



**RESERVE BANK OF INDIA  
ESTATE DEPARTMENT  
NEW DELHI**

**Notice Inviting Tender**

**Conducting Energy Audit of Bank's Office Building at New Delhi**

1. Sealed tenders in two parts are invited for "Conducting Energy Audit of Bank's Office Building at New Delhi. The work is estimated to cost Rs. **1.00 lakh** and is to be completed within **06 (six) weeks**.
2. Tender forms will be issued only to those contractors who invariably furnish, at the time of applying for tender-forms, the following information in writing and submit relevant documents to satisfy the Bank about their eligibility for participating in the tendering process. Only those contractors who fulfill the following pre-qualification criteria will be eligible to participate in the tender for the work:
  - (i) The intending tenderer for conducting Energy Audit should be professionally qualified degree holder and experienced **Energy Auditor duly certified and accredited by Bureau of Energy Efficiency(BEE)**. Supporting evidence/documents need to be submitted along with the documents pertaining to the pre-qualification criteria.
  - (ii) The firm should have the experience of carrying out at least **two energy audits** in Banks, Financial institutions, major hotels or multistoried office buildings or any other electrical installations with a minimum **connected load of 500 KW** in last 5 years. Supporting evidence/documents need to be submitted along with the documents pertaining to the pre-qualification criteria.

The client's certificate shall be accepted only when the same is signed by an official of the rank of Executive engineer/Superintendent Engineer or equivalent in respect of a Government/Semi Government organization or a PSU and only when they are supported by adequate proof of payment received by the contractor for the work done by him. The client's certificate issued by the private organizations shall also be accompanied by Tax Deducted at Source (TDS) certificates. Applications/tenders received without the above certificates may be rejected. The Bank shall have the right to independently verify these certificates.

The Bank shall evaluate the said reports before evaluation of price bid of the tenders. If any tenderer is not found to possess the required eligibility for participating in the tendering process at any point of time and/or his performance reports received from his clients are found unsatisfactory, the Bank reserves the right to reject his offer even after opening of Part-I of the tender. The Bank is not bound to assign any reason for doing so.

Work experience & Completion of similar works of specified value during the specified period	Copies of the detailed work orders for the qualifying works indicating date of award, value of awarded work, time given for completing the work, etc. and the corresponding completion certificates indicating actual date of completion and actual value of executed <b>similar</b> works should be enclosed in proof of the work experience. The details along with documentary evidence of previous experience, if any, of carrying out works for the Reserve Bank of India at any centre, should also be given.
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Details of completed works	The client-wise names of work(s), year(s) of execution of work (s), awarded and actual cost (s) of executed work (s), completion time stipulated in the contract (s) and actual time taken to complete the work (s), Name(s) and full contact-details of the officers/authorities/departments under whom the work(s) was/were executed should be furnished.
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3. In the event of intending tenderer failing to satisfy the pre-qualification criteria; the Bank reserves the right to refuse issuance of tender forms/documents to them.
4. After satisfactory confirmation for fulfilling the pre-qualification criteria mentioned above, tender forms will be issued through e-mail from **December 29, 2020 to January 20, 2021** from **10.00 AM to 5.30 PM** on all working days (Monday to Friday) by Estate Department, Reserve Bank of India, New Delhi.
5. The pre-tender clarification by the intending tenderers can be sought through e-mail or by visiting the Bank on or before January 27, 2021 in Estate Department, RBI New Delhi to clarify any point/doubt in respect of the tender/scope of the work. The duly filled in tender documents should reach in Bank's Office at Estate Department, Reserve Bank of India, New Delhi by **14.00 hours on February 03, 2021**.
6. Tender forms can also be downloaded from the website [www.rbi.org.in](http://www.rbi.org.in) till **January 20, 2021**.
7. **In case the downloaded tender document is intended to be submitted**, all the information/documents, mentioned in Para 2 above, will have to be submitted at Estate Department, Reserve Bank of India, New Delhi in a sealed cover addressed by name to Shri Ajay Kumar, Regional Director, Reserve Bank of India, Estate Department, New Delhi **upto 4:30 PM on January 20, 2021 (the last date of issue of tender)** for Banks' examination. On scrutiny of these documents submitted for pre-qualification criteria, tenderers would be advised for their eligibility. Tenderers are requested to submit their filled-in tender forms within stipulated time, only after receiving the eligibility confirmation from the Bank. If any of the intended tenderer is not found to possess the required eligibility, his/her tender will not be accepted by the Bank, for further processing.
8. Tenders only in the prescribed form shall be accepted; Part-I of the tender should contain the Bank's standard technical and commercial conditions, if any for the proposed work, tenderers' covering letter, and the proof of EMD of Rs.2, 000/- through NEFT to RBI New Delhi or in the form of a demand draft favouring Reserve Bank of India payable at New Delhi and be sealed in one cover, super scribing "Part – I. Part-II of the tender should contain only the price bid/bill of quantity in the prescribed format. Both these sealed envelopes of part-I and part-II should be sealed in one cover superscribing, "Tenders for Conducting Energy Audit for Bank's Office Building at New Delhi". This sealed envelope addressed by name to Shri Ajay Kumar, Regional Director, Reserve Bank of India, Estate Department, New Delhi will be received by the Bank at Estate Department, Reserve Bank of India, New Delhi **up to 14:00 hours on February 03, 2021 in the manner described in the tender form. Tenders received after the due date and time will not be accepted under any circumstances.**
9. Part I of the tenders will be opened at **15.00** hours on **February 03, 2021 in the presence of the authorized representative of the tenderers who choose to be present.**
10. The Bank is not bound to accept the lowest tender and reserves the right to accept either in full or in part any tender. The Bank also reserves the right to reject all the tenders without assigning any reason there for.

