



**Reserve Bank of India**  
**Estate Department, Rail Head Complex**  
**Jammu-180012**  
<https://www.rbi.org.in>

**Tender: Energy Audit for Electro-mechanical and Electronic Equipment in Main Office Building and Annex Building of RBI Jammu**

Reserve Bank of India, Jammu invites sealed applications in two parts (I & II) for “Energy Audit for Electro-mechanical and Electronic Equipment in Main Office Building and Annex Building of RBI Jammu”. The tendering shall be done through offline mode only. All eligible and interested companies / agencies / firms must participate as per terms and conditions mentioned in the tender:

Estimated cost of the work	₹1,00,000 (Rupees One Lakh Only)
Availability of application from	May 09, 2022
Last date and time for submission of duly filled /completed Application	May 30, 2022 up to 02:00 P.M.
Date of opening of the applications	May 30, 2022 from 03:00 P.M. onwards

Date: 09.05.2022

Regional Director



**भारतीय रिजर्व बैंक/Reserve Bank of India**  
**संपदा विभाग/Estate Department**  
**जम्मू/Jammu**

जम्मू स्थित बैंक के कार्यालय भवन का एनर्जी ऑडिट कराने हेतु कोटेशन/निविदा  
Quotation/Tender for Conducting Energy Audit of Bank's Office Building at Jammu

भाग-1/Part-1

**कोटेशन/निविदा**  
**Quotation/Tender**

निविदाकर्ता का नाम /Name of the Tenderer: \_\_\_\_\_

पता/ Address: \_\_\_\_\_

मोबाईल/Mobile : \_\_\_\_\_

ई-मेल/Email: \_\_\_\_\_

प्रस्तुत करने की नियत तिथि/ : 30 मई 2022 अपराहन 02:00 बजे तक/May 30,  
Due Date of Submission 2022 upto 2:00 pm

निविदा के भाग 1 खुलने की तिथि/ : 30 मई 2022 अपराहन 03:00 बजे से/May 30  
Date of opening of Part I from 3:00 pm onwards  
of Tender

## CONTENTS

<b>Sr. No.</b>	<b>Subject</b>	<b>Page No</b>
1.	Section I – Form of Tender/Quotation	3
2.	Section II – Articles of Agreement	5
3.	Section III - Commercial Conditions	9
4.	Section IV - Technical Specifications	12
5.	Annexure I	21
6.	Annexure II	24

**Section I  
Form of Tender**

Place \_\_\_\_\_

Date \_\_\_\_\_

To,

The Regional Director  
Estate Department,  
Reserve Bank of India  
Jammu

Dear Sir,

We have carefully examined the specifications, designs and schedule of quantities relating to the Energy Audit specified in the memorandum hereinafter set out and having visited and examined the site of the Energy Audit as specified in the said memorandum and having acquired the requisite information relating thereto as affecting the tender. We hereby offer to conduct the Energy Audit as specified in the said memorandum within the time specified in the said memorandum at the rates mentioned in the attached Schedule of Quantities and in accordance in all respects with specifications, designs and instructions in writing referred to in articles of agreement, general instructions to the tenderers and special conditions, conditions hereinbefore referred to, specifications, data sheet and schedule of quantities and with such equipment's as are provided for, by and in all other respects, in accordance with such conditions so far as they may be applicable.

**MEMORANDUM**

(a)	Description of works	Conducting Energy Audit of Bank's Office Building at RBI, Jammu.
(b)	Estimated cost	Rs. 1,00,000/-
(c)	Terms of payment	As per clause 11 of Commercial Conditions.
(d)	Earnest Money	<ol style="list-style-type: none"><li>1. Rs.2000/- through NEFT RBI Jammu <b>A/c No.8714295</b>, IFSC Code:<b>RBIS0JMPA01 (0=Zero) Intimation of the same we may be given <a href="mailto:estate@rbi.org.in">estate@rbi.org.in</a>; <a href="mailto:sumitjain@rbi.org.in">sumitjain@rbi.org.in</a>;</b></li><li>2. No interest will be paid on EMD. EMD of the unsuccessful bidder(s) will be refunded by RBI, Jammu.</li><li>3. MSEs are exempted from submission of EMD subject to submission of MSE Registration certificate.</li></ol>

(e)	Time allowed for completion of work, including submitting the report from tenth day after the date of letter advising acceptance of tender.	45 Days
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2. We also agree that our tender will remain valid for acceptance by the Bank for 90 days from the date of opening of Part I of the tender and this period of validity can be extended for such period as may be mutually agreed between the Bank and us in writing.
3. I/we hereby agree to abide by and fulfill all the Terms and Conditions of the Tender and in default thereof, to forfeit and pay to you or your successors, or assignees or nominees such sums of money as are stipulated in the conditions contained in the tender together with the written acceptance of the Contract.
4. I/We understand that you reserve the right to accept or reject any or all the tender either in full or in part without assigning any reason therefor. We have deposited a sum of **Rs.2000/- (through NEFT)** as earnest money with the Reserve Bank of India, which amount is not to bear any interest. Should we fail to execute the Contract when called upon to do so, we do hereby agree that this sum shall be forfeited by the Reserve Bank of India.
5. **The Tender/Quotation is to be submitted in separate sealed envelopes as under:**
  - All commercial terms and conditions and technical particulars.
  - As separate sealed cover containing the price bid in the Bank's proforma.

