordan.

8. Tenderers attention is drawn to the action of customs officers in the discharge of their duties. Whereby air parcels are frequently opened In their own interests and in order to preserve the confidential nature of the tender price, tenderers are urged to pay attention to the:
 - a. To dispatch the completed tender document and any covering letter only by Air Mail which should be endorsed and labeled in the manner laid down in paragraph 10 of the Instructions to Tendering.
 - b. Technical literature and the like may reasonably be sent by Air Parcel or Air Freight but since this would then be separated from the actual Tender, each parcel should contain specific evidence identifying the Tender to which the contents refer.
 - c. The purchaser will not consider late or incompletely delivered tenders or literature supporting tenders due to the action of any customs officer.
9. In the event that the intending signatory does not manufacture one or more of the main sections of equipment and materials, then the tender submitted should give evidence to show that all the obligations imposed by the documents on the intending signatory have been fully understood and accepted, where applicable, by the manufacturer(s) to whom it would be intended to sub-contract one or more of the main sections of the equipment and materials.
10. For overseas transport of the contractor and his Sub-contractors, suppliers and manufactures must give priority to Jordan shipping national lines, and to Arab shipping companies and their subsidiaries for the shipping of goods, materials provided such companies ships call at the port of export. The contractor shall also give priority to the Royal Jordanian Airlines for air freight shipment and transport of personnel.
11. Tenderer must submit country of origin and name of manufacturer for the offered goods.
12. The foreign bidders who participate in this tender must submit their bids through a registered local agent or through their registered office in Jordan.
13. For all manufacturers from inside Jordan it is quite essential that they have JQM for their products and the purchaser will have the right to accept or reject their offer if they did not submitted the JQM certificate with their offer.

14. If samples were not re-claimed by the tenderer within one month from date of order all samples shall remain the property of the purchaser.
15. The purchaser will not be responsible for, nor to pay for, any expenses or losses which may be incurred by a tenderer in the preparation of his tender.
16. If the tenderer has any doubt about the meaning of any portion of the General Conditions, Specifications, Drawings, he shall clarify such doubts before submitting his tender, or in case of any further information can be obtained by an application in writing to the director general.
17. Tenderers are particularly directed that the amount entered on the form of tender shall be a fixed price for performing the contract strictly in accordance with the bound document, and shall be the sum total of all the amounts printed into and entered by the tenderer upon the schedule of prices.
18. Tender price shall include all incidental and contingent expenses.
19. The tender shall be accompanied by a tender bond in the form of a Bank Guarantee valid for at least 90 days from the time fixed for opening the tenders or certified check in favor of and payable to the purchaser for a sum of **5% Of Your Offer** _____ as a guarantee of good faith. This bond is to be issued by any approved bank in Jordan. The bond will be returned to the unsuccessful tenderer within (90) days from the time fixed for opening the tenders or at such earlier time as a tender shall have been accepted by the purchaser. In the case of the successful tenderer, the bond will, subject to the conditions of contract, be returned as soon as a formal contract agreement and a performance bond have been entered into.
20. The successful tenderer has to submit a performance bond equal to (10%) ten percent of the total amount of the order within (15) days from date of receipt of the order. Any delay will be subject to delay penalty.

If the successful tenderer fails for any reason to submit the required performance bond within (15) days, the purchaser will confiscate the bid bond and the awarding letter will be cancelled too.
21. The performance bond should be valid for a period; expiring at least one month after receipt of the last consignment in EDCO stores.

22. The tenderer shall state in his tender the name or names of the sureties, insurance company, or bank proposed for guaranteeing the performance of the contract.
23. Prices are highly recommended to be on the basis of C&F EDCO STORES. However CFR Aqaba port or Amman customs are also accepted. All prices offered shall be exempted from custom duties, sales taxes, import license fees and any other tariffs.
24. The tenderer may state the tender price in Jordanian Dinars. If however, a portion of the tenderer's expenditure under the contract is expected to be made in countries other than Jordan he may state a corresponding foreign currency portion of the tender price in the currencies of those other countries.
25. Stamp duty and award fees are payable on Jordanian contracts according to Jordanian laws and, after the placing of a contract, it is the contractor's responsibility to purchase legal stamps to the requisite amount depending on the contract value.
26. If after receipt of tenders, the purchaser finds any difference between prices shown on the form of tender in writing and in numerals, then the price shown in writing shall be considered correct by the purchaser and the tenderer. If any discrepancies are found between the total in the price schedule and the total obtained by adding the products of each quantity and its particular rate then, whether the price shown on the form of tender in numerals or in writing corresponds or not, the total obtained by adding the products of the quantities and their particular rates shall be considered by the purchaser and the tenderer as the tender price.
27. Tender evaluation will be consistent with the terms and conditions set forth in the tender document. In addition to the tender price adjusted to correct arithmetical errors, other relevant factors such as the time of completion of delivery or construction, operating costs where applicable, or the efficiency and compatibility of the equipment, the availability of service and spare parts, and reliability of construction methods proposed will be taken into consideration, to the extent and in the manner specified in the tender documents, in determining the evaluated tender most advantageous to the purchaser. For comparison of all tenders, the currency or currencies of the tender price for each tender will be valued in terms of Jordanian Dinars. The

rates of exchange to be used in such valuation will be the selling rates published by the CENTRAL BANK OF JORDAN and applicable to similar transactions, on the day tenders are opened unless there should be a change in the value of the currencies before the award is made. In the latter case, the exchange rates prevailing at the time of the decision to notify the award to the successful tenderer may be used.

28. The purchaser does not bind himself to accept the lowest offers of any tender, nor to assign any reason for the rejection of any tender, nor to purchase the whole of the equipment and materials specified. The purchaser has the right to purchase part of the tender, even if it is only one item from the schedule of rates and prices.
29. The tenderer shall submit with his tender in order of the relevant clauses, a statement of any departures from specifications, or he can fill in the related schedule attached herewith. Notwithstanding any description, drawings, or literature which may be submitted, all details other than those in the statement of departures shall be assumed to be in accordance with the specification.
30. Although IEC standards for workmanship, equipment and materials, have been selected in this specification as a basis of reference, standards and specifications of other countries and recommendations of other international standard organizations will be acceptable provided that they are substantially equivalent to the designated standards and provided

Further that the tenderer submits for approval detailed specification which he proposes to use.

31. References to brand names or catalog numbers, if any, in this specification have been made only for that equipment for which it has been determined that a degree of standardization is necessary to maintain certain essential features. In certain instances such references have also been made for purpose of convenience to specify the requirements. In either case offers of alternative goods which have similar characteristics and provide performance and quality at least equal to those specified are acceptable.
32. Where compliance with a specific standard specification is called for the standard specification used shall be that in force at the time of tender.
33. The Tenderer should submit a type test certificate from independent testing laboratory similar to the Tender materials as an evidence of his capability to

manufacture such materials also to submit a reference list showing his past supply and he should prove that he supplied similar materials to more than one firm and operated for more than 3 years without problems otherwise his offer will not be considered.

34. A nonrefundable fee of (550) JD will be charged for each set comprising one copy of the Tender Documents.

TENDER AGREEMENT SUMMARY

Tender No. (22/2024)

Dear Sir;

1. Having examined the conditions of Contract, specification and schedule for the above Works, the undersigned, offer to manufacture, supply, work, test, and deliver the said works described in the specification and schedules and in accordance with the said conditions of contract, for the sum of _____ or such other sum as may be ascertained in accordance with the said conditions.
2. We agree that this tender shall be held open for acceptance or rejection for the validity period of **(90) days** from the date fixed for opening tenders and it shall remain binding upon us and may be accepted at any time before the expiration of that period.
3. Unless and until a formal agreement is prepared and executed, this tender, together with your written acceptance thereof, shall constitute a binding contract between us.
4. If our tender is accepted, we will deliver to **ELECTRICITY DISTRIBUTION COMPANY**. Within **(15) days** of being called upon to do so a performance bond by bank or insurance company (to be approved in either case by the purchaser) to be jointly and severally bound with us in a sum equal to **10%** of the value of the contract. The form of the performance bond will be as attached hereto. We propose the following Bank or insurance company as surety (or sureties) in this respect:-.....

5. We undertake if our tender is accepted and on receipt of your acceptance to commence and manufacture, works test, and complete for delivery **ex-works** the whole of the Works offered within (——) weeks calculated from the date of **Order Letter Awarding**, and to deliver on the dock at (————— port) - Jordan the whole of the works offered within a further (————— weeks, or to **EDCO stores** within a further (——) weeks.
6. We undertake to insure the materials against all risks from the time they leave the works until they are placed on board ship. We understand that marine insurance will be affected by **ELECTRICITY DISTRIBUTION COMPANY**. And we will provide details of the materials to be shipped in good time for **ELECTRICITY DISTRIBUTION COMPANY** to arrange for the said marine insurance.
7. A guarantee Period will apply to each section of the works of 15 months from the date of dispatch ex-works or 12 months from the date of setting to work whichever shall be later.
8. We understand that you are not bound to accept the lowest or any tender you may receive.

Dated this ————— day of / / 2024.

Signature————— in the capacity of—————

Duly authorized to sign Tender for and on behalf of —————

ADDRESS ————— OCCUPATION —————

ELECTRICITY DISTRIBUTION COMPANY.

Form of Bid Bond

Tender No. (22/2024)

Dear Sir,

We are pleased to inform you that we guarantee
M/S _____for the amount
of _____in order to allow them to submit an offer
for the due performance of the undertaking and obligation as specified in their
Tender for Contract No. _____This Guarantee shall remain valid for a
period of **(90)** days from the time fixed for opening the Tenders by
ELECTRICITY DISTRIBUTION COMPANY.

This Guarantee shall be free from any interest and will be extended or paid in cash upon your first request in any or required, without the need for natural warning or judicial proceedings and without any rights to delay, oppose, or stop payment on our part, or on the part of the Tenderer or any of his representatives whomever.

This Guarantee shall be deemed valid until the submittal of a duly executed Performance Bond.

Signed _____ Bank (Surety)

ELECTRICITY DISTRIBUTION COMPANY.

Form of Performance Bond

Tender No. (22/2024)

Dear Sirs,

At the request of _____ bank (the Foreign Bank)
and on behalf of M/S _____
(Contractor's Name and Address), we _____ Bank (the
Local Bank) issue in your favor our irrevocable and unconditional Performance
Bond No. _____ in the amount of _____
_____(In _____ words), in this connection we
_____ Bank (the Local Bank) hereby consider
ourselves responsible forth unconditional payment to you or to your authorized
representatives of the above sum on your first written demand in whole or in
part notwithstanding any objections on the part of the above named contractor
and without any need for natural warning or judicial proceedings.

This Bond will expire on _____ and shall be renewed automatically for
a period of _____ months and for consecutive similar periods until it is
returned by you to us.

Signed _____ Bank (Surety)

ELECTRICITY DISTRIBUTION COMPANY.

Form of Maintenance Bond

Tender No. (22/2024)

**M/S. ELECTRICITY DISTRIBUTION CO. (EDCO)
Amman – Jordan**

At the request of _____ Bank (the foreign bank) and on behalf of M/S : _____ (The Contractor name and address), we _____ Bank (the local bank) issue in your favor our irrevocable and unconditional maintenance bond No.(_____) in the amount of _____ (In words) valid until _____ covering _____ PCT value of the _____ (Contract No. Name), in this connection we the _____ Bank (local bank), hereby consider ourselves responsible for the unconditional payment to you or your authorized representatives of the above sum on your first written demand in whole or in part notwithstanding any objections on the part of the above named Contractor and without any need for notarial warning or judicial proceedings.

This bond will expire on _____and shall be renewed automatically for a period of (_____) months and for consecutive similar periods until it is returned by you to us.

Signed _____ Bank (Surety)

Specifications of KWH AMI Meters

A. Scope:

Electricity Distribution Company (EDCO) intends to procure energy smart meters with the following types: single phase, three phase direct, CT operated three phase meters with communication (2G/3G/4G) modules to be supplied in batches and to be added to the EDCO HES systems.

Also to procure a Head End System (HES) or to upgrade an existing HES, as well as all services required for the design, configuration, development, integration, training, and provisioning of operational and maintenance support are included.

EDCO existing HES systems includes “Hexing MDC v8.11.0.13_ED2_RELEASE”, and “Holley MDC v1 3 24.2 20”. The existing HES system might be upgraded where tenderer shall comply with last upgrade.

B. Reference Standards:

- ◆ International Standard specifications IEC 62052/53, 62053-21, 62052-11, 62053-22, 62053-23 ...etc. or an equivalent specification.
- ◆ International Communication Protocols are DLMS/COSEM, MOD-Bus, IEC62056-21... enabling AMI function application.

C. General Specifications:

1. Meters’ Firmware and communication modules shall be successfully capable to integrate with the “Hexing MDC v8.11.0.13_ED2_RELEASE”, or “Holley MDC v1 3 24.2 20” or the new HES (to be supplied in this tender) as specified in HES specifications.
2. A certified document proving tenderer offered meters had operated successfully with one of Head End Servers with the same mentioned versions above.
3. Tenderer must cooperate with EDCO HES vendors (Hexing, Holley, and the new HES to be supplied in this tender) to successfully insure integration of the new supplied meters with one of EDCO HESs.
4. All offered meters shall be support the remote firmware upgrade by EDCO HES in case needed without any change in the installation conditions.
5. Offered meters will have a communication modules support (2G/3G/4G), all Documents and datasheet clarify the model, type, working bands, certification, compliance information and manufactures of the modules should be provided,

6. Telecommunication Regulatory Commission approvals, and approvals related to Jordan custom department are a part of Tenderer responsibilities where the delivery is considered EDCO stores. EDCO role play here is exclusive in supporting documents if needed to concern governmental departments.
7. Offered meters shall contain “last gasp” communication, so that smart meter can generate a message in case of power failure and should support the push events with a clear detail of the supported events.
8. Tenderer shall assign a specialist metering local engineer as a single point of contact enabling EDCO to discuss any technical issue(s).
9. In view of EDCO available HESs (Hexing HES, Holley MDC and the new HES to be supplied in this tender); AMI Expansion and licenses is under tenderer liability and full responsibility.
10. Any meters, which are found to have errors of more than error stated in related IEC standard (when transported by the supplier to EDCO test room and tested with the covers removed or in position) shall be replaced by the supplier at no cost to EDCO.
11. The tenderer/manufacture of the meters offered shall supply proof that he has been manufacturing meters similar to those specified in this document, for at least 5 years. The Tenderer shall submit with his offer a list of supply Authorities using similar meters to those offered as references and the current re-certification period required by law in the country of manufacture.
12. The expected operational time of the offered meter shall be not less than (20 years) and the accuracy of the meter shall remain within the specified class which must be confirmed by an official organization from KEMA, SGS or NMI. A certificate or confirmation to this effect must be provided.
13. The battery life shall be in the range (15-20) years, the meter shall continue to operate even if the battery is lost for any reasons. The battery should not be used if the meter is electrified. The battery should be in a separated sealed place so can be changed in case of need without opening the main cover of the meter.
14. The meter base, terminal and main cover shall be made of suitable rigid plastic material of adequate mechanical and insulation qualities; meter base and main cover shall be non-transparent, the terminal cover shall be of extended type and made from a transparent material.