Regional Director



**Reserve Bank of India  
Estate Department  
New Delhi**

Tender for  
Conducting Energy Audit of Bank's Office Building  
at New Delhi

**PART I**

Name of the Tenderer: \_\_\_\_\_

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

\_\_\_\_\_

**Due Date of Submission** : 2.00pm on February 03, 2021  
**Date of opening of Part I of tender** : 3.00pm on February 03, 2021  
**Venue** : Estate Department

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## Section I Form of Tender

Place \_\_\_\_\_

Date \_\_\_\_\_

To,

The Regional Director  
Estate Department,  
Reserve Bank of India  
New Delhi

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 equipments 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 <b>New Delhi</b>
(b)	Estimated cost	Rs. 1.00 lakhs
(c)	Terms of payment	As per clause 12 of Commercial Conditions.
(d)	Earnest Money	Rs. 2000/-
(e)	Time allowed for completion of work from tenth day after the date of letter advising acceptance of tender.	<b>Six weeks</b>

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. Should this Tender be accepted, 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** 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 is submitted in two parts in separate sealed envelopes as under:**

- Part I shall have proof of EMD/EMD and all commercial terms and conditions and technical particulars
- Part II shall have the Price Bid in sealed cover in the Bank's proforma.

Dated this \_\_\_\_\_ day of \_\_\_\_\_ 2021.

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

ARTICLES OF AGREEMENT made the \_\_\_\_\_ day of \_\_\_\_\_ between the Reserve Bank of India, 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 RBI New Delhi** 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, Central Office, Reserve Bank of India 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 **within six weeks** 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, New Delhi.
- 2.11 All disputes arising out of or in any way connected with this agreement shall be deemed to have arisen in New Delhi and only courts in New Delhi shall have jurisdiction to determine the same.
- 2.12 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 authorised 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 New Delhi.

#### 2. Eligibility:

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

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

3. **Earnest Money Deposit (EMD):** The Earnest Money Deposit shall be paid by the tenderer either in the form of Demand Draft drawn in favour of Reserve Bank of India payable at New Delhi or through NEFT. The EMD draft or proof of EMD shall be submitted alongwith Part I of the tender.
4. **Pre-Bid Clarification:** The pre-tender clarification by the intending tenderers can be sought through e-mail or by visiting the Bank on or before January 27, 2021 in Estate Department, RBI New Delhi to clarify any point/doubt in respect of the tender. All the intending tenderers are advised to go through the tender documents in details. The issues will be discussed and all the tenderers