Dated this \_\_\_\_\_ day of \_\_\_\_\_ 2022.

For and on behalf of M/s \_\_\_\_\_

\_\_\_\_\_  
(Signature with seal)

Name \_\_\_\_\_  
 Designation \_\_\_\_\_  
 Place \_\_\_\_\_  
 Date \_\_\_\_\_

(Certified true copy of the Power of Attorney of the above signatory should be enclosed).

Witnesses

(1) Signature with name, address and date \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

(2) Signature with name, address and date \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## Section II

### Articles of Agreement

#### (Rs 100 Non Judicial Stamp Paper and cost will be borne by the tenderer)

ARTICLES OF AGREEMENT made the \_\_\_\_\_ day of \_\_\_\_\_ between the Reserve Bank of India, Jammu having its Central Office at Mumbai (hereinafter called "the Employer") of the one part and \_\_\_\_\_ (hereinafter called "the Auditor") on the other part.

WHEREAS the Employer is desirous of conducting **Energy Audit for its Office Building** at Jammu and has caused drawings and specifications describing the work to be done AND WHEREAS the said specifications, and the schedule of quantities have been signed by or on behalf of the parties hereto.

AND WHEREAS the Auditor has agreed to execute upon the subject work to the conditions set forth herein and to the conditions set forth in the special conditions and in the schedule of quantities and conditions of Contract as modified and finally accepted by both the parties (all of which are collectively hereinafter referred to as "the said Conditions") the works shown upon the said drawings and/or described in the said Specifications and included in the Schedule of quantities at the respective rates therein set forth, amounting to the sum as therein arrived at or such other sum as shall become payable there under (**hereinafter referred to as "the said Contract Amount"**).

#### **NOW IT IS HEREBY AGREED AS FOLLOWS -**

- 2.1 In consideration of the said Contract amount to be paid at the times and in the manner set forth in the said conditions, the Auditor shall, upon and subject to the said conditions, execute and complete the work shown upon the said drawings and described in the said specifications and the schedule of quantities.
- 2.2 The Employer shall pay the Auditor the said Contract amount or such other sum as shall become payable at the times and in the manner specified in the said conditions.
- 2.3 The term "Architect" in the said conditions shall mean CGM, Premises Department, CO, Reserve Bank of India Mumbai and on his ceasing to be the architect for the purpose of this Contract for whatever reason, such other person or persons as shall be nominated for that purposes by the Employer, not being a person to whom the Auditor shall object for reasons considered to be sufficient by the Employer PROVIDED ALWAYS that no person or perhaps persons subsequently appointed to be architect under this Contract shall be entitled to disregard or overrule any previous decisions or approval or direction given or expressed in writing by the architect for the time being.
- 2.4 The said Conditions and Annexures thereto shall be read and construed as forming part of this agreement and the parties hereto shall respectively abide by, submit themselves to the said conditions and perform the agreements on their part respectively in the said conditions contained.
- 2.5 The drawings, agreement and documents mentioned herein shall form the basis of this Contract.

- 2.6 This Contract is deemed to be lump sum Contract as described in the bill of quantities and specifications in part I and Part II of the tender documents.
- 2.7 The Auditor shall afford every reasonable facility for carrying out of all works relating to Energy Audit in the manner laid down in the said conditions, and shall make good any damages done to walls, floors, etc., after the completion of such works.
- 2.8 The Employer reserves to itself the right of altering the drawings and nature of the work by adding to or omitting any items of work or having portions of the same carried out at any time during the currency of Contract, without prejudice to this Contract.
- 2.9 Time shall be considered as the essence of this Contract and the Auditor hereby agrees to commence the work from the day of issue of works order/letter of acceptance as provided for in the said conditions and to complete the entire work **as mentioned under memorandum (point no: e)** subject nevertheless to the provisions for the extension of time.
- 2.10 All payments by the Employer under this Contract will be made only at Reserve Bank of India, Jammu.
- 2.11 All disputes arising out of or in any way connected with this agreement shall be deemed to have arisen in Jammu and only courts in Jammu shall have jurisdiction to determine the same.