15. To ensure the fixing screws of modems cannot come out from their place, some design considerations must be taken.
16. The terminals shall be made of nickel- coated brass (bimetallic) material to enable a good electrical contact in hot and humid conditions. The fixing screws shall also be nickel- coated brass material to enable a good contact and prevent loosening at heat. It must be resistant to damage because of use.
17. The meter shall be of tamper-proof design and construction. Tampering cases are detailed at technical part, with a clear detail of the supported events and its conditions.
18. Non-volatile memory shall have a retention time not less than 20 years even in case of power failure.
19. The meter shall not be affected by power failure, as it contains early detection means of power failure, which permits control circuits to store consumption data, and configure the circuit for this failure.
20. The meters shall not generate waves or harmonics, which might affect the neighbouring electrical instruments or super imposed on power.
21. The meter shall be provided with a clock and a calendar to get real time and date. In addition, backup power means that ensures the operation of the clock during the power failure and does not need periodic replacement.
22. Meters shall be support to program by a minimum of 4 tariffs for all supported Energy registers and MD, tariffs controlled by internal timing circuitry and a built-in tariff time switch module, the meter shall provide a minimum of 4 switching times and be capable of providing different programmable tariff structures for summer and winter season or many interval seasons.
23. The meter shall include a built-in time switch of base time shall been taken from crystal oscillator. This time switch shall be programmable to meet tariff scheme and the following requirements:
 - a) The programmable tariff software application shall provide different programmable tariff structures (up to 4 daily switching times) with day light time saving according to the Jordan Standard.

It must be possible to change date, time as well the tariff program; this should also include the ability to make changes remotely via the communications network using EDCO HES systems including Hexing HES, Holley MDC, and the new HES to be supplied in this tender, MDM, SAP billing system, HHU & laptop (The HHU

application shall be in the form of Windows based application with industry standard features).

- b) Tenderers are requested to quote meter with a maximum demand, the meter shall be able to be programmed to activate the maximum demand within the specified daily period of maximum demand through software & HES. The daily period quantity should be specified as per Jordan local law (for 12 period at least).
 - c) The monthly/daily/ load profiles readings of all stored values.
 - d) Automatic and manual reset facilities shall be provided.
 - e) Four tariffs for Energy registers and four tariffs for Maximum Demand.
 - f) Import and Export measurement in two registers (NET register also)
24. Single phase and three phase direct meters inlets should be capable of accepting any size of conductor in the range 6 mm² up to 25 of stranded copper and aluminium conductor, PVC insulated.
25. The meter connection drawing should be provided under terminals cover.
26. The main cover seals shall be visible without any need to remove terminal cover.
27. The meter shall be completely tampering proof, facilitated with up-to-date anti-fraud protection with all fraud events that shall be record in meter's history.
28. The offer shall include the cost of the PC original Software, with necessary accessorise.
29. **List of type test certificates for the meters:**
- a) All type test certificates covering the equipment offered to IEC recommendations shall be submitted with the tender. Failure to provide copies of these type test certificates/reports will result in rejection of the tender.
 - b) The Tender should submit with his offer type test certificates/reports, according to IEC standard from an independent & international recognized testing laboratory such as KEMA, SGS, NMI, for materials similar to the tender materials as an evidence of his capability to manufacture such materials.
 - c) Type test certificates shall be submitted.
 - d) The expected operational time of the meter must be confirmed by an official organization like SGS, KEMA OFGEM, or NMI. A certificate or confirmation to this effect must be provided.
 - e) The relay shall be tested in respect of the following standard IEC 62055-31 (2005) Requirements for UC2. Also, it is a must for the tendered to submit type test certificates of relay from well-known third part laboratory like KEMA, or STL labs or others.

- f) DLMS/COSEM compliance certificate for the offered meters.
- g) CE report test, EMC test report, Radio test report and safety test report for the communication modules shall be submitted.

Type test made on identical designs of equipment to those offered	Certificate No.	Certificate Authority

30. **Property Plates**

- a) The meters shall be individually identified by a 10-digit alphanumeric code as follow:
 - I. The first five digits shall be identified and approved by EDCO.
 - II. 6th to 10th digits represent the individual meter number, which should be advised by the purchaser.

Example: XXXXX 00000.

- b) In addition, this 10-digit serial number shall be presented by a barcode to be read by a handheld. Barcode should be fixed outside over the outer frame, or inside the meter which can be reached through the glass. The barcode size should not affect the meter design.
- c) The meter nameplates shall be marked “**Property of EDCO**”. The meter nameplate shall be approved by EDCO.

28) **Drawings, Catalogues And Requirements:**

The Tenderer must submit with his offer all the specifications, software manual, indicating ratings, weights, dimensions, and time current characteristics of the offered materials.

29) **Deviation from specification if any completed by the tenderer.**

Item No.	Brief description	Deviation

- 30) Two No's of Industrial Laptops (Dell Type) with latest specifications shall be offered including all needed concerned software and ports.
- 31) License of exiting EDCO's HESs (Hexing, Holley, or the new HES to be supplied by this tender) shall be included.
- 32) "0.4 % "Ex stock spare parts (meters + modems) shall be available immediately (on call) once needed for rush replacement.
- 33) A sample of each meter type should be submitted with the offer. Any offer received without technical details and samples; EDCO has the right to reject that offer during evaluation without any prior notice.
- 34) All catalog and technical details of all items and options should be submitted with the offer.
- 35) A sample programming software should be submitted with the offer.
- 36) The sample meter shall be programmed to meet the previous EDCO Tariff scheme.
- 37) Tenderer should clarify and provide all supporting registers, channels, and capacity for every channel with full detailed documentation.
- 38) Tenderer should clarify and provide all supporting events with full detailed documentation.

D. Technical Specifications

- 1) The meter shall be of indoor and outdoor domestic applications, 50 HZ frequency with internal electronic circuits foiled in Aluminium foils against high voltage application (400 KV).
- 2) The meter shall include two ways IrDA or Local Flag communications port (According to IEC62056-21/IEC61107 Mode C). Contractor shall provide software open protocol license, which enable the user to make easy read and write from and to the meter.
- 3) The Tenderer shall provide a serial port RS485 using open Standard Protocols (according should IEC 62056-21) that allows two-way communication with the meter using an external modem. (According should as per IEC 62056/DLMS HDLC mode).
- 4) The meter shall be provided with an internal built-in RTC (Real Time Clock), time and calendar, to indicate real time and date (TOU). Date and time must be

available in the display during normal operation. (The accuracy of this clock must have high accuracy of variation not exceed ± 0.5 seconds per day.

- 5) The meter's register shall be reset to zero after reaching the maximum range, and not be permitted to reset to zero under any other circumstances.
- 6) A high contrast, large character Liquid Crystal Display (LCD) must be provided with light illumination and uses information on the display to indicate the active element.
- 7) An auto cycle display with a programmable switch-over time (0-30 sec.) between the different registers must be provided and can be programmed.
- 8) The rated shelf life of the LCD screen shall not be less than 20 Years for continuous operation (In Normal operation).
- 9) A push button for rolling the display manually must be provided.
- 10) The meter shall be equipped with two LEDs for meter testing (active and reactive energy), calibration and operation, and the meter constant shall be in the form of Impulse/kWh and Impulse/kVARh, it is preferred that meters support pulse output terminal.
- 11) The meter shall detect and record the accurate energy consumption correctly even under tampering conditions.
- 12) The meter should not be influenced by external strong DC magnetic fields.
- 13) All the measured quantities and registers shall be compatible with OBIS-Code of the IEC62056 standard protocol, and the meter shall be capable to show any stored register value on the LCD with its OBIS code, (for example: total import active energy shall be stored in 1.8.0 register and can be displayed on the LCD), and that should be approved by EDCO.
- 14) The meter shall be able to provide historical data, (billing periods for not less than 12 months). The meter shall be able to be programmed to show these historical data registers on LCD and can be read locally and remotely.
- 15) **High-level Anti- Tampering Meter.**
 - a) The meter shall be a high-level anti-tampering. This meter should detect and record the energy (energy recording in such cases should be fully explained from the tenderer and approved by EDCO) and event with time stamp for the following tampering cases:
 - I. Main cover opening.
 - II. Terminal cover opening.
 - III. Module cover opening.
 - IV. Module plug out.
 - V. Disconnecting one or more phases.
 - VI. High magnetic field exposure.
 - VII. High voltage DC discharge.
 - VIII. Other anti-tampering features are highly preferred.

- IX. The meter shall be provided with alarm flag displayed on LCD to indicate for all the above tampering cases (and for any detected non mentioned tampering case) and record the date and time of this case besides storing all the events in the meter's memory and storing the energy. And this flag should not disappear by itself but use PC software to clear it or remotely by HES.
- b) The tenderer shall state in his document the behavior of meter for the following tampering cases, and its highly preferred to detect and record the energy (energy recording in such cases should be fully explained from the tenderer and approved by EDCO) and event with time stamp for these tampering cases:
- I. Load connected to incoming supply terminals.
 - II. The load partially returned to earth when the phase and neutral reversed on incoming supply terminals.
 - III. Switching between phases.
 - IV. Load connected to incoming terminals as well as partial to earth.
 - V. Neutral connection removed. (Single phase only)
 - VI. Connecting bypass between incoming phase and outgoing phase
 - VII. Current without voltage for the CT and CTVT meters (at least one phase should have voltage).
- c) The meter shall be completely tamper-proof design and construction, facilitated with up-to-date anti-fraud protection with all fraud events that shall be recorded in meter's history in the logbook with their time stamp.
- d) The meter shall detect and record the accurate energy consumption correctly even under tampering conditions. Under these conditions, (energy recording in such cases should be fully explained from the tenderer and approved by EDCO) which occur by opening terminal cover or meter's cover, a visual annunciation appears on the LCD screen and on LED at the meter front in addition to store these events in the logbook with their time stamp.
- e) The meter should not be influenced by external strong DC or electrostatic DC discharge up to 400 KV.
- f) The meter shall be provided with alarm flag displayed (not symbols) on LCD to indicate for any of the above tampering cases and record the date and time of this case besides storing all the events in the meter's memory and it should not disappear by itself but to use PC software to clear it.
- g) In addition to mentioned alarm flags, the meter should have Alarm LED and it should be programmable when it should be on, EDCO shall approve this operation.
- 16) The Single-phase meter shall be provided with measuring elements one on the phase and the other on neutral and the meter shall measure the (phase energy) and display this energy in the main register for billing purposes, the meter shall measure the (neutral energy) and display this energy in sub register. Also, the meter shall calculate the difference between the phase energy and

neutral energy when the neutral energy is higher by a define percentage confirmed by EDCO and display this difference in sub register.

- 17) The three phase meter shall record bypass event according to the following conditions or as confirmed by EDCO:
- A. when $3I_0 > 5.5A$ or $I_n > 5.5A$, then if $\text{absolute}((3I_0 - I_n) / I_{\text{max}}) > Y_{\text{bp}}$ for a time duration more than T_d , the meter will record Bypass Start event.
 - B. when $3I_0 < 5.5A$ and $I_n < 5.5A$, or $\text{absolute}((3I_0 - I_n) / I_{\text{max}}) < Y_{\text{bp}}$ for a time duration more than T_d , the meter will record Bypass End event.
 - C. When the meter is powered off, the bypass event will end.

$3I_0$: the vector sum of the current of three phases in ampere.

I_n : the neutral current in ampere.

I_{max} : Max ($3I_0$, I_n) in ampere.

Y_{bp} : bypass threshold percentage %.

T_d : time threshold for bypass in sec.

- 18) Single phase should calculate energy in case Neutral connection removed in the main phase registers depending in the battery voltage, meter will suppose the voltage 230 and power factor 1, it's preferred to have a sperate register for this energy in addition to energize in the main phase registers.
- 19) Meters should support reading the current status (open/close) for the meters covers (Main, terminal & module cover).
- 20) The meter's software shall be user-friendly including all controllable parameterization features such as multi-level of security for downloading and Uploading the data. The software module could be upgraded frequently without extra charges while the Electricity Distribution Company (EDCO) owns all software management properties.
- 21) Further, meter's software should be capable to export the required registers' values in Excel office file such as voltages, currents and any other available values in meter, meter's software shall accept control signals via AMI software using DLMS including Hexing HES, Holley MDC, and the new HES to be supplied in this tender, IDIS... etc. Communication protocols.
- 22) Voltage application should appear in date wise at meters load profile.
- 23) The enclosures of meters should be capable of being sealed with lead and two wire seals, and the hole shall be with suitable size for using two wire seals.
- 24) Offered CT meters shall fulfil the requirement of controlling a smart circuit breaker by CT meters latching relay and to implement control mechanisms to operate the latching relay associated with CT meters. This can involve software-

based control systems that send commands to the latching relay to open or close the circuit with needed relay events in the meter.

- 25) For three phase meters (both direct & CT operated meters) it shall use Arithmetic registration method in calculating energy in three phases as the example below:

Arithmetic Registration Method:

The meter can register A+ and A- energy in the same time.

Example: (same load in each phases)

Phase	L1	L2	L3
Load	A+	A-	A+

Total registration, import (forward) direction: OBIS 1.8.0 = (A+) + (A+)

Total registration, export (reverse) direction: OBIS 2.8.0 = (A-)

- 26) The required direct meters shall be provided with internal disconnecter (relay) to be used for remote connection/disconnection in addition to limit and control load current/voltage of the customer.