**2.12 Non-Disclosure Clause:**

The Contractor shall not disclose directly or indirectly any information, materials and details of the Bank's infrastructure/ systems/ equipment etc., which may come to the possession or knowledge of the Contractor during the course of discharging its contractual obligations in connection with this agreement, to any third party and shall at all times hold the same in strictest confidence. The Contractor shall treat the details of the contract as private and confidential, except to the extent necessary to carry out the obligations under it or to comply with applicable laws. The Contractor shall not publish, permit to be published, or disclose any particulars of the works in any trade or technical paper or elsewhere without the previous written consent of the Employer. The Contractor shall indemnify the Employer for any loss suffered by the Employer as a result of disclosure of any confidential information. Failure to observe the above shall be treated as breach of contract on the part of the Contractor and the Employer shall be entitled to claim damages and pursue legal remedies.

The Contractor shall take all appropriate actions with respect to its employees to ensure that the obligations of non-disclosure of confidential information under this agreement are fully satisfied.

The Contractor's obligations with respect to non-disclosure and confidentiality will survive the expiry or termination of this agreement for whatever reason.”

If the contractor is a Partnership or an Individual/Proprietor IN WITNESS WHEREOF The Bank and the Contractor have set their respective hands to these presents and two duplicate hereof the day and year first hereinabove written.

If the contractor is a Company IN WITNESS WHEREOF The Bank has set its hand to these presents through its duly authorized official and the Contractor has caused its common seal to be affixed hereunto and the said two duplicate/has caused these presents and the said two duplicates hereof to be executed on its behalf, the day and year first hereinabove written.

**2.13 The Sexual Harassment of women at work place:**

The Contractor / Agency shall comply with the provisions of “the Sexual Harassment of women at work place (Prevention, Prohibition and Redressal) Act, 2013”. In case of any complaint of sexual harassment against its employee within the premises of the Bank, the complaint will be filed before the Internal Complaints Committee constituted by the Contractor / Agency and the Contractor/Agency shall ensure appropriate action under the said Act in respect to the complaint.

a. Any complaint of sexual harassment from any aggrieved employee of the contractor against any employee of the Bank shall be taken cognizance of by the Regional Complaints Committee constituted by the Bank.

b. The contractor shall be responsible for any monetary compensation that may need to be paid in case the incident involves the employees of the contractor, for instance any monetary relief to Bank’s employee, if sexual violence by the employee of the contractor is proved.

The contractor shall be responsible for educating its employees about prevention of sexual harassment at work place and related issues.

2.14 That the several parts of this Contract have been read by the Auditor and fully understood by the Auditor.

If the Auditor is a partnership or an individual	IN WITNESS WHEREOF the Employer and the Auditor have set their respective hands to these presents and two duplicates hereof the day and year first herein above written.
If the Auditor is a company	IN WITNESS WHEREOF the Employer has set its hands to these presents through its duly authorized official and the Auditor has caused its common seal to be affixed hereunto and the said two duplicates hereof to be executed on its behalf, the day and year first hereinabove written.

Signature Clause:

SIGNED AND DELIVERED by Reserve Bank of India, \_\_\_\_\_

\_\_\_\_\_  
(Name and Designation)

In the presence of -

Witness -

1. \_\_\_\_\_  
Address \_\_\_\_\_

\_\_\_\_\_  
2. \_\_\_\_\_  
Address \_\_\_\_\_  
\_\_\_\_\_

If the party is a partnership firm or individual

SIGNED AND DELIVERED BY \_\_\_\_\_

\_\_\_\_\_



\_\_\_\_\_  
In the presence of -

Witness -

1. \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_  
2. \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

THE COMMON SEAL OF \_\_\_\_\_  
\_\_\_\_\_

was hereunto affixed pursuant to the resolutions passed by its  
Board of Directors at the meeting held on

\_\_\_\_\_

\_\_\_\_\_

In the presence of -

Witness –

1. \_\_\_\_\_

2. \_\_\_\_\_

If the Auditor signs under common seal, the signature clause should tally with the sealing clause in the articles of association.

Directors who have signed these presents in token thereof in the presence of -

1. \_\_\_\_\_

2. \_\_\_\_\_

If the Contract is signed by the hand of power of attorney, whether a company or an individual.

SIGNED AND DELIVERED BY -  
the Auditor by the hand of  
Shri \_\_\_\_\_

\_\_\_\_\_

and duly constituted attorney.

## Section III

### Commercial Conditions

1. Sealed tenders are invited from accredited energy auditors for conducting energy audit in Bank's office buildings at Jammu, Rail Head Complex. Pin -180012.

2. **Eligibility:**

The intending tenderer for energy audit should be **qualified accredited energy auditor** by Bureau of Energy Efficiency.

&

The firm should have the experience of carrying out at least **One electrical energy audits** in Banks, Financial institutions, major hotels or multistoried office buildings or any other electrical installations with a minimum **connected load of 476 KW** (in single connection) in last 5 years (date of issue of tender).

In support of the above, the firms should submit the **letter of accreditation** issued by Bureau of Energy Efficiency.

In case if the accreditation letter is not found then the firm will not be eligible for price bid.

3. **Earnest Money Deposit (EMD):** The Earnest Money Deposit shall be paid by the tenderer as per Memorandum to all tenderers. No interest will be paid on EMD. EMD of the unsuccessful bidder(s) will be refunded by RBI, Jammu. MSEs are exempted from submission of EMD subject to submission of MSE Registration certificate.
4. Price bid of the tenders will be opened on a subsequent date under intimation to all the tenderers. Tenderers are advised to use only the forms supplied by the Bank and not to use any other form. Incomplete tenders are liable for rejection. No terms and conditions or any other information/ enclosures shall be included in tender Price bid.
5. The tenders/Quotation shall be valid for acceptance by the Bank for a period of 90 days from the date of opening of Quotation/tender and shall be extended by such period as may be mutually agreed to.
6. **Prices:** The price quoted for the work shall be firm till completion of the work and shall include all taxes including GST service tax as applicable and cost of transportation/accommodation etc. of the equipment's and persons deputed.
7. This contract is a fixed lump sum contract in respect of the entire energy auditing and to be paid for according to, at the rates contained in the schedule of rates and as provided in the said conditions.
8. The employer reserves to itself the right of altering the items to be executed by adding to or omitting any items without prejudice to this contract. However, the Auditor shall not be entitled to any payment for the works done exceeding the tender quantities unless specifically approved in writing by the Bank's engineer.

9. **Completion Period**: The time for completion of the entire work is 45 days (time period inclusive of submission of final report) from the 10<sup>th</sup> day of issue of work order.
10. **Liquidity Damages**: If work does not complete within the stipulated time period as mentioned clause 9 a liquidity damages of Rs 200 per day and maximum upto 10% of contract amount.

11. **Terms of payment**

The following terms of payment shall be applicable for the work:

- i) 100% of the quoted amount after completion of energy audit and submission of final report to the Bank.
12. All disputes arising out of or in way connected with this Agreement shall be deemed to have arisen at Jammu and only courts in Jammu shall have the jurisdiction to determine the same.
  13. The Reserve Bank of India does not bind itself to accept the lowest or any tender and reserves to itself the right to accept or reject any or all the tenders, either in whole or in part, without assigning any reasons for doing so.
  14. On receipt of intimation from the employer of the acceptance of his/ their tender, the successful tenderer shall be bound to sign the formal contract and within ten days thereof, the successful tenderer shall sign an agreement in accordance with the draft agreement and the schedule of conditions but the written acceptance by the Reserve Bank of India of a tender will constitute a binding contract between the RBI and the person so tendering, whether such formal Agreement is or is not subsequently executed. The cost of necessary stamp paper for execution of the agreement shall be borne by the successful tenderer.
  15. If the Auditor being individual or a firm commits any act of insolvency or shall be adjudged an Insolvent or being an incorporated company shall have an order for compulsory winding up made against it or pass an effective resolution for winding up voluntarily or subject to supervision of the court and official Assignee or liquidator in such acts of solvency or winding up, as the case may be, shall be unable within seven days after notice of him requiring him to do so, to show to the reasonable satisfaction of the Bank's Engineer that he is able to carry out and fulfill the contract and to give security therefore, if so required by the Bank's Engineer or If the Bank's Engineer certify in writing to the employer that the Auditor is solvent and is in a position to carry out the work.
  16. All addendum /corrigendum/ Notice will be forwarded to all eligible tenderers on their emails as mentioned on the front cover of Part I of the tender through email ([estate@rbi.org.in](mailto:estate@rbi.org.in)) and on RBI website ([www.rbi.org.in](http://www.rbi.org.in)).

Date:  
Place:

Signature of tenderer  
Name and Address

### List of clients

(For whom similar scope has been completed in the last 5 years.)

<b>Sr. No.</b>	<b>Details</b>	<b>Name of client (1)</b>	<b>Name of client (2)</b>	<b>Name of client (3)</b>
1	Address, fax and telephone numbers			
2	Establishment name, location and address.			
3	Brief details of the work			
4	Date of award of contract			
5	Date of completion of work			
6	Whether the Establishment is with central air-conditioning system			

## Section IV

### **Terms and Conditions**

#### **1. Introduction**

Reserve Bank of India Jammu is desirous of undertaking Energy audit of the Electrical/Electromechanical installations provided in the office building at Jammu. The office building receives power supply at 11 KV from the Electricity supply authorities. In addition, Jammu office has sanctioned load 476 kW. It has Substation, Transformers 2X500KVA having OLTC, Switchgear (ACB), Electrical Panels, Capacitor Panels, Distribution Board, Distribution circuits, Electrical wiring consisting of power, lighting and fan circuits including earthing, Building and Equipment Earthing, Various types of motors, DG set (400kVA & 250 kVA), UPS 2X60kVA, Central Air-conditioning Plant 2X200TR, Room Air conditioner, Air Handling Units, Lifts, Lightning Arrester, Kitchen Equipment, Water Pumps, Servers, switches, PCs, printers and other IT equipment and Interactive grid 20kWp solar inverter any other equipment and gadgets connected to power supply.