♦ **The relay should be:**

- a) Able to be programed on site or at utility's lab, and software shall contain the ability to enable or disable the relay function, the disabling is important to run the I-max test for accuracy test.
- b) In three phase meters: the relay contact for all phases shall be connected/disconnected together with mechanical interlock.
- c) The relay shall not be affected by any external magnetic field.
- d) Several measures shall be implemented to ensure that the relay status does not indicate "connected" when the relay hardware status "Disconnect", but the voltage exists on both sides of the relay.
- e) The relay should not accept connect in case the voltage exists in the outage side.
- f) The relay should work on these modes:
 - f.1) Automatic modes for control the relay by:
 - Over/Under current with programmable threshold and should support programmable counting times for the operation.
 - Over/Under voltage with programmable threshold.
 - Over/Under active power KW (optional) with programmable threshold.
 - Control the relay by schedule time.

These modes can run parallel or separate, EDCO can define or disable these modes remotely by HES and locally by PC software.

f.2) Manual mode, this mode is to make connecting/disconnecting by the utility by using remote HES system including Hexing HES, Holley MDC & the new HES to be supplied in this tender or by handheld units HHU, the manual disconnection should be programmable to take place after a given time from the manual disconnect command i.e., after 0,15, 30, 40 ...minutes up to 72 hours.

f.3) It is preferred that relay can be programmed to disconnect by agreed tampering events like, covers open, Bypass events ... etc

27) Meters should store all relay events with all details of operation type and instantaneous reading.

28) Meter should have a clear way to show the relay status such as using tow LEDs to show overload or manual disconnection or to have clear screen message or any other suitable way and this need to be approved by EDCO.

29) EDCO should approve the relay behaviour for all mentioned and not mentioned cases.

30) The relay should be tested in respect of the following standard IEC 62055-31 (2005) Requirements for UC2. Also, it is a must for the tendered to submit type test certificates of relay from well-known third part laboratory like KEMA, or STL labs.

27- For the required communication modules:

- 1- The communication modules shall be (2G/3G/4G) technology.
- 2- The modules shall be compatible with the following meter models & manufacturing year:

Single phase meters	DDSY283SR	Manufacturing year 2017
Three phase meters	DTSD5454	Manufacturing year 2017

- 3- A sample from each module type shall be submitted with the offer.

A) Technical Specifications of the single-phase meters

Nominal Voltage	(230 ± 10 %) Volt.
Rated Current	(10-80) Amp.
Measured	Four Rates kWh
Connection	Two wires, two elements as specified, BS 5685 connection. (Phase- Neutral- Neutral- Phase)
Frequency	50 Hz ± 5 %
Accuracy	Class 1
Display	Display screen: <ul style="list-style-type: none"> Fully electronic (LCD), display is retained during loss of power. 7 digits at least, display area for each digit not less than 20 mm². The registers shall reset to zero after reaching their maximum indication 9999999. The display shall show all required data about consumption, reverse energy registered and total consumption.
Historical Data	<ul style="list-style-type: none"> Display at least the latest billing period. Stores historical data for at least 12 billing periods.
Relative Humidity	Zero to 90 % or better
Temperature Range	–20 °C to + 80 °C ambient temperature. For electronic components inside the meter up to 80 °C.
Degree of protection	IP 54
Data retention	Not less than 20 years (unpowered)
Annunciation on LCD screen	<ul style="list-style-type: none"> Applied tariff. Tamper and fraud detection. Opened meter cover and terminal box.
LED for meter testing	<ul style="list-style-type: none"> Impulse/kWh
Communication ports	<ul style="list-style-type: none"> Two ways IrDA communication ports or Local – Flag (According to IEC62056-21/IEC61107 Mode C). Supported protocols (IEC 61850 "Smart Grid", DLMS/COSEM, M-Bus, IDIS)
CONTROL	<ul style="list-style-type: none"> Current Limitation. Relay Contact.

B) Technical Specifications of the three phase direct connection meters

Nominal Voltage	(400 ± 10 %) V.
Rated Current	(15-100) A.
Measured Quantities	Four Rates kWh, kVARh and MD
Connection	Four wires
Accuracy	Class 1
Display	<p>Display screen:</p> <ul style="list-style-type: none"> Fully electronic (LCD), display is retained during loss of power. 7 digits at least, display area for each digit not less than 20 mm². The registers shall reset to zero after reaching their maximum indication 9999999. The display shall show all required data about consumption, reverse energy registered and total consumption.
Historical Data	<ul style="list-style-type: none"> Display at least the latest billing period. Stores historical data for at least 12 billing periods.
Relative Humidity	Zero to 90 % or better
Temperature Range	<p>–20 °C to 80 °C ambient temperature.</p> <p>For electronic components inside the meter up to 80 °C.</p>
Degree of protection	IP 54
Data retention	Not less than 20 years (unpowered)
Annunciation on LCD screen	<p>A symbolic annunciation is present on the LCD screen to indicate the following:</p> <ul style="list-style-type: none"> Phase presence indication. Phase sequence monitoring. Applied tariff. Tamper and fraud detection. Opened meter cover or terminal box.
LED for meter testing	<ul style="list-style-type: none"> Impulse/kWh and Impulse/kVARh
Communication ports	<ul style="list-style-type: none"> Two ways IrDA communication ports or Local – Flag (According to IEC62056-21/IEC61107 Mode C). Supported protocols (IEC 61850 "Smart Grid", DLMS/COMES, M-Bus, IDIS)
CONTROL	<ul style="list-style-type: none"> Current Limitation. Relay Contact.

C) Technical Specifications of the three phase CT operated meters

Nominal Voltage	(400 ± 10 %) V.
Rated Current	(5) A.
Measured Quantities	Four Rates kWh, kVARh and MD
Connection	Four wires
Accuracy	Class 0.5 for kWh, Class 2 for kVARh.
Display	<p>Display screen:</p> <ul style="list-style-type: none"> • Fully electronic (LCD), display is retained during loss of power. • 7 digits at least, display area for each digit not less than 20 mm². • The registers shall reset to zero after reaching their maximum indication 9999999. • The display shall show all required data about consumption, reverse energy registered and total consumption.
Historical Data	<ul style="list-style-type: none"> • Display at least the latest billing period. • Stores historical data for at least 12 billing periods.
Relative Humidity	Zero to 90 % or better
Temperature Range	<p>–20 °C to 80 °C ambient temperature.</p> <p>For electronic components inside the meter up to 80 °C.</p>
Degree of protection	IP 54
Data retention	Not less than 20 years (unpowered)
Annunciation on LCD screen	<p>A symbolic annunciation is present on the LCD screen to indicate the following:</p> <ul style="list-style-type: none"> • Phase presence indication. • Phase sequence monitoring. • Applied tariff. • Tamper and fraud detection. • Opened meter cover or terminal box.
LED for meter testing	<ul style="list-style-type: none"> • Impulse/kWh • Impulse/kVARh
Communication ports	<ul style="list-style-type: none"> • Two ways IrDA communication ports or Local – Flag (According to IEC62056-21/IEC61107 Mode C). • Supported protocols (IEC 61850 "Smart Grid", DLMS/COMES, M-Bus, IDIS)

25. The tariff scheme of EDCO meters in present time:

- a) The KWH tariff Periods are (23:00-7:00) o'clock for low tariff (T1) and (7:00-23:00) o'clock for the high tariff (T2).
- b) The (MD) KW periods can be adjusted as EDCO requirements.
- c) The integration period for MD to be adjusted at 30 minutes.
- d) Monthly reset after automatic storage of all readings shall be on the first day of every month at 00:00 o'clock.
- e) The summer season starts on the last Friday of February every year at 00:00 o'clock.
- f) The winter season starts at the last Friday of October every year at 01:00 o'clock.
- g) In the summer season, the clock is usually advanced automatically one full hour over the winter season time.
- h) In the winter season, the clock is usually automatically delayed one full hour from the summer season time.
- i) The change of seasons and daylight savings time occur concurrently.
- j) Jordan local time is (GMT + 3 hour) in the summer season and (GMT + 2 hour) in the winter season.

Note: All the above settings shall be programmable to meet any possible changes remotely by HES and locally by PC software

26. Sample meters and its Software.

- a) Sample non-returnable meters, one for each of the items listed in Schedule 'A' and identical to the designs offered, shall be hand-carried, and submitted with the Tender on the specified date for opening Tenders. These representative samples will be closely examined and will undergo mechanical, electrical and accuracy tests at the EDCO Test Station in Amman. Failure of the samples to meet the mechanical and electrical specifications set out in this Document will entitle EDCO to reject the Tender.
- b) These samples shall be programmed to meet the previous EDCO Tariff scheme.
- c) A sample of programming software should be submitted with the offer with its user manual.
- d) The samples are preferred to be programed in auto cycle display to show 15.8.0, and for the push button display should be programmed for these

Main registers or an equivalent OBIS code register and the tenderer need to explain it in the offer.

No	OBIS code	Description
1	0.9.1	Current time (hh:mm:ss)
2	0.9.2	Date (DD.MM.YY)
3	1.8.0	Total import active energy (A+) [kWh]
4	2.8.0	Total export active energy (A-) total [kWh]
5	15.8.0	Total absolute sum active energy ($ A+ + A- $) [kWh] (absolute sum for 1.8.0 and 2.8.0)
6	16.8.0	Total absolute difference active energy ($ A+ - A- $) [kWh] (absolute difference between 1.8.0 and 2.8.0)
7	55.8.0 or any register certified from manufacture	Neutral absolute active energy total [kWh] (It must not affect other register reading)
8	C.53.1 or any tamper register	Difference energy when neutral is higher [kWh] (It must not affect other register reading)

SCHEDULES AND GUARANTEES

<u>SCHEDULE NO.</u>	<u>DESCRIPTION</u>
A	Schedule of Requirement
B	Price Schedule
C	Guaranteed Delivery Periods Schedule
D	Main Components Manufacturer Reference List
D.1	Manufacturer of Single-Phase Meter
D.2	Manufacturer of Three Phase Direct Meter
D.3	Manufacturer of Three Phase CT Meter
E.1	Technical Data for the Single-Phase Meter
E.2	Technical Data for the Three Phase Direct Meter
E.3	Technical Data for the Three Phase CT Meter
F	Standards
G	Deviation from specifications Schedule

SCHEDULE (A)

SCHEDULE OF REQUIREMENTS

ITEM NO.	Description	Stock Code	Unit Item	Quantity Required
1.	Class 1 AMI programmable single phase 4 Rates KWH meters rated 230 volts, (10 - 80) amps with internal disconnect (relay) two elements, as specified in tender specifications with communication modems (2G/3G/4G) .	-----	No.	60,000
2.	Class 1 AMI programmable three phase direct 4 Rates KWH, KVARH and MD meters rated 3* 230/400 volt, (15 - 100) amps with internal disconnect (relay), as specified in tender specifications and with communication modems (2G/3G/4G).	-----	No.	4,000
3.	Class 0.5 AMI programmable three phase 4-wire 4 Rates KWH, KVARH and MD meters, CT Operated, rated 400 volts and 5 amps, as specified in tender specifications with and with communication modems (2G/3G/4G) .	-----	No.	500
4.	Communication modules (2G/3G/4G) for single phase smart meters as specified (Optional).	-----	No.	1000
5.	Communication modules (2G/3G/4G) for three phase smart meters as specified (Optional).	-----		1100
6.	Head End System HES to read & configure up to 100,000 meters remotely or upgrading existing HES.	-----	No.	1

SCHEDULE (B)
PRICE SCHEDULE

ITEM NO.	Description	QTY & UNIT	UNIT PRICE & CURRENCY		TOTAL PRICE C&F AQABA-JORDAN
			FOB	C & F AQABA	
1)	Class 1 AMI programmable single phase 4 Rates KWH meters rated 230 volts, (10 - 80) amps with internal disconnecter (relay) two elements, as specified in tender specifications with communication modems (2G/3G/4G).	60,000	-----	-----	-----
2)	Class 1 AMI programmable three phase direct 4 Rates KWH, KVARH and MD meters rated 3* 230/400 volt, (15 - 100) amps with internal disconnecter (relay), as specified in tender specifications and with communication modems (2G/3G/4G).	4,000	-----	-----	-----
3)	Class 0.5 AMI programmable three phase 4-wire 4 Rates KWH, KVARH and MD meters, CT Operated, rated 400 volts and 5 amps, as specified in tender specifications with and with communication modems (2G/3G/4G)	500	-----	-----	-----
4)	Communication modules (2G/3G/4G) for single phase smart meters as specified (Optional) .	1000	-----	-----	-----
5)	Communication modules (2G/3G/4G) for three phase smart meters as specified (Optional) .	1100			
5)	Head End System HES to read & configure up to 100,000 meters remotely or upgrading existing HES.	1	-----	-----	-----
8)	EDCO staff training "Can be detailed for both onsite local training and abroad training".	-	-----	-----	-----
9)	Factory Inspection and Test charges for two EDCO Engineers for 1 week per purchase order.	-	-----	-----	-----
Total Price					

IMPORTANT NOTICE:

- FACTORY ACCEPTANCE TEST SHOULD BE PER ORDER.
- EDCO has the right to accept partial offer and to award part of the items or quantities without any limit or notice.
- Meter type/ model shall be written on the previous schedule.
- **The offer shall include the cost of the Original Software.**

SCHEDULE (C)

GUARANTEED DELIVERY PERIODS

This schedule shall be completed by the Tenderer and the periods entered shall be binding on the Contractor.