#### **2. Objective**

- a. The objective of energy audit is to have Energy Performance Assessment of equipment's and utilities in the electrical sub-station, Electric power distribution network, HVAC systems, Electric motors and drives, Fans and blowers, Water pumping systems, UPS systems, Lighting systems, Diesel generator sets, etc. including study of energy consumption pattern and management of power demand in the building. Marking to small DBs for incoming and out-going feeder.
- b. Based on the above observations, to identify opportunities for energy saving and to have recommendations for the same along with cost benefit analysis.

#### **3. Terms & conditions**

##### **A. Equipment's/measuring instruments**

i) All the equipment's/instruments required for site measurements for carrying out the energy audit will have to be arranged by the firm without any extra payment by the Bank. The firm should have the following minimum equipment's/instruments for energy audit:

1. Three-phase Power analyzer
2. Ultra-sonic flow meter
3. Pressure gauges
4. Thermometers
5. Anemometers
6. Thermography camera
7. Harmonic Analyzer

- ii) All testing instruments/meters shall be accompanied with valid calibration certificate.
- iii) The site measurements should be recorded in the presence of Bank's personnel.

Please note that the Bank will not provide any kind of assistance in the form of men/material and the firm will have to make their own arrangement for all assistance at their own cost.

## **B. Work at site**

The firm may visit the premises and ascertain site conditions. The work has to be carried out in a working office building without causing inconvenience to the normal working of the Bank. No power shut down will be provided during office hours. Power shut down required for the work will be given on holidays and after office hours at the discretion of the Bank. No extra claims will be admissible later on these grounds.

The firm should deploy only qualified and experienced Engineers/Technician having requisite licenses to carry out such works. Utmost care shall be exercised by the firm in carrying out the work to ensure that no damage is caused to persons and properties. The Bank will not be liable for any injury or damage to persons and any such happening will be entirely the responsibility of the firm

## **Scope of Work:**

### **A. Methodology:**

Energy audit activities shall include but not limited to the following:

1. **Pre Audit:** Meeting with Bank's technical team, Visual inspection of the site & verification of various documents regarding energy consumption and electrical installation.
2. **Audit:** Auditing and performance analysis to determine the condition of electrical installation as detailed below.
3. Submission of **Draft report** to Bank and discuss the report with Bank's representative.
4. Submission of **Final report** to Bank after incorporating the changes as per discussions with the Bank.

### **B. Equipment details**

The energy audit of the electrical/electromechanical installation as detailed in [Annexure-I](#) shall be conducted. The major list of equipments is as under:

1. Electricity Supply and Distribution
2. Air Conditioning System
3. Air Handling Units
4. Split / Package Air Conditioners
5. UPS
6. Lighting
7. Kitchen Equipment's
8. Water Pumps, Fire Pumps

9. Lifts,
10. DG sets
11. Any other existing electrical system not mentioned above

**C. The energy audit of the electrical installation shall cover the following activities:**

**i) Building Energy Bills Analysis**

Analysis of energy consumption pattern in the building with respect to peak demand, load pattern, power factor for the last 3 years

**ii) Electricity Supply and Distribution network-**

**Distribution Transformer(s)**

Study and analysis of the utility pattern of transformer(s), checking no load loss of the Transformers, measuring all Day Efficiency for each transformer etc.

**LT Distribution Panels**

1. General inspection of the LT distribution panel(s) for its maintenance and working including checking all the meters mounted on it.
2. Performing thermography for the cable termination wherever required and analysis of the observations
3. Measurement and analysis of demand and power factor, suggestions to reduce the demand and improve the power factor.
4. Study on Metering system and suggestion for improvement.
5. Study on V, I, KW fluctuation and profiling, V & I imbalances in the network.
6. Detailed examination of the existing energy use of the facility with break up.
7. Study and examination of use of electric energy, cost balance with break up.
8. Performance evaluation of installed capacitors to ensure deliverance of desired output, level of losses, management of system power factor and operation of capacitors.

**iii) Air Conditioning Systems–**

**Centralised Air Conditioning System**

1. Performance evaluation of existing central air conditioning system(s) in all the areas, measurement and analysis of indoor temperatures and suggest to optimise the energy utilisation.

**Chillers -**

1. Measuring all the operating parameters such as water flow (If the actual flow found to be in variation with the designed flow, the same needs to be adjusted to match designed flow before taking observations) inlet & out water temperatures, gas suction & discharge pressure, Power Consumption etc. after stabilising the parameters.

2. Calculation of operating Input KW per TR (IKW / TR) of Chiller(s) at minimum three different available load conditions for each chiller.
3. Comparison of actual parameters with the design values, and suggestion for corrective actions to be implemented.

#### **Pumps -**

1. Measuring all the operating parameter such as water flow, suction & discharge head, power consumption etc.
2. Performance Evaluation of chilled water & Condenser water pumps and compare the same with the design or generally expected efficiency of such pumps.

#### **Cooling Towers -**

1. Measurement of various parameters for cooling tower fans, water flow rate, air flow rate, dry bulb temperature (DBT) wet bulb temperature (WBT) sump temperature, relative humidity etc.
2. Evaluation of cooling tower performance (Range, approach, and effectiveness) and comparing it with designed data.

#### **Air Handling Units**

1. Measurement of airflow, Relative Humidity(RH), Supply air temperature (Tsa), Return air temperature (Tra), Chilled Water Inlet and outlet temperature i.e. Tin, Tout through cooling coil and energy consumption of Air Handling Units (AHUs).
2. Examination of Air Handling Units for air delivery capacity, capacity utilization, temperature pattern, pressure drop and operational pattern with respect to time to identify potential energy saving measures.
3. Calculation of actual tonnage of AHUs and Measurement of operating zone temperatures under each unit. Comparison of actual parameters with the design values.

#### **Package/ precision Air Conditioners / Split or window air conditioners**

1. Evaluation of operating Coefficient of Performance (COP) of Precision and package Air Conditioner. Identification and suggestions for performance improvement and energy saving potential.
2. Calculation of actual tonnage and comparison of actual parameters with the design values and corrective actions.

#### **iv) UPS**

1. Measurement and analysis UPS loading, redundancy, operating efficiency, load pattern to suggest measures for energy cost reduction, Measurement and analysis of Harmonics as per standards.

#### **v) Lightning**

1. Examination of the performance of existing lighting system in all the areas, measurement of illumination levels, etc



2. To look possibilities to reduce energy use by incorporating energy efficient lighting system.
3. Study of operating electrical parameters like voltage, current etc in the lighting circuits.

**vi) Diesel generator sets**

1. General Inspection of DG set.
2. The DG sets are to be tested for operational performance and parameters including fuel consumption, power generated, Voltage, Ampere, KW, KWh, KVA should be recorded during the audit.

**vii) Kitchen equipment's**

1. Examination of the performance of the existing kitchen equipment's, measurement of power consumption etc to improve efficiency and optimizing power consumption.
2. To explore and suggest the possibilities to reduce energy use by incorporating energy efficient equipment's.

**viii) Fire Hydrant Pumps and Domestic water Pumps**

1. Performance analysis of all major motors (above 10 HP) needs to be studied for possible energy savings opportunities by the application of following items.
  - a. Possibility of on /off control
  - b. Interlocking
  - c. Downsizing motors etc.

**ix) Preparation of single line diagram(SLD) of Electrical Installation** from HT panel to Floor panels, covering transformers, main LT panels, capacitor panel, DG sets, UPS Panel upto the incomer of Power/UPS distribution boards installed at different floors/areas. **(This will also include physical marking (computerised sticker) of individual distribution boards at site).**

**D. Energy Audit Report**

The report shall contain complete building information, inventory of all equipment. It should include the log sheet data collected/measured at site, analysis of data (Log sheet and actual measured), observations of operational performance of various equipment, findings and recommendations for achieving energy and cost saving.

The recommended energy saving measures shall be categorized as (i) short term, (ii) medium term and (iii) long term measures for energy conservation. The report should also include energy use indices and comparison with industry averages.

The report should provide the estimated cost, estimated savings and simple pay back for each recommended energy saving measures in a chart. A detailed description of each energy conservation measure and supporting calculation with energy use and savings calculations, economic analysis and any assumptions that are made regarding operation or equipment efficiency shall be included. The recommendations for energy efficiency shall include the technical particulars of the equipment, life expectancy and details of manufacturer etc.

Date:

Place:

Seal & Signature of Agency

Report

on

Energy Audit of Bank's Office Building

at Jammu

Duration of Energy Audit:

Name of the Energy Audit Agency: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

## **Summary of Recommendations**

**Remarks**

**Details existing Electrical Systems****Details of Power Supply :**

Sanctioned Load (KVA)	
-----------------------	--

	Capacity (KVA)	Voltage ratio	Type of cooling (oil / air)
Transformer No. 1 Rating			
Transformer No. 2 Rating			
Transformer No. 3 Rating			

**Details of Major Power Equipment's:**

Central A C Plant Data					
	Capacity (TR)	compressor Motor 1 (KW)	compressor Motor 2 (KW)	Chilled Water Flow (LPM)	Condenser Water Flow (LPM)
Chiller No. 1					
Chiller No. 2					
Chiller No. 3					

**Chilled Water Pumps**

	Flow (LPM)	Head (M)	Motor (KW)
Chilled Water Pump 1			
Chilled Water Pump 2			
Chilled Water Pump 3			
Chilled Water Pump 4			