ITEM NO.	Description	DELIVERY PERIOD FOB PORT OF LOADING-SPECIFY PORT	DELIVERY PERIOD AQABA PORT-JORDAN
1.	Class 1 AMI programmable single phase 4 Rates KWH meters rated 230 volts, (10 - 80) amps with internal disconnecter (relay) two elements, as specified in tender specifications with communication modems (2G/3G/4G)	-----	
2.	Class 1 AMI programmable three phase direct 4 Rates KWH, KVARH and MD meters rated 3* 230/400 volt, (15 - 100) amps with internal disconnecter (relay), as specified in tender specifications and with communication modems (2G/3G/4G).	-----	
3.	Class 0.5 AMI programmable three phase 4-wire 4 Rates KWH, KVARH and MD meters, CT Operated, rated 400 volts and 5 amps, as specified in tender specifications with and with communication modems (2G/3G/4G).	-----	
4.	Communication modules (2G/3G/4G) for single phase smart meters as specified (Optional).	-----	
5.	Communication modules (2G/3G/4G) for three phase smart meters as specified (Optional).	-----	
6.	Head End System HES to read & configure up to 100,000 meters remotely.	-----	

Note:

- **Delivery time shall not exceed 12 weeks for the Single and Three phase meters, from the date of receipt EDCO purchasing order.**
- **Telecommunication Regulatory Commission approvals, and approvals related to Jordan custom duty are a part of Tenderer responsibilities where the delivery is considered EDCO stores. EDCO role play here is exclusive in supporting documents if needed to concern governmental departments.**
- **Packing: Every 10 meters must be in one package.**

SCHEDULE (D)**The Main Components Manufacturer Reference List**

(To Be Completed by the Tenderer, only the Reference List Manufacturer is qualified in this Tender)

Item No.	Description	Reference Manufacturer	Offered component manufacturer	Offered component place of manufacture
1	SMT Resistance	TDK		
		YAGEO		
		UniOhm		
2	SMT Capacitor	TDK		
		YAGEO		
3	SMT Filter	TDK		
		Murata		
4	Electronics Capacitor	Nippon Chemi-Con		
		RUBYCON		
5	MCU*	ST Microelectronics		
		Microchip		
		Maxim Microelectronics		
		Texas Instruments		
6	E2PROM	Microchip		
		Maxim Microelectronics		
		Texas Instruments		
		ON Semiconductor		
7	FLASH ROM	Microchip		
		Maxim Microelectronics		
		Texas Instruments		
		ON Semiconductor		
8	RS485 Chip	Maxim Microelectronics		
		ON Semiconductor		
9	POWER REGULATOR	Maxim Microelectronics		
		ON Semiconductor		
		JRC		
		ST Microelectronics		
10	CRYSTAL OSCILLATOR	KDS		
		SEIKO		
11	BATTERY	SAFT		
		SANYO		

* ARM technology is accepted.

SCHEDULE (D.1)
MANUFACTURERS, PLACES OF MANUFACTURE AND TESTING
(TO BE COMPLETED BY THE TENDERER)

<u>Single Phase Meter</u>			
<u>Item</u>	<u>Description</u>		<u>Tenderer's reply</u>
1	Name of manufacturer		
2	Country of origin		
3	Type of meter		
4	Manufacturing License		
5	Quality Assurance certificate		
6	Standard IEC No		
7	Operating Ranges:		
8	Temperature	C°	
9	Humidity up to 90 %	RH	
10	Rated Voltage	(V)	
11	Basic Current	(A)	
	Max current	(A)	
12	Starting current of Basic Current	(A)	
13	Short circuit current	(A)	
14	Active energy class of meter		
15	Reactive energy class of meter		
16	Modem and antenna		
	Model / Manufacture		
	Support Bands		
17	AC Withstand voltage for 1min.	kV	
	4kVAC at 50Hz		
	IEC No 62052-11/62053-21		
18	Impulse withstands voltage 1.2/50 Microseconds.	kV	
	8kV main circuits, 6 kV auxiliary circuits		
	IEC No 62052-11		
19	Burst Test : Fast Transient Burst 4 kV for main circuits, 2 kV for auxiliary circuits	kV	
	IEC No 61000-4-5		
20	Electrostatic discharge	kV	
	contact discharge : 8 KV		
	Air discharge : 15 KV		
	IEC No 61000-4-2		
21	HF Magnetic field	V/m	
	Electromagnetic RF Fields 80MHz-2GHz, typical 30 V/m		
	IEC No 61000-4-3		
22	Electromagnetic Compatibility of 15kV		
	IEC No 61000-4-2		

23	Type of surge protection: 4 KV		
	IEC No 62052-11		
24	Insulation resistance	MOhm	
25	Total power consumption	VA	
26	Power consumption in voltage circuit	VA per	
		phase	
27	Power consumption in current circuit	VA per phase	
28	Meter constant	Imp per kWh,KVARH	
29	Meter dimensions		
30	Material of the base (color)		
31	Material of the meter cover (color)		
	Material of terminal block cover(color)		
32	Material of terminal block connectors		
33	Meter weight		
34	Degree of Protection		
35	Min Cross section of terminal block holes		
36	No of digits for energy		
	Size of digits		
	Size of display		
	No of available decimal		
	Display contrast		
	LCD rated shelf time	Years	
37	Is self-diagnostic check available?		
38	Type of memory provided		
39	Non-volatile memory (Minimum retention time)	Years	
40	Backup supply continuous carryover capability (Batteries)	Years	
41	RTC accuracy		
42	Time keeping source available:		
	i: Internal time clock (depend on crystal oscillator)		
	ii: Synchronization to system frequency		
43	Optical port		
	IrDA Baud Rate		
44	Is the meter IEC62056 compliant?		
45	What other protocols used?		
46	Is pulse output provided?		
	- No of pulse outputs		
47	Method of pulse output		
48	Pulse transmission distance		
49	No of control inputs		
50	Is the meter "Tamper proof"? How?		
51	Is the meter equipped with phase failure Indicator on LCD?		

52	Is the meter equipped with Reverse run Indicator on LCD?		
53	is the meter equipped with phase rotation Indicator on LCD?		
54	Is the meter equipped with energy direction status Indicator on LCD?		
55	Is the meter equipped with Communication Indicator on LCD?		
56	Is the meter equipped with low battery Indicator on LCD?		
57	Is the meter equipped with terminal cover removing record indicator on LCD?		
58	Is the meter equipped with bypass indicator on LCD?		
59	Could the meter be extended for prepaid?		
60	Does “last gasp” communication exist?		
61	Is the meter for outdoor use?		
62	HHU provided for settings at site?		
63	The HHU operating system?		
64	Terminal cover dimension according to which IEC or equivalent DIN?		
65	Is the meter including load profile and maximum demand?		
66	Is the meter including bush bottom for manual reading?		
67	Routine test laboratory		
68	Type test laboratory		
69	Test Certificate No		
70	Name of testing laboratory		
71	Years of experience of manufacturing the required item (Similar Type)		
72	Software Features		
73	Is the software upgrade free of extra charge		
74	All software features shall be provided in tender offer.		
75	Relay		
	Model / Manufacture		
	Rated Current		
	Short circuit current		
	No of operation process during relay life		
76	No. of support events (should be attached)		
77	Monthly Billing data		
	support registers(should be attached)		
	channel Capacity	Months	
78	Daily Billing data		
	support registers(should be attached)		

	channel Capacity	Days	
79	load profile		
	No. of channels		
	Support registers, demands, instantaneous(should be attached)		
	channels Capacity in case 60 min	Days	
	channels Capacity in case 30 min	Days	
	channels Capacity in case 15 min	Days	

SCHEDULE (D.2)
MANUFACTURERS, PLACES OF MANUFACTURE AND TESTING
(TO BE COMPLETED BY THE TENDERER)

<u>Three Phase Direct Meter</u>			
<u>Item</u>	<u>Description</u>		<u>Tenderer's reply</u>
1	Name of manufacturer		
2	Country of origin		
3	Type of meter		
4	Manufacturing License		
5	Quality Assurance certificate		
6	Standard IEC No		
7	Operating Ranges:		
8	Temperature	C°	
9	Humidity up to 90 %	RH	
10	Rated Voltage	(V)	
11	Basic Current	(A)	
	Max current	(A)	
12	Starting current of Basic Current	(A)	
13	Short circuit current	(A)	
14	Active energy class of meter		
15	Reactive energy class of meter		
16	Modem and antenna		
	Model / Manufacture		
	Support Bands		
17	AC Withstand voltage for 1min.	kV	
	4kVAC at 50Hz		
	IEC No 62052-11/62053-21		
18	Impulse withstands voltage 1.2/50 Microseconds.	kV	
	8kV main circuits, 6 kV auxiliary circuits		
	IEC No 62052-11		
19	Burst Test : Fast Transient Burst 4 kV for main circuits, 2 kV for auxiliary circuits	kV	

	IEC No 61000-4-5		
20	Electrostatic discharge	kV	
	contact discharge : 8 KV		
	Air discharge : 15 KV		
	IEC No 61000-4-2		
21	HF Magnetic field	V/m	
	Electromagnetic RF Fields 80MHz-2GHz, typical 30 V/m		
	IEC No 61000-4-3		
22	Electromagnetic Compatibility of 15kV		
	IEC No 61000-4-2		
23	Type of surge protection: 4 KV		
	IEC No 62052-11		
24	Insulation resistance	MOhm	
25	Total power consumption	VA	
26	Power consumption in voltage circuit	VA per	
		phase	
27	Power consumption in current circuit	VA per phase	
28	Meter constant	Imp per kWh,KVARH	
29	Meter dimensions		
30	Material of the base (color)		
31	Material of the meter cover (color)		
	Material of terminal block cover(color)		
32	Material of terminal block connectors		
33	Meter weight		
34	Degree of Protection		
35	Min Cross section of terminal block holes		
36	No of digits for energy		
	Size of digits		
	Size of display		
	No of available decimal		
	Display contrast		
	LCD rated shelf time	Years	
37	Is self-diagnostic check available?		
38	Type of memory provided		
39	Non-volatile memory (Minimum retention time)	Years	
40	Backup supply continuous carryover capability (Batteries)	Years	
41	RTC accuracy		
42	Time keeping source available:		
	i: Internal time clock (depend on crystal oscillator)		
	ii: Synchronization to system frequency		
43	Optical port		

	IrDA Baud Rate		
44	Is the meter IEC62056 compliant?		
45	What other protocols used?		
46	Is pulse output provided?		
	- No of pulse outputs		
47	Method of pulse output		
48	Pulse transmission distance		
49	No of control inputs		
50	Is the meter "Tamper proof"? How?		
51	Is the meter equipped with phase failure Indicator on LCD?		
52	Is the meter equipped with Reverse run Indicator on LCD?		
53	is the meter equipped with phase rotation Indicator on LCD?		
54	Is the meter equipped with energy direction status Indicator on LCD?		
55	Is the meter equipped with Communication Indicator on LCD?		
56	Is the meter equipped with low battery Indicator on LCD?		
57	Is the meter equipped with terminal cover removing record indicator on LCD?		
58	Is the meter equipped with bypass indicator on LCD?		
59	Could the meter be extended for prepaid?		
60	Does "last gasp" communication exist?		
61	Is the meter for outdoor use?		
62	HHU provided for settings at site?		
63	The HHU operating system?		
64	Terminal cover dimension according to which IEC or equivalent DIN?		
65	Is the meter including load profile and maximum demand?		
66	Is the meter including bush bottom for manual reading?		
67	Routine test laboratory		
68	Type test laboratory		
69	Test Certificate No		
70	Name of testing laboratory		
71	Years of experience of manufacturing the required item (Similar Type)		
72	Software Features		
73	Is the software upgrade free of extra charge		
74	All software features shall be provided in tender offer.		

75	Relay		
	Model / Manufacture		
	Rated Current		
	Short circuit current		
	No of operation process during relay life		
76	No. of support events (should be attached)		
77	Mothly Billing data		
	support registers(should be attached)		
	channel Capacity	Months	
78	Daily Billing data		
	support registers(should be attached)		
	channel Capacity	Days	
79	load profile		
	No. of channels		
	Support registers, demands, instantaneous(should be attached)		
	channels Capacity in case 60 min	Days	
	channels Capacity in case 30 min	Days	
	channels Capacity in case 15 min	Days	

SCHEDULE (D.3)
MANUFACTURERS, PLACES OF MANUFACTURE AND TESTING
(TO BE COMPLETED BY THE TENDERER)

<u>Three Phase CT Meter</u>			
<u>Item</u>	<u>Description</u>		<u>Tenderer's reply</u>
1	Name of manufacturer		
2	Country of origin		
3	Type of meter		
4	Manufacturing License		
5	Quality Assurance certificate		
6	Standard IEC No		
7	Operating Ranges:		
8	Temperature	C°	
9	Humidity up to 90 %	RH	
10	Rated Voltage	(V)	
11	Basic Current	(A)	
	Max current	(A)	
12	Starting current of Basic Current	(A)	
13	Short circuit current	(A)	
14	Active energy class of meter		
15	Reactive energy class of meter		
16	Modem and antenna		

	Model / Manufacture		
	Support Bands		
17	AC Withstand voltage for 1min.	kV	
	4kVAC at 50Hz		
	IEC No 62052-11/62053-21		
18	Impulse withstands voltage 1.2/50 Microseconds.	kV	
	8kV main circuits, 6 kV auxiliary circuits		
	IEC No 62052-11		
19	Burst Test : Fast Transient Burst 4 kV for main circuits, 2 kV for auxiliary circuits	kV	
	IEC No 61000-4-5		
20	Electrostatic discharge	kV	
	contact discharge : 8 KV		
	Air discharge : 15 KV		
	IEC No 61000-4-2		
21	HF Magnetic field	V/m	
	Electromagnetic RF Fields 80MHz-2GHz, typical 30 V/m		
	IEC No 61000-4-3		
22	Electromagnetic Compatibility of 15kV		
	IEC No 61000-4-2		
23	Type of surge protection: 4 KV		
	IEC No 62052-11		
24	Insulation resistance	MOhm	
25	Total power consumption	VA	
26	Power consumption in voltage circuit	VA per	
		phase	
27	Power consumption in current circuit	VA per phase	
28	Meter constant	Imp per kWh,KVARH	
29	Meter dimensions		
30	Material of the base (color)		
31	Material of the meter cover (color)		
	Material of terminal block cover(color)		
32	Material of terminal block connectors		
33	Meter weight		
34	Degree of Protection		
35	Min Cross section of terminal block holes		
36	No of digits for energy		
	Size of digits		
	Size of display		
	No of available decimal		
	Display contrast		
	LCD rated shelf time	Years	
37	Is self-diagnostic check available?		

38	Type of memory provided		
39	Non-volatile memory (Minimum retention time)	Years	
40	Backup supply continuous carryover capability (Batteries)	Years	
41	RTC accuracy		
42	Time keeping source available:		
	i: Internal time clock (depend on crystal oscillator)		
	ii: Synchronization to system frequency		
43	Optical port		
	IrDA Baud Rate		
44	Is the meter IEC62056 compliant?		
45	What other protocols used?		
46	Is pulse output provided?		
	- No of pulse outputs		
47	Method of pulse output		
48	Pulse transmission distance		
49	No of control inputs		
50	Is the meter "Tamper proof"? How?		
51	Is the meter equipped with phase failure Indicator on LCD?		
52	Is the meter equipped with Reverse run Indicator on LCD?		
53	is the meter equipped with phase rotation Indicator on LCD?		
54	Is the meter equipped with energy direction status Indicator on LCD?		
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56	Is the meter equipped with low battery Indicator on LCD?		
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58	Is the meter equipped with bypass indicator on LCD?		
59	Could the meter be extended for prepaid?		
60	Does "last gasp" communication exist?		
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62	HHU provided for settings at site?		
63	The HHU operating system?		
64	Terminal cover dimension according to which IEC or equivalent DIN?		
65	Is the meter including load profile and maximum demand?		

66	Is the meter including bush bottom for manual reading?		
67	Routine test laboratory		
68	Type test laboratory		
69	Test Certificate No		
70	Name of testing laboratory		
71	Years of experience of manufacturing the required item (Similar Type)		
72	Software Features		
73	Is the software upgrade free of extra charge		
74	All software features shall be provided in tender offer.		
75	Relay		
	Model / Manufacture		
	Rated Current		
	Short circuit current		
	No of operation process during relay life		
76	No. of support events (should be attached)		
77	Monthly Billing data		
	support registers(should be attached)		
	channel Capacity	Months	
78	Daily Billing data		
	support registers(should be attached)		
	channel Capacity	Days	
79	load profile		
	No. of channels		
	Support registers, demands, instantaneous(should be attached)		
	channels Capacity in case 60 min	Days	
	channels Capacity in case 30 min	Days	
	channels Capacity in case 15 min	Days	

SCHEDULE (F)
STANDARDS

The Tenderer shall list the standard specifications to which the main items of tendered equipment are designed and manufactured.

Equipment	National standard	English title

SCHEDULE (G)

**DEVIATION FROM SPECIFICATION IF ANY COMPLETED BY THE
TENDERER**

ITEM NO.	BREIF DESCRIPTION	DEVIATION

**SPECIFICATIONS
FOR
HEAD-END SYSTEM**

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1. ABBREVIATIONS

ABAP	ADVANCED BUSINESS APPLICATION PROGRAMMING
AMI	ADVANCED METERING INFRASTRUCTURE
API	APPLICATION PROGRAM INTERFACE
CIS	CUSTOMER INFORMATION SYSTEM
CPU	CENTRAL PROCESSING UNIT
CT/VT	CURRENT TRANSFORMER / VOLTAGE TRANSFORMER
GIS	GEOGRAPHICAL INFORMATION SYSTEM
GSM	GLOBAL SYSTEM FOR MOBILE COMMUNICATION
GUI	GRAPHICAL USER INTERFACE
HES	HEAD END SYSTEM
HHU	HAND HELD UNIT
HIDS	HOST-BASED INTRUSION DETECTION SYSTEM
HTTP	HYPERTEXT TRANSFER PROTOCOL
HTTPS	HYPERTEXT TRANSFER PROTOCOL SECURE
IDE	INTEGRATED DEVELOPMENT ENVIRONMENT
IP	INTERNET PROTOCOL
IWA	INTEGRATED WINDOWS AUTHENTICATION
JDBC	JAVA DATABASE CONNECTIVITY
EDCO	JORDANIAN ELECTRIC POWER COMPANY LIMITED
JSP	JAVA SERVER PAGES
KVAH	KILO VOLT AMPERE HOUR
KVAR	KILO VOLT AMPERE REACTIVE
KWH	KILO WATT HOUR
LDAP	LIGHTWEIGHT DIRECTORY ACCESS PROTOCOL
LG	LANDIS & GYR
MBUS	METER BUS
MDMS	METER DATA MANAGEMENT SYSTEM
NB IoT	NARROW BAND INTERNET OF THINGS
ODBC	OPEN DATABASE CONNECTIVITY
OLEDB	OBJECT LINKING AND EMBEDDING DATABASE
PPS	PREPAYMENT SYSTEM
PSTN	PUBLIC SWITCHED TELEPHONE NETWORK
REST	REPRESENTATIONAL STATE TRANSFER

SAN	STORAGE AREA NETWORK
SDK	SOFTWARE DEVELOPMENT KIT
SFTP	SSH FILE TRANSFER PROTOCOL
SIEM	SECURITY INFORMATION EVENT MANAGEMENT
SMI	SMART METERING INFRASTRUCTURE
SMOC	SMART METERING OPERATIONS CENTER
SMS	SHORT MESSAGE SERVICE
SOA	SERVICE ORIENTED ARCHITECTURE
SOAP	SIMPLE OBJECT ACCESS PROTOCOL
SQL	STRUCTURED QUERY LANGUAGE
SSO	SINGLE SIGN-ON
TCP	TRANSMISSION CONTROL PROTOCOL
TDD	TOTAL DEMAND DISTORSION
THD	TOTAL HARMONIC DISTORSION
TLS	TRANSPORT LAYER SECURITY
TOU	TIME OF USE
VEE	VALIDATION, ESTIMATION, AND EDITING
WADL	WEB APPLICATION DESCRIPTION LANGUAGE
WSDL	WEB SERVICES DESCRIPTION LANGUAGE
WSFL	WEB SERVICES FLOW LANGUAGE

2. SCOPE and PROGRAM OVERVIEW

This document describes the minimum requirements for design, performance and supply of a Head End System (HES) for the Electricity Distribution Company.

The bidder's obligation covers the procuring of the HES system or Upgrading existing HES as well as the procuring of all services required for the design, configuration, development, integration, training and provisioning of operational and maintenance support for the HES system including the procurement of quality assurance, site design and preparation, delivery, pre-commissioning, installation, testing, and commissioning in accordance with the plan, procedures, specifications, codes, standards and any other document specified in the contract and agreed and finalized in the project plan.

The bidders are anyway encouraged to propose any potential enhancement or additional work activity that may be seen necessary to maximize the benefits of the project or to cover any potential gap identified in the tender's scope, functional and technical requirements detailed hereunder. Bidders are also encouraged to advise regarding the best setup for the system (centralized vs. decentralized).

EDCO, as part of its smart meter roll-out project, is issuing a Request for Proposals for a HES solution with the following high-level characteristics:

- (1) Receive meter data from 300,000 meters (this number is expected to grow by 15,000 new meters yearly);
- (2) The meters can be configured to operate with a granularity down till one value every minute;
- (3) The data collection frequency can be configured with a frequency down till every hour;
- (4) Act as the system of meter data collection and initial validations and delivery of data to the meter data management system
 - a) Store at least 6 months of interval data
 - b) Act as the temporary system of record for raw meter data
 - c) Ensure data quality through limited amount of data validation
- (5) Make data available to upstream systems
- (6) Support the management of meter reading schedules and processing of meter events

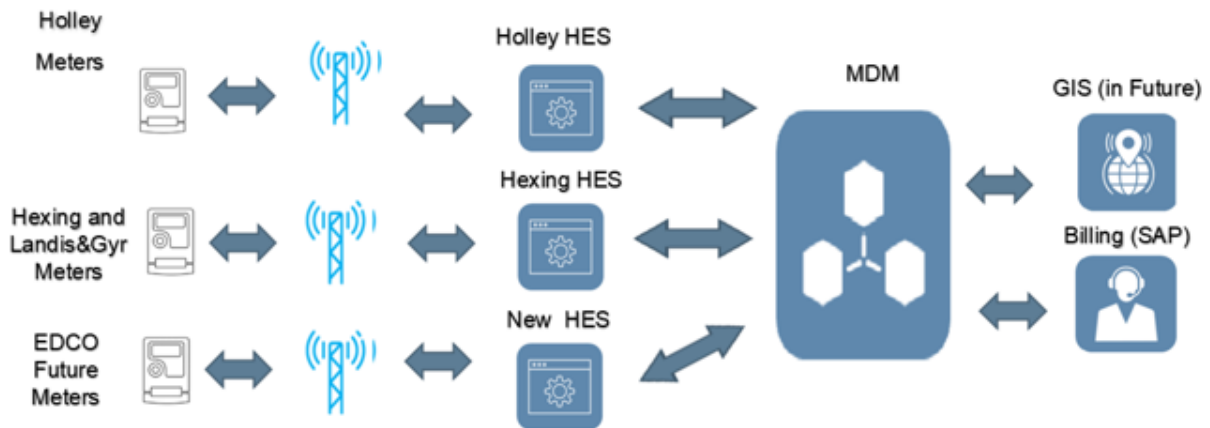
The HES is a scalable enterprise application which receives the stream of meter data brought back to the utility through the AMI: it typically performs a limited amount of data validation before either making the data available for other systems to request or pushing the data out to other systems. The HES receives data from meters and smart devices through the communication network and interfaces with a Meter Data Management System (MDMS) receiving raw meter data for storage. HES is broadly configurable to enable the storage of any data that an electric meter or smart device can provide. The HES processes the data and stores all raw data in a relational database.

The HES supplier will be expected to act as the system integrator between the HES and the following systems:

- (1) Meters and Communication Layer
 - (2) Meter Data Management
-

3. EDCO AMI ARCHITECTURE

The HES receives meter data from multiple EDCO smart meters through the communication layer and, after data verification, transmits the data to the EDCO's MDMS. The proposed high-level architecture for the EDCO's AMI is shown in Figure 1:



For Upgrading existing HES:

Existing EDCO HESs as below:

- **Hexing System** Version: Hexing MDC v8.11.0.13_ED2_RELEASE - Hosting on ZAIN Main HQ
- **Holley system:** Holley MDC v1 3 24.2 20- Hosting on EDCO HQ

It is required to:

- Upgrade an existing Head End System (HES) to accommodate approximately 64,500 additional meters.
- Ensure that the offer includes all hardware and software components, as well as installation, operation.
- The bidder shall provide web services, application programming interfaces (API), and/or adaptors to support system integrations with other enterprise information systems like MDM and Billing.
- For maintenance refer to point 9.2.

Any configuration, enhancement and customizations related to existing HES functions are part of the project deliverables.

4. HES GENERAL REQUIREMENTS

4.1. Meter Data

4.1.1. Data Collection

4.1.1.1. The HES shall support all types of electricity meters including single phase and poly phase electricity meters as well as CTs and CTs/VTs meters

4.1.1.2. The HES shall support multiple channels per meter (supplier should state the maximum limit)

4.1.1.3. The HES shall support for bi-directional, net metering, and other types of metering scenarios (such as demand response)

4.1.1.4. The HES shall retrieve harmonics from any three-phase customer meter or other power quality data (including single phase meters)

4.1.2. Data Processing

4.1.2.1. The HES shall process and request register/interval meter reading from all the meters used in EDCO

4.1.2.2. The HES shall process and provide response for register/interval meter reading data from all the meters as per specific meter request from upstream systems

4.1.2.3. The HES shall process and send on-demand meter read requests to the data collector/data concentrator/access point

4.1.2.4. The HES shall process and send on-demand meter read data to the upstream systems

4.1.2.5. The HES shall present consumption data in local time

4.1.2.6. The HES shall detect reverse power flow on a meter programmed or operating as a non-net energy meter or non-bidirectional energy meter

4.1.2.7. The HES shall support at least the following meter event categories:

- Tampering
- Voltage-related events
- Current-related events
- Control events
- Time- related events
- Meter status events
- Security related events
- Meter diagnostic

HES shall be flexible to distinguish and separate and alarming the following cases :
Cover Open- Bypass-Neutral Removal-Reverse Pwr and any other above event if required.

4.1.3. Data Provisioning

4.1.3.1. The HES shall send all meter read data for the previous day to MDMS after collection by time as specified by EDCO at later stage

4.1.3.2. The HES shall collect meter events in near real-time and provide them to the upstream systems

4.1.3.3. The HES shall report and send every communication error to the upstream systems

4.2. Meter Configuration

4.2.1. The HES shall be capable to configure remotely all of the parameters (including the firmware upgrade) that a meter makes available in the configuration toolset

4.2.2. The proposed system configuration should support backup/restore and disaster recovery framework, as appropriate

4.2.3. The HES shall audit and remotely configure channel multipliers, meter multipliers, unit of measure per channel, and other basic meter information

4.2.4. The HES shall remotely configure the meter display to relay information and data for specified duration. Configurable information and data shall include (but not limited to) kWh, kVAh, Voltage, etc.