**Condenser Water Pumps**

	Flow (LPM)	Head (M)	Motor (KW)
Condenser Water Pump 1			
Condenser Water Pump 2			
Condenser Water Pump 3			
Condenser Water Pump 4			

**Cooling Towers**

	Capacity (TR)	Flow (LPM)	Motor (KW)
Cooling Tower 1			
Cooling Tower 2			
Cooling Tower 3			

Air Handling Units (AHUs)	Location	Capacity (TR)	Air Flow (CFM)	Motor (KW)	Area catered (M <sup>2</sup> )
AHU 1					
AHU 2					
AHU 3					
AHU 4					
AHU 5					
AHU 6					
AHU 7					

### **Hot Water Generator**

	Make	Capacity (KW)
Hot Water Generator 1		
Hot Water Generator 2		

### **Lightening**

#### **Internal Lightening (Floor wise)**

Sr. No.	Floor	Type of fitting	Wattage	Qty.	Total carpet area covered (M <sup>2</sup> )

#### **External Lightening**

Sr. No.	Location	Type of fitting	Wattage	Qty.	Total ground area covered (M <sup>2</sup> )

### **Lifts**

Lifts No.	Location	Make	Passenger Capacity	Speed (M/S)	No. of floors served	Whether controller V3F or not
1						
2						
3						
4						

**Standalone A. C. units where central AC is also provided (Area wise)**

Sr. No.	Location	Type of AC (window / split / package etc.)	Qty	Capacity of each AC (TR)	Area catered (M <sup>2</sup> )	Expected per day operating hours

**Standalone A. C. units where central AC is not provided (Area wise)**

Sr. No.	Location	Type of AC (window / split / package etc.)	Qty	Capacity of each AC (TR)	Area catered (M <sup>2</sup> )	Expected per day operating hours

**DG Sets**

	Location	Make	Rating (KVA)
DG SET No. 1			
DG SET No. 2			
DG SET No. 3			
DG SET No. 4			

**Special Equipment viz. Shredding & Briquetting Machine, CVPS machine etc.**

Sr. No.	Name of the machine	Make	Power Rating of the machine (KW)	Expected per day operating hours

**UPS Details**

Sr. No.	Location	Make	Capacity (KVA)



**Performance Evaluation of Main Equipments-Sample Formats****Central AC Plant**

Chiller No. \_\_\_\_\_

Sr. No.	Chilled water inlet Temp. (Tin)°C	Chilled water outlet Temp. (Tout)°C	Chilled Water Flow (LPM)	Suction Pressure	Discharge Pressure	Capacity (TR)	Input Power (KW)	IKW /TR	Remarks/Comments/Suggestions

**Capacity of the Chiller (TR) = (Tin -Tout)\*Water Flow rate (LPM)\*60/3024**

**Efficiency of Chiller in KW/TR = Total Power input (in KW)/Total Tonnage**

**Air Handling Units**

Air Handling Unit (AHU) No. \_\_\_\_\_

Sr. No.	Return / Inlet Air		Supply / outlet Air		Air Flow (CFM)	Tons of Refrigeration (TR)	Input KW	IKW /TR	Remarks/Comments/Suggestions
	Dry Bulb Temp. Tdb (°C)	Wet Bulb Temp. Twb (°C)	Dry Bulb Temp. Tdb (°C)	Wet Bulb Temp. Twb (°C)					

**AHU TR = 1.699\*Air Flow (CFM)\* Density of Air (Kg/M<sup>3</sup>)\*(Hin-Hout)/(4.18\*3024)**

Where :

Hin = Enthalpy of inlet Air at AHU (KJ/Kg)

Enthalpy of outlet Air from AHU

Hout = (KJ/Kg)

Density of Air = 1.18 Kg/M<sup>3</sup> at standard Temperature and Pressure

**Note: Enthalpy is to be read from Psychrometric Chart corresponding to DB and WB Temp.**

**Chilled Water Pumps**

Chilled Water Pump No. \_\_\_\_\_

Sr. No.	Discharge Pressure (Pdisc) Kg/cm <sup>2</sup>	Suction Pressure (Psuc) Kg/cm <sup>2</sup>	Chilled Water Flow (LPM)	Developed Hydraulic Power (KW)	Measured Input Power (KW)	Pump efficiency	Remarks / Comments / Suggestions

**Developed Hydraulic Power (KW) = Flow (LPM) \* (Pdisc-Psuc) Kg/cm<sup>2</sup> \*9.81/6000**

**Pump Efficiency =Developed Hydraulic Power (KW)/ Input Electric KW**

**Condenser Water Pump**

Condenser Water Pump No. \_\_\_\_\_

Sr. No.	Discharge Pressure (Pdisc) Kg/cm <sup>2</sup>	Suction Pressure (Psuc) Kg/cm <sup>2</sup>	Condenser Water Flow (LPM)	Developed Hydraulic Power (KW)	Measured Input Power (KW)	Pump efficienc	Remarks/ Comments/ Suggestions