4.2.5. The HES shall support at least the following quantities per each TOU rate, each in a separate register:

Measured item			Unit
Active energy	Billing period <i>m</i> -Total import	(QI+QIV)	kWh+
	Billing period <i>m</i> –Tariff <i>n</i> import	(QI+QIV)	kWh+
	Billing period <i>m</i> -Total export	(QII+QIII)	kWh+
	Billing period <i>m</i> –Tariff <i>n</i> export	(QII+QIII)	kWh+

	Billing period m – Absolute total	$\text{abs}(Q_I+Q_{IV})+$ $\text{abs}(Q_{II}+Q_{III})$	kWh+
	Billing period m –Net Total	$\text{abs}(Q_I+Q_{IV})-$ $\text{abs}(Q_{II}+Q_{III})$	kWh+
Reactive energy	Billing period m –Total import	(Q_I+Q_{II})	kVARh+
	Billing period m –Tariff n import	(Q_I+Q_{II})	kVARh+
	Billing period m –Total export	$(Q_{III}+Q_{IV})$	kVARh-
	Billing period m –Tariff n export	$(Q_{III}+Q_{IV})$	kVARh-
Active power	Billing period m – Total Import Max Demand with Time Stamp	(Q_I+Q_{IV})	kW
	Billing period m –Tariff n – Total Import Max Demand with Time Stamp	(Q_I+Q_{IV})	kW

Measured item			Unit
	Billing period m – Total Export Max Demand with Time Stamp	(QII+QIII)	kW
	Billing period m –Tariff n – Total Export Max Demand with Time Stamp	(QII+QIII)	kW
Reactive Power	Billing period m – Total import Max Demand with Time Stamp	(QI+QII)	kVAR
	Billing period m –Tariff n – Total import Max Demand with Time Stamp	(QI+QII)	kVAR
	Billing period m – Total export Max Demand with Time Stamp	(QIII+QIV)	kVAR
	Billing period m –Tariff n – Total export Max Demand with Time Stamp	(QIII+QIV)	kVAR

m : billing period index
n : tariff index

Table 1: TOU Rates Required

- 4.2.6. The HES shall be capable to collect data from all meter data channels for all data type (scalar or interval) that the electricity meter can manage
- 4.2.7. The HES shall support measurements including but not limited to:
- Active energy
 - Reactive energy
 - Apparent energy
- 4.2.8. The HES shall support the 3Ph power quality measurements including but not limited to:
- Voltage harmonics up to the 13th order
 - Voltage THD (Total Harmonic Distortion)
 - Current harmonics up to 13th order
 - Current TDD (Total Demand Distortion)
- 4.2.9. The HES shall support at least 4 multiple tariffs/rates based on Time of Use (TOU) for the 1Ph meter and at least 8 multiple tariffs/rates for the 3Ph meter
- 4.2.10. The HES shall support tariffs/rates that will be used to create a complete yearly based tariff system according to the following structure:
- Tariff switches - Min. 8 switches per day
 - Daily - Min. 4 daily profiles
 - Weekly - Min. 8 weekly profiles
 - Seasons - Min. 12 season profiles
 - Special Day - Min. 50 special days
- 4.2.11. The HES shall collect all meter data within the end of each day
- 4.2.12. The HES shall support at least 2 load profiles including but not limited to: Voltage, Current, Energy Readings, Power Readings, PF . . .etc.
- 4.2.13. The HES shall support at least the following meter display parameters:
- Time and date
 - Register values with its appropriate unit and OBIS code

- Indication of particular conditions, such as causes of disconnection of remote switch
- Indication of energy flow quadrant
- Indication of presence of phases (3Ph meter only)
- Applied tariff

4.3. Switch Operation

- 4.3.1. The HES shall have the capability to send connection and disconnection commands to a single meter or to multiple meters (command may originate in other system such as MDMS)
- 4.3.2. The HES shall allow EDCO to grant disconnection and reconnection right on a user or group of users level with the possibility to grant any user the right of issuing disconnection commands with the ability to issue the reconnection commands.
- 4.3.3. The HES shall have the capability to receive acknowledgements about the command's execution from the meters (such as retrieving the status of latching relay about the connection and disconnection of single/multiple meters) and to receive and process the status update details sent by the meter in case of connection/disconnection operated manually on the meter
- 4.3.4. The HES shall have the capability to limit the service switch operations originated by systems without acknowledgement or that went through failed verification exceeding the number of attempts defined by EDCO.
- 4.3.5. The HES shall be capable of filtering the number of disconnect operations and shall be able to stop further disconnects if an operation exceeds a configurable threshold. The system shall allow EDCO to prohibit disconnection of a single meter or specified list of meters such as hospitals, critical sites and important customers.

4.4. Reporting

- 4.4.1. A pre-built set of dashboards need to be provided by the proposed solution:
The bidder is requested to specify the list of pre-built dashboards 4.4.2.

The HES shall generate reports, including but not limited to:

- Interval gap
- Reads
- Performance
- Success rate
- Failure rate
- Meter read performance (duration)
- Schedule performance

- Network performance
- Alarms, events and flags
- Audit reports
- User activity
- Firmware/program
- Meter registration (i.e., inventory, installed, disconnected, maintenance, retired, etc.)
- Meter communication path/routing
- Meter status (connected, disconnected, ...)

4.4.3. The bidder is requested to provide the full range of the HES reporting capabilities (vendor specific)

4.4.4. The bidder is requested to provide details about all administrative reports and audit logs available in the proposed solution

4.4.5. The HES shall recognize meter failure reports and issue commands to the meter for self-diagnostic test

4.5. Scheduling and Maintenance

4.5.1. The HES shall have a scheduling function for all of the parameters that a meter makes available in the configuration toolset, including (but not limited to) the following:

- Meter Reading
- Firmware/program upgrades
- Report execution
- Ping
- Trace route
- Events
- Time synchronization

4.5.2. The HES shall log all messages sent and received (e.g., message ID, destination ID and date/time received etc.)

4.5.3. The HES shall retrieve message logs stored in the meter or other devices containing logs

4.5.4. The HES shall allow EDCO to identify and isolate meters in user-defined groups for managing and monitoring purposes

4.5.5. The HES must have capability to send broadcast messages from a system administrator to all users

4.6. Additional Requirements

- 4.6.1. The HES shall support the AMI system deployment (meters, network communications, and other field devices etc.)
- 4.6.2. The HES shall support centralized remote management, monitoring and control of all network hardware including the tracking of necessary system component battery replacements
- 4.6.3. The HES shall support revenue integrity monitoring across the entire meter/customer population including, but not limited to, meter tamper, energy diversion, site diagnostics, and load diagnostic
- 4.6.4. The HES shall store for a minimum period (to be specified by EDCO) of all meter read data including register reads, corrected and uncorrected meter consumption and interval data
- 4.6.5. The HES shall retrieve the applicable log each day during the normal daily read schedule, unless otherwise configured
- 4.6.6. The electricity meter's recording interval length shall be remotely configurable by the HES
- 4.6.7. The HES shall prioritize network communications
- 4.6.8. The HES shall reject malformed messages
- 4.6.9. The HES shall provide standardized, configurable message/command formats

5. COMMUNICATION REQUIREMENTS

5.1. Communication Technologies

- 5.1.1. The HES shall support the connection to multiple brands and types of electricity meter devices and/or data concentrators from a single data collection system using pluggable protocols and configurable device features
- 5.1.2. The HES shall support various communication technologies such as GSM, 3G, 4G, IP, PSTN, and SMS using a broad range of communication protocol stacks
- 5.1.3. The HES shall support future technologies such as NB IoT (Internet of Things) for direct communication to the meters and data concentrators
- 5.1.4. The HES shall support easy switching of communication technology without complex operation procedures

6. SYSTEM USABILITY

6.1. User Interface

- 6.1.1. HES GUI screen layouts, workflow, alerts, menus, etc., must be designed to mirror business processes
- 6.1.2. The business rules that support the creation of data must be integrated and logically flow within the HES GUI from one screen to the next
- 6.1.3. The business rules that support the updating of data must be integrated and logically flow within the HES GUI from one screen to the next
- 6.1.4. The business rules that support the deletion of data must be integrated and logically flow within the HES GUI from one screen to the next
- 6.1.5. The HES GUI access will be based on user role and profile, and will control view/update access to HES data as well as access to functions and commands (e.g., ping meter, request on-demand read, issue on/off commands, retry commands, etc.)
- 6.1.6. The HES shall display engineering units and unit type (e.g., kWh) whenever interval data is displayed
- 6.1.7. The HES shall allow authorized users to customize their screen views and save customized settings for future sessions
- 6.1.8. The HES users shall be identified via a unique ID and support single sign on
- 6.1.9. The HES GUI shall present a similar look and feel of its tools such as help, notes, hot keys, graphs, and reports
- 6.1.10. The HES GUI shall be able to perform user input validations and to apply reasonable checking based on industry standards and user-defined rules (e.g., input sanitization, filtering, canonicalization, through use of regex, character escaping schemes)
- 6.1.11. The HES GUI shall prompt the user when exiting if edits have not been saved
- 6.1.12. The HES GUI shall warn the user prior deleting any information from the system
- 6.1.13. The HES GUI shall provide a drop down selection list for specific fields

7. TECHNOLOGY REQUIREMENTS

7.1. General Requirements

- 7.1.1. The HES shall provide web based or client-server access and shall not have a remote desktop console access
- 7.1.2. The HES shall provide server and application level monitoring tools

- 7.1.3. The HES's database setup shall support high-availability and clustering
- 7.1.4. All production and quality servers shall have high-availability system and quality and production landscape shall have disaster recovery (DR). DR setup shall have continuous data protection with zero downtime and data loss
- 7.1.5. The bidder shall provide load balancer mechanism and provide load balance appliances details
- 7.1.7. The bidder shall provide the list of pre-requisite third-party mandatory software licenses which has to be purchased in order to run the proposed HES

7.2. Data Management

- 7.2.1. The HES shall access data through a data object rather than directly from the database
- 7.2.2. The HES shall include a data access utility that can be used to directly manage the data (business) object
- 7.2.3. The HES shall include built-in data import/export utilities
- 7.2.4. The HES shall support extract, transform, load capabilities directly or via close integration with other common extract, transform, load tools
- 7.2.5. The HES shall allow for designating levels of confidentiality to be associated with data fields such that data users can readily comply with EDCO data labelling and handling requirements

7.3. Database Architecture

- 7.3.1. The HES database shall be Open Database Connectivity (ODBC) compliant
- 7.3.2. The HES database shall be Java Database Connectivity (JDBC) compliant
- 7.3.3. The HES database shall be Object Linking and Embedding, Database (OLEDB) compliant
- 7.3.4. The HES database shall be able to accommodate and respond properly to standard SQL queries run against the database

7.4. Componentization and Service Oriented Architecture (SOA) Support

- 7.4.1. The HES shall employ the use of application development tiers to separate major functions or layers; at a minimum, three tiers (database, application, client) shall be supported
- 7.4.2. The HES data shall be stored in a separate tier distinct from other aspects of the application architecture
- 7.4.3. Beyond the separation of data from the application, the HES shall specifically avoid storing (other than very short term caching) of any 'content' information on web servers

- 7.4.4. The HES shall support the segregation of reporting functionality to allow the use of mainstream external tools for generating reports from the data
- 7.4.5. The HES shall employ the full separation of the presentation layer from the application layer
- 7.4.6. The HES shall allow alternative presentation options such as fat vs. thin client options without affecting fundamental system functionality
- 7.4.7. Individual system functions within the HES shall be modular, thereby providing individual business functions in a componentized fashion
- 7.4.8. The HES program modules shall allow the individual modules to be called from one another or from a main program in order to reuse functionality across the system
- 7.4.9. The HES shall allow business functions/processes to be defined in Web Services Description Language (WSDL) or Web Application Description Language (WADL)
- 7.4.10. When applicable, the HES shall allow workflow attributes to be described in Web Services Flow Language (WSFL)
- 7.4.11. The HES shall allow for important system functions to be called via SOAP (Simple Object Access Protocol) or REST (Representational State Transfer) protocol
- 7.5. Development Environment
 - 7.5.1. The HES shall allow development or maintenance work to be performed using a mainstream Integrated Development Environment (IDE)
 - 7.5.2. The HES shall provide an organized, programmatic interface or software development kit (SDK) to perform any system configuration or to access and modify system information or accounts
 - 7.5.3. Any user configurable or exposed development language within the HES used for customization and maintenance shall be based on one of the following: .Net, Java, or Advanced Business Application Programming (ABAP)
 - 7.5.4. The HES shall be based on a modern development technology framework such as .Net, ASP.Net, Java EE, or Java Server pages (JSP)
 - 7.5.5. The HES shall allow for the preservation of prior customizations during product upgrades
- 7.6. System Configurability
 - 7.6.1. The HES shall support distributed processing across multiple network zones and data centres, with application and database processes distributed on multiple servers with dynamic resource allocation and automatic failover and load balancing as appropriate
 - 7.6.2. The HES shall support enhancements and upgrades in a modular fashion

- 7.6.3. The HES shall allow EDCO to set up or change data validation rules, user screens, and alarm/event notifications without modifying source program code and without any proprietary language skills
- 7.6.4. The HES shall include a toolset to make configuration changes to reflect new business rules for data validation and estimation
- 7.6.5. The HES shall include a toolset to change format, content, or functionality of user screens and online help contents
- 7.6.6. The HES shall include a toolset to group, prioritize, filter, and send the system generated alarms and events to predetermined email addresses, text pagers, cellular text messages, and/or phone numbers

7.7. Integration Capabilities

7.7.1. Integration with MDMS

- 7.7.1.1. The HES shall be able to communicate with MDMS: the bidder is requested to provide details about the complete list of MDMS vendors and middleware products with which the proposed solution has integrated with in previous implementations.
- 7.7.1.2. The HES shall support open standards and **CIM** 61968 based integration with MDMS and other enterprise systems
- 7.7.1.3. The HES shall process and forward any communication error (reliability and latency to be specified by the supplier)
- 7.7.1.4. The HES shall process and forward any data from any of the meter channels (reliability and latency to be specified by the supplier)
- 7.7.1.5. The HES shall process and send bulk meter read information data to the upstream systems (reliability and latency to be specified by the supplier)
- 7.7.1.6. The HES shall process and forward service switch operate acknowledgement and metrology information after a successful service switch operation command (reliability and latency to be specified by the supplier)
- 7.7.1.7. The HES shall process service switch operate requests coming from upstream systems and manage potential communications failures (reliability and latency to be specified by the supplier)
- 7.7.1.8. The HES shall process and forward service switch operate failure (reliability and latency to be specified by the supplier)
- 7.7.1.9. The HES shall report and send the on-demand meter read request communications errors to upstream systems (reliability and latency to be specified by the supplier)
- 7.7.1.10. The HES shall report and send any data collector/concentrator to electricity meter on-demand meter read request communications errors (reliability and latency to be specified by the supplier)

- 7.7.1.11. The HES shall date and time stamp the availability of the outage events
- 7.7.1.12. The HES shall process and forward any notification from the meters to the upstream systems whenever required (reliability and latency to be specified by the supplier)
- 7.7.1.13. The HES shall send events that include (but are not limited to) “configuration”, “fault/error/alarm”, “power quality” and “security” (reliability and latency to be specified by the supplier)
- 7.7.1.14. The HES shall process and forward firmware update confirmation messages from meters and data collector/concentrator (reliability and latency to be specified by the supplier)
- 7.7.1.15. The HES shall confirm that all of the data sent to the upstream systems have been received
- 7.7.2. Integration with Other Systems
 - 7.7.2.1. The HES shall be able to forward any acknowledgement from the electricity meters to the upstream systems (reliability and latency to be specified by the supplier)
- 7.7.3. Integration with WAN
 - 7.7.3.1. The HES shall send and receive data, instructions, and information through Wide Area Network
- 7.7.4. Integration with Existing Meters
 - 7.7.4.1. EDCO is already adopting a set of smart meters provided by Holley, Hexing and Landis & Gyr; the tables below provide some details about these meters:

No.	Type	Model	DLMS Certificate	Quantity (Approx.)
1.	Single Phase	DDSY283SR	1405 -(version2.4)	12,000
2.	Three Phase	DTSD545	1406 -(version 2.4)	12,000
3.	CT operated	DTSD545	1406 - (version2.4)	6700

Table 2: Holley Meters Installed in EDCO

No.	Type	Model	DLMS certificate	Quantity (Approx.)
1.	Single Phase	HXE110	1301 -(version2.4)	60,000
2.	Three Phase	HXE310	1270 - (version2.4)	1000

Table 3: Hexing Meters Installed in EDCO

No.	Type	Model	DLMS certificate	Quantity (Approx.)
1.	Three Phase CT/VT	E650	1803 -(version3)	150

Table 4: Landis & Gyr Meters Installed in EDCO

EDCO requires that the proposed HES solution must be able to integrate with the Holley, Hexing and Landis & Gyr meters models in the table above in the case EDCO will decide to integrate these meters with the proposed HES solution (therefore, this integration has to be considered as an optional project requirement)

- 7.7.4.2. The bidder is required to provide a commercial proposal for the integration with Holley meters, and a separated proposals for the integration with Hexing and LG meters listed in the tables above
- 7.7.4.3. The purchasing of the integration service with the existing meters is considered optional: the bidder shall quote it and EDCO will decide whether to purchase it or not
- 7.7.4.4. The bidder shall provide references of projects where the proposed HES solution has been integrated with Holley, Hexing and LG meters (as there are meters from these brands already installed in EDCO) or shall provide proof about the capability of the proposed HES solution to integrate with Holley, Hexing and LG meters
- 7.7.4.5. The proposed HES solution, through the integration with the proposed meters and communication technologies, shall support as a minimum the following scenarios:
 - Obtain meter readings
 - Collect meter events
 - Connect/ Disconnect relay
 - Configure meters (for parameters such as ToU, LCD display, event programming, relay setting, billing day, DST, communication setting, time synch, etc.)
 - Load Profile collection

7.7.5. General Requirements on Integration

- 7.7.5.1. All user accessible data within the HES shall be capable of being accessed via documented APIs (with the preferred method of access being a data access model)
- 7.7.5.2. The HES shall provide web services, application programming interfaces (API), and/or adaptors to support system integrations with other enterprise information systems
- 7.7.5.3. The HES shall support an enterprise integration strategy using Service Oriented Architecture/Enterprise Service Bus
- 7.7.5.4. The HES shall provide a proper queuing mechanism to be in place. A time stamp validation shall exist in the HES to process or cancel the request; the requests shall not be reprocessed if the request failed or got cancelled as per time stamp validation
- 7.7.5.5. The bidder shall provide the detailed flow chart and actions to be performed in all the stages from request creation to success/fail request and archiving
- 7.7.5.6. The bidder shall provide details about the protocols used for integration like SOAP, FTP, etc.
- 7.7.5.7. The HES shall provide various error handling techniques for errors that may appear during the integration
- 7.7.5.8. The bidder must detail its approach for disaster recovery plan to communicate with primary/high-availability HES in case of system failure
- 7.7.5.9. HES shall support (for all the services) individual and bulk requests based on individual/bulk requests from the requested integrated systems such as MDMS (or others in future)
- 7.7.5.10. The HES shall allow business functions/processes to be defined in WSDL and/or WADL as per requirements during design stage
- 7.7.5.11. The HES shall call important system functions via SOAP and/or REST protocol as per requirements which will be finalized during design stage
- 7.7.5.12. The HES shall support XML and/or JSON messages to present data or to transfer information in and out of the system as per the requirements which will be finalized during design stage
- 7.7.5.13. The HES shall support integration flexibility at the web services layer such as allowing XML/WSDL/WADL calls or the interactive use of portlets as per the requirements which will be finalized during design stage
- 7.7.5.14. The HES shall support interoperability with MS Exchange for e-mail functions which will be finalized during design stage

- 7.7.5.15. The HES shall support standard interfaces, adaptors and file formats for data exchanges which will be finalized during design stage
- 7.7.5.16. The HES shall allow the configuration and modification of data fields used in data exchanges which will be finalized during design stage
- 7.7.5.17. The HES shall support an enterprise integration strategy using Service Oriented Architecture (SOA)
- 7.7.5.18. The HES shall consume and expose web services for both inbound and outbound services and compatible to use WSDL and/or WADL file
- 7.7.5.19. The HES shall log all service requests and publishing between HES and other systems/applications
- 7.7.5.20. The HES shall allow the configuration of a number of retries and delays to reprocess any request failures
- 7.7.5.21. The HES shall prevent the data reprocessing if the request failed or cancelled as per time stamp validation
- 7.7.5.22. The HES shall provide a web service client interface for all outbound alerts to send alerts through an enterprise message brokering system (service)
- 7.7.5.23. The HES shall provide support for open, documented, and upgradeable industry standards for message structures
- 7.7.5.24. The HES shall provide support for standard messaging structures to ensure request, acknowledgement, and response
- 7.7.5.25. The HES shall develop message structures, protocols, and common information models that adhere to the industry standard
- 7.7.5.26. The HES shall integrate with business intelligence (BI) and reporting systems and send data based on a predefined schedule: the bidder shall provide the list of these BI and reporting systems with which has been integrated with in previous projects
- 7.7.5.27. The HES shall read meters periodically (as per predefined billing cycle) and on demand
- 7.7.5.28. The HES shall issue an on-demand read request to retrieve missing/incomplete data for any period(s) present in the meter (i.e., at least [6 months]), for all meters with missing/incomplete data
- 7.7.5.29. The HES shall log the request's related information (e.g., time received, customer ID, etc.)
- 7.7.5.30. The HES shall convert data into a compatible format to EDCO systems, which can be sorted and organized

- 7.7.5.31. The HES shall uniquely identify each meter and track multiple meter read requests
- 7.7.5.32. The HES shall track the source of read information and issue ondemand reads
- 7.7.5.33. The HES shall have version control for the stored data
- 7.7.5.34. The HES shall inform the subscribing (integrated) systems about any change in previously shared meter readings
- 7.7.5.35. The HES shall track/log the end-to-end communication for all requests and responses
- 7.7.5.36. The HES shall provide user interface portal to track request and response and to present proper messages for any error case
- 7.7.5.37. The HES shall be able to update master data as and when change is implemented at the source system
- 7.7.5.38. The bidder shall provide references of projects where the proposed HES solution has been integrated with the proposed meters and communication technologies
- 7.7.5.39. The bidder is requested to provide details about the complete list of meter vendors and communication technologies with which the proposed HES solution has been integrated with in previous implementations

7.8. Network/Communication Architecture

- 7.8.1. The HES shall support TCP/IP for network transport
- 7.8.2. The HES shall support HTTP and HTTPS web data transport protocol

7.9. Scalability and Performance

- 7.9.1. The HES shall be capable of being scaled vertically by adding CPU power and/or memory
- 7.9.2. The HES shall be capable of being scaled horizontally by adding servers
- 7.9.3. The HES shall be "cluster aware" at the application layer and can fully leverage server based clustering techniques
- 7.9.4. The HES shall be capable of being recreated and brought back to prior state through manual restoration processes while also using system logs or other outside messaging/broker services to understand which transactions may have failed
- 7.9.5. The HES shall support semi-automated failover protection that allows a replacement platform to be brought up with an audit log of failed transactions
- 7.9.6. The HES shall support high availability failover protection that provides for unattended with complete transaction recovery and seamless reprocessing of failed transactions in progress

- 7.9.7. The HES shall support separate environments (such as sandbox, development, QA, production environments, etc.)
- 7.9.8. The HES shall support EDCO's entire electricity meter population, plus an annual growth of around 4%
- 7.9.9. The HES shall be scalable to support interval reads from all EDCO's electricity meters in addition to the cumulative consumption data
- 7.9.10. The HES shall support the number of users as suggested by EDCO to access the system, plus 50% capacity for growth and contingencies
- 7.9.11. The proposed system shall support the scalability through multiple locations with high-availability and disaster recovery

7.10. Server Platforms

- 7.10.1. The web related HES services shall operate using the web server
- 7.10.2. The HES shall run on 64 bit and latest Operating System version for Windows Server, REDHAT/ ORACLE LINUX, or AIX
- 7.10.3. The HES shall have the capability to monitor and generate notifications and alarms for individual processes, group of processes, and work or data flows within the system to ensure reliable operation
- 7.10.4. The HES shall expose the status of internal processes to external process monitoring systems supported by EDCO

7.11. System Operation and Management

- 7.11.1. The HES shall be capable of effective operation in a virtual server environment
- 7.11.2. The bidder shall mention whether there is any limitation of the proposed HES to run with specific hardware solutions or architectures
- 7.11.3. The HES shall be capable of effective operation in concert with on-line data backup procedures including awareness of open transactions and files
- 7.11.4. The HES shall support database and application backup using stored procedures and other tools for the production environment
- 7.11.5. The backup shall include all versions of the database, configuration data, register data, and event data. The backup shall be performed without any interruption of service
- 7.11.6. The HES shall support local storage, network attached storage, and storage area networks
- 7.11.7. The HES shall have adequate online data storage capacity to ultimately support the system scalability
- 7.11.8. The HES shall support automated data archiving, purging, and restoration
- 7.11.9. The solution shall support the latest database versions such as Oracle 19c or MS-SQL 2019 or later

7.12. Testing Tools

- 7.12.1. The HES shall allow for the use of a testing tool for test case development, automation, and tie to defect management software. Also, this shall include performance testing capabilities
- 7.12.2. The HES shall allow for the use of automated change management
- 7.12.3. The HES shall provide for easy use of log files to track events during testing or debugging operations
- 7.12.4. The HES (under its proposed licensing provisions) shall be configured and sized to support multiple environments (including development, staging, and training) that fully emulate the production environment including connectivity to other key systems
- 7.12.5. The HES (under its proposed licensing provisions) shall allow for the hosting of development, staging, or training versions/implementations of the system within a virtual server environment

7.13. User Interface (UI) Standards – Cross Platform

- 7.13.1. Browser based components of the HES shall work with EDCO adopted web browsers which are Microsoft Edge and Google Chrome
- 7.13.2. Browser based components of the HES exposed to public facing internet shall work with MS Explorer 11 and higher, Firefox 89 and higher, and Chrome 91 and higher to be inclusive of all external users

7.14. Web Content Management Architecture

- 7.14.1. The HES shall either provide or integrate with an application to add, edit and remove data that is presented and collected on-line via the web application
- 7.14.2. The HES shall either provide or integrate with an application to manage and update web content. Web content includes images, style sheets, multimedia files, etc. that typically do not come from the database but rather from other file systems. Applications involved in presenting such content on the web shall have tools for organizing, versioning, changing and updating content

8. SECURITY REQUIREMENTS

8.1. User Access Management

- 8.1.1. The HES shall provide or allow for user authentication and identification
- 8.1.2. The HES shall be capable of interfacing with Integrated Windows Authentication (IWA) to provide for user authentication and identification for any web based components
- 8.1.3. The HES shall support standard LDAP (Lightweight Directory Access Protocol) services

- 8.1.4. The HES shall be capable of enforcing strong password handling for all external customer users and for EDCO's users (employees or contractors), and the ability to enforce different rules based on account type (e.g., internal, customer, supervisor, administrator)
- 8.1.5. The HES shall support Single Sign-On (SSO)
- 8.1.6. The HES shall be capable of removal of all generic accounts and default logins
- 8.1.7. The HES shall provide multiple levels of access control based on user profiles
- 8.1.8. The HES shall provide task or role based access control tied to user profiles and group definitions
- 8.1.9. The HES shall provide task or role based data import/export control tied to user profiles and group definitions
- 8.1.10. The HES shall support both Active Directory and HES system-defined user authentication; the HES shall allow for single sign-on using Active Directory, which can then be linked to user's EDCO ID or account
- 8.1.11. The HES shall have the capability to authenticate against a hybrid solution that shall combine authentication either locally or using single sign-on; EDCO uses Microsoft Windows Active Directory
- 8.1.12. The HES shall provide role-based security function, where multiple users can be grouped for a specific role within the system. The change in the privileges of any role will be dynamically reflected to the users of the particular role
- 8.1.13. The HES shall have the capability to redefine the role-based security for a user through the system administrator
- 8.1.14. The association between a role and its users shall be done at the directory level and the association shall be maintained within the HES application and stored in the HES database
- 8.1.15. The HES shall have the capability to define access rules (such as particular time of the day, weekend, holiday, etc.) for different roles
- 8.1.16. The role based security shall have strict access controls (definition and management of rules) for HES functionality use in the HES system. The strict control requires that the list of personnel responsible for changing the parameters of the access is limited, and that there exists an access control reinforced to be able to modify the list, and the modifications are logged and audited. Typically, primary and backup system administrators are designated to manage the security rules for all the users of the systems. Security roles shall be assigned by group and workgroup, not individual users.
- 8.1.17. The HES shall store and track the login and logout entry in the system

- 8.1.18. The HES shall have the capability to allow the creation of ad hoc reports against the tracking data, which can be used for internal audits or in case of unauthorized entry or breaches into the system
- 8.1.19. The HES authorization system shall have the capability to re-validate authentication prior to any sensitive operations such as meter reconnect/disconnect commands to the AMI network
- 8.1.20. In case of specific period of inactivity (absence of exchange of information in a defined time) of a user, the HES authorization system shall automatically log the user out of the system, and make it mandatory to require new identification (re-login)
- 8.1.21. The logging process on the HES shall be protected, where no additional information, besides the user ID and password, is presented to the user
- 8.1.22. The passwords stored in the system shall be encrypted
- 8.1.23. The HES shall have strong authentication (crypto logical process) in place for authenticating the administrators or owners of sensitive information
- 8.1.24. The HES shall not be susceptible to be breached due to visual observation or listening of network, and not breakable by special tools (password cracking tools)
- 8.1.25. The HES shall not only strictly control the access to the system and roles of each user, but also strictly control the data each user can access. Users with the exception of database administrators and system administrators shall have no direct access to the database or system directories
- 8.1.26. The HES shall maintain the accuracy, authenticity, and integrity of the data stored in the system. The HES system shall be capable of maintain the security of sessions
- 8.1.27. The HES shall allow the user to change his/her password. The system shall disable the account after 45 days (this number shall be configurable in the HES) on non-utilization. The system must request for new password after 90 days (this number shall be configurable in the HES) and prompt user for change of password in advance
- 8.2. Security Monitoring
 - 8.2.1. The HES shall allow the synchronization of the network time protocol (NTP) clock
 - 8.2.2. The HES shall log the security events and other application transactions to a centralized allocated directory in the HES application or database servers. At least the following activities shall be logged:
 - Access to the critical HES components
 - Access to the confidential information
 - Access to the sensitive resources (customer information files, databases, etc.)

- Modifications of parameters and definitions that manage login rules and user names
- The sensitive system calls (utility sensitive information requiring privileged rights, access to the security files, security parameters administrations, etc.)

8.2.3. The HES shall cover essential components of event logs that record all activity in the system. The HES shall record all actions taken by the HES, as well as all users and external systems. Logs shall include:

- Audit Log: HES shall provide a way to view changes that have been made to configuration data in the system over a selected time period. This identifies which users in the system changed data and the time at which they changed it
- Task Log: HES shall log all task activity in the database. EDCO shall be able to view log data for individual tasks or by log
- Edit Log: HES shall maintain an edit log for all edited data, including start and end date of each edit operation, edit estimation mode that was applied, edit code, user name of the editor, user comments, and additional channels subject to the same edit
- Validation Log: HES shall store the results of each validation rule or validation set
- Communications Log: HES shall store communications data from meter cross-examination sessions

8.2.4. The HES shall maintain a comprehensive audit trail of all users and external system activity. The HES shall have the ability to provide this information as a standard operational report. The HES shall have the ability to restrict the viewing, printing and moving of the security logs based on the HES role-based security permissions

8.2.5. The HES shall have the capability to audit not only changes to master data (such as meters) but also changes to system settings and configurations. Among these the HES shall have the capability to monitor the disabling of audit logging settings. If the user disables logging, an audit entry shall be generated in the database which can be reviewed by a system administrator

8.2.6. Any disabling of the audit functionality shall generate an entry in the audit log table. The monitoring tools can monitor the logs for any security event and alert notifications shall be set up for any anomalies

8.3. Software and Services

8.3.1. The HES shall allow for all software components that are not required for the operation and/or maintenance of the HES to be removed. If removal is not technically feasible, then software features that are not required for the operation and/or maintenance of the HES shall be capable of being disabled

8.3.2. The HES shall allow for services and ports not required for operation of the system to be removed and disabled

8.3.3. The HES shall provide the ability to view and report all versions for software, configurations, firmware, scripts, macros and enabled ports and services

8.4. Connection and Data Transport Security

8.4.1. The HES shall support the Transport Layer Security (TLS) protocol for internet session security for web based components

8.4.2. The HES shall support large file transfer utilizing a SSH File Transfer Protocol (SFTP) server

8.4.3. The HES shall enforce security policies from the critical side when interprocess communication is initiated from a less privileged application

8.5. Encryption

8.5.1. The HES shall support secure transmission (encryption) of all non-public data

8.5.2. The HES shall provide encryption mechanism for the cached data and elimination of the cached data when are no longer needed to assure that residual data is not left in caches or on local hard drives when any confidential data is processed on the system

8.5.3. The HES shall provide encryption mechanism for the cached data and elimination of the cached data when are no longer needed to assure that residual data is not left in caches or on local hard drives when any confidential data is processed on the system

8.5.4. The HES shall allow for confidential and restricted data to be encrypted

8.5.5. The HES shall store PINS and passwords hashed and never in clear text

8.5.6. The HES shall use robust encryption mechanisms for the access to the consoles of administration and/or operations. In the case of Active Directory, the user and authentication type shall be stored in the HES database, while the credentials shall be stored in Active Directory. In the case of HES based authentication, the username and password shall be stored in HES, and the passwords shall be one-way hashed and encrypted. HES users shall only be able to access the functions and screens that are allowed for the role that they have been assigned

8.5.7. The encryption mechanism shall protect against any violation. Majority of the interaction in the HES shall be done via web services. These web services shall be configured to enable transport or message level encryptions to prevent tampering of messages while in transit. These mechanisms shall be based on standard security technologies platform such as Microsoft and shall be configured as part of the deployment of the HES. Any passwords used in the product shall never be exposed in clear and shall be masked in the user interface

8.5.8. The HES shall immediately detect the disabling or the by-pass of the encryption mechanism. Once configured, the encryption mechanism for API interaction with the HES shall only be allowed to be disabled via the system settings interface. This interface shall be isolated using the authorization mechanism so that only system administrators can access those settings. The changing of those settings shall be logged in the audit tables

8.6. Session Management for Web-based Application

8.6.1. The HES shall provide automated session terminations after configurable periods of inactivity

8.6.2. The HES shall allow the configuration of limits on the number of concurrent sessions allowed for any user

8.6.3. The HES shall lock out users after a configurable number of unsuccessful log-on attempts

8.6.4. The HES shall support a session logout that will terminate the user session with a configurable session timeout value

8.6.5. The HES shall support a session kill on browser freezing and browser closing

8.6.6. The HES shall support encryption and random generation of the session ID

8.6.7. The HES shall not allow more than one active session for the same user from multiple machines. However, it shall allow multiple sessions for the same user from the same machine

8.7. Audit, Alert and Reporting Safeguards

8.7.1. The HES shall be able to report real time on all active users outlining all of their permissions and roles

8.7.2. The HES shall support tracking of new access, modification of access and security permissions for a configurable period

8.7.3. The HES shall provide customizable audit logs and produce customizable reports detailing user and administrator activities and security events. Event logging must be enabled

8.7.4. The HES shall be capable of alerting each user as to the time and location of their previous log on(s)

8.8. System Integrity Assurance

8.8.1. The HES shall employ methods that minimize the impact and risks from 'Denial-of-Service' attacks (e.g., load balancing, packet filtering, connection throttling)

8.8.2. The HES shall be compatible with and interoperate with host-based intrusion detection system (HIDS) and network-based intrusion detection systems (NIDS)

8.8.3. The bidder shall inform EDCO whether there is any limitation for the proposed HES to work with any of the anti-virus and anti-malware tools

available in the market; if so, the vendor shall detail the list of these tools with which the proposed HES is not compatible with

8.8.4. The HES shall be able to provide heartbeat signals to other systems such as outage management solutions

8.9. Privacy Compliance

8.9.1. The HES shall allow for the purging of individual customers' data after a period of time as defined by EDCO

8.9.2. The HES shall allow for the archiving of individual customers' data after a period of time as defined by EDCO

8.10. Security Compliance

8.10.1. The HES shall be compliant with existing EDCO's Commvault version 11 data backup systems

8.10.2. The HES shall allow for the protection of audit logs via back-up and provisions to prevent and detect tampering with logs

8.10.3. If the HES solution being proposed is hosted at external sites managed by the vendor or vendor's agent, the vendor must ensure proper ongoing backup and storage of electronic data records

8.10.4. The HES shall provide a method to remotely update encryption certificates on an EDCO defined and configurable frequency without disrupting normal system operation

8.10.5. The HES shall provide a method of updating the encryption method (algorithm/primitive) throughout the service life of the HES

8.10.6. The vendor shall provide documentation of third party vulnerability assessments of their development, test and product delivery environments and systems

9. PROJECT REQUIREMENTS

9.1. Project Delivery Components

9.1.1. Project Management

9.1.1.1. The PMO shall have dedicated project manager (PM) only for IT tasks

9.1.1.2. The high-level project plan and the resources' CVs have to be shared

9.1.1.3. The PM shall submit daily and weekly reports

9.1.1.4. Relevant project documentation must include (but not limited to) the following:

- Risk register

- Issue register
- Action log
- Communication matrix
- Change request
- Process and system hand over

9.1.1.5. The bidder shall provide project resources, roles and responsibilities. The project team shall comprise (but not limited to) the following:

- Product Architect
- Integration Manager
- Communication Engineer
- Application Engineer
- HES Integration Expert
- Security Expert
- Security Engineer
- Network engineer
- Database Expert

9.1.1.6. The bidder shall provide the risk matrix for the entire program for the various components of the project

9.1.1.7. The bidder shall provide details about its competency centre and support team

9.1.1.8. The bidder shall provide the support mechanism for the application and software monitoring after implementation

9.1.1.9. The bidder shall provide details about maintenance window and software release policy to be mentioned

9.1.1.10. The bidder shall provide testing resource requirements

9.1.1.11. The bidder shall provide the test plan

9.1.1.12. The bidder shall mention the list of tools (if any) that are required for testing

9.1.1.13. All test scripts shall be provided by the bidder

9.1.1.14. UAT sign off is the responsibility of the bidder

9.1.1.15. In regards to governance and communication, the following items need to be covered during the project:

- Communication matrix
- Daily/weekly meetings
- Steering committee meetings
- Escalation matrix
- Governance model
- Proposed project team (from the bidder side)

9.1.1.16. All bidder's resources shall bring their own laptops and necessary equipment to carry out their day to day work

9.1.1.17. The bidder shall deliver the following documents (but not limited to) as per the project phases:

- Requirement document
- Solution documents and presentation as required during various phases of the project
- Integration specification document (sequence/line diagram of end to end process with time intervals)
- HES integration specification document
- Test scripts (test scripts to contain the acceptance criteria of performance and success rate of process or request)
- Training manuals and recordings
- System hand over
- Other documents as required by the project (such as minute of meetings, solution presentation to management, etc.)
- Architecture design
- Hardware sizing and failover methodology
- GAP analysis document
- Incident reports
- Application installation and security certificate installation
- Functional specification document
- Technical specification document

9.1.1.18. The bidder is required to initiate the process of integration study at the beginning of the project

9.1.1.19. The bidder is required to provide a detailed project plan with parallel activities to this effect

9.1.1.20. The delivery of the project has to be concluded in 6 months from the date of contract

9.1.2. System Testing

9.1.2.1. The bidder shall provide SOAP UI service testing tools for stress testing and performance testing

9.1.2.2. The purpose of this test shall be to exercise the implemented HES to verify the correct functional operation of all the supplied software and the supplied configuration. The system functional test shall include, but not be limited to, the following:

- Verification of all operational and maintenance functions
- Verification of all software functionality
- Verification of all secure access functions
- Demonstration of failover and restart processing

The bidder shall provide as-needed assistance in running the tests

9.1.2.3. Verification of system performance shall be demonstrated. The bidder shall discuss in the test procedure the method and any assumptions that will be used to verify that the HES meets the performance specifications that will be agreed with EDCO

9.1.2.4. The HES shall be subjected to an acceptance test by EDCO to satisfy the requirements given in this specification

9.1.2.5. The HES shall be subjected to a routine test by EDCO or the vendor to ensure continued satisfaction of functional and performance-based requirements given in this specification

9.1.2.6. The bidder shall perform load, HA and DR tests and shall provide solution to ensure capacity, performance and business continuity before go-live and use the same during production for diagnostic and testing purpose

9.1.3. Training

9.1.3.1. The bidder shall provide trainings on the delivered HW and SW to EDCO team with detailed documentation and training materials

9.1.3.2. The bidder shall supply a training plan and associated onsite training classes

9.1.3.3. The bidder shall supply a copy of the proposal, user's guide, configuration guide, administration guide, installation guide, support guide for help desk, and training materials

- 9.1.3.4. The bidder shall supply digital copies of the staging table APIs specifications, manual data import/export specifications, RESTful API specifications, infrastructure, architecture, integration APIs, and data entity documents. Where applicable, these documents shall allow edits, and shall be provided in MS Office and PDF Format
- 9.1.3.5. The bidder shall supply functional, technical, interface and troubleshooting manuals
- 9.1.3.6. The bidder shall provide training on management of the HES database, preparation of input and output data, and modifications to the HES Database
- 9.1.3.7. The bidder shall provide training on management and maintenance of the HES at the operating-system level inclusive of servers and workstations
- 9.1.3.8. The bidder shall provide training on management of communications including email, SMS, communication with downstream devices, and communication with MDMS, as well as associated software and interfaces for these communications
- 9.1.3.9. The bidder shall provide training on controls, procedures, tools, and best practices for maintaining the security of the HES and the systems with which it interfaces. This shall include user access management, role-based access control, and public key infrastructure (PKI) management
- 9.1.3.10. The bidder shall provide training on the back-end and front-end HES applications and their maintenance
- 9.1.3.11. The bidder shall provide training on software maintenance and patch management
- 9.1.3.12. The bidder shall provide training on details regarding systems with which the HES interacts, the interfaces between them, the data exchanged, and the management of those interfaces and data exchanges
- 9.1.3.13. The bidder shall provide an overview of hardware and software architecture, including key components, the relationships between those components, and information on the use and management of those components
- 9.1.3.14. The bidder shall provide training on configuration of data and appearance of custom reports

9.1.4. Defect Liabilities Period

- 9.1.4.1. The system software maintenance responsibility during warranty shall include, but not be limited to, the following general types of activities:

- Corrections, including the design, implementation, and testing of modifications and corrections to any implemented system software that impacts the operation of the system and/or does not meet the technical requirements described in this document
- Coordination of software development activities necessary to correct any problems found by EDCO. The supplier will not be responsible for development activities directed by EDCO that are in excess of the contractual requirements

9.1.4.2. The vendor shall guarantee the HES against all defects arising out of faulty design or workmanship for a period of 3 years from the date of commissioning

9.1.4.3. The vendor shall be responsible for applying for and obtaining all permits and trade licenses necessary to provide the services under the agreement. The vendor shall satisfy itself as to the procedures and timeframes required for such consents and trade licenses. It is emphasized that the responsibility for identifying and obtaining the consents and licenses rests solely with the vendor

9.2. Maintenance & warranty:

9.2.1 The warranty period shall be 3 years starting from installation and system setup including software and hardware repair and replacement.

9.2.2 Technical support 24/7 shall be available on-call with physical present if required.

9.2.3 After 3 years warranty completion, a three years maintenance shall be applied including S/W repair and on call response not exceeding 3 working days upon the defect case.

9.2.4 Anyhow; tenderer must include the warranty and maintenance proposal and it will be subjected to EDCO approval,

9.2.5 Tenderer shall submit an annual maintenance year offer which might be purchased by EDCO and after 3 years maintenance completion, but its mandatory for tenderer and to include a clear maintenance description and fixed prices.

The bidder is expected to provide support on an ongoing basis for the application, database, installation and configuration of new releases, software updates, software upgrade, patches installation and integration requirements