**Developed Hydraulic Power (KW)= Flow (LPM)\*(Pdisc-Psuc)\*9.81/6000**

**Pump Efficiency =Developed Hydraulic Power (KW)/ Input Electric KW**

**COOLING TOWER**

Sr. No.	Water inlet Temp. (Tin)°C	Water outlet Temp. (Tout)°C	Water Flow (LPM)	Wet Bulb Temp. Twb (°C)	Cooling Tower Capacity (TR)	Cooling Tower Efficiency	IKW /TR	Remarks/ Comments/ Suggestions

**Range= Tin-Tout**

**Approach= Tout-Twb**

**Cooling Tower Efficiency = Range\*100/(Range+Approach)**

**Cooling Tower Capacity (TR) = (Tin -Tout)\*Water Flow (LPM)\*60/3024**

### Internal Lightening (Floor wise)

Sr. No.	Floor	Type of fitting	Calculate d Wattage per Fitting	Qty	Total Wattage (KW)	Total carpet area covered (M <sup>2</sup> )	Light Power Density (W/M <sup>2</sup> )	Measured Average Light Level (Lux)	Light Efficiency (Lux/LPD)

### DG set

1. Run the DG set at available load
2. The initial and final reading of the diesel tank and Energy meter needs to be recorded.

Sr. No.	Rating of DG set (KVA)	Make of DG set	Start Time	Stop Time	Period of Operation (Hrs.)	Diesel Consumed (Ltrs.)	Generate d Energy (KWH)	Specific fuel Consumption (KWH/Ltr)	Remark /Observation

### UPS

1. Measurement on each UPS needs to be recorded

Sr. No.	Rating of UPS (KVA)	Make of UPS	Input Voltage			Input Current			Total current Harmonic Distortion THDi	Total Voltage Harmonic Distortion THDv	Remarks
			Vrn	Vyn	Vbn	Ir	Iy	Ib			

### LT Panels: LT Panels at Substation including capacitor

#### Panel Name:

Sr. No.	Input Voltage			Input Current			Input KW	Input KVA	P.F.	Total current Harmonic Distortion THDi	Total Voltage Harmonic Distortion THDv	Remarks
	Vrn	Vyn	Vbn	Ir	Iy	Ib						

**Part-II**

**To be submitted in Separate Envelope**



**भारतीय रिजर्व बैंक/Reserve Bank of India**  
**संपदा विभाग/Estate Department**  
**जम्मू/Jammu**

जम्मू स्थित बैंक के कार्यालय भवन का एनर्जी ऑडिट कराने हेतु कोटेशन/निविदा  
Quotation/Tender for Conducting Energy Audit of Bank's Office Building at Jammu

भाग-2/Part-2

**कोटेशन/निविदा**  
**Quotation/Tender**

निविदाकर्ता का नाम/Name of the Tenderer: \_\_\_\_\_

पता/Address: \_\_\_\_\_

मोबाईल/Mobile : \_\_\_\_\_

ई-मेल/Email: \_\_\_\_\_

**प्रस्तुत करने की नियत तिथि/** : 30 मई 2022 अपराह्न 02:00 बजे तक/May 30,  
**Due Date of Submission** 2022 upto 2:00 pm

**निविदा के भाग 1 खुलने की तिथि /** : 30 मई 2022 अपराह्न 03:00 बजे से/May 30  
**Date of opening of Part I** from 3:00 pm onwards  
**of Tender**

**भारतीय रिज़र्व बैंक/Reserve Bank of India**  
**संपदा विभाग/Estate Department**  
**जम्मू/Jammu**

**मात्रा के बिल/Bill of Quantity**

**कार्य का नाम/Name of work: जम्मू स्थित बैंक के कार्यालय भवन एनर्जी ऑडिट कराने हेतु निविदा**  
**/Tender for conducting Energy Audit of Bank's Office Building at Jammu.**

क्र.सं./ S.No.	विवरण /Description	मात्रा/Qty	जीएसटी को छोड़कर दरें (रु.)/Rates excluding GST(Rs.)	लागू जीएसटी (रु.)/GST as applicable (Rs.)	कुल दर=(4)+(5) (रु.)/ Total rate=(4) + (5) (Rs.)
(1)	(2)	(3)	(4)	(5)	(6)
1	निविदा भाग-I में निर्दिष्ट कार्यक्षेत्र के अनुसार एनर्जी ऑडिट करवाने और एनर्जी ऑडिट रिपोर्ट प्रस्तुत करने की दर Rate for conducting Energy Audit and Submitting Energy Audit Reports as per the scope specified in the tender Part-I	L.S.			

दिनांक/Date:

स्थान/Place:

एजेंसी की मुहर और हस्ताक्षर/

Seal and Signature of the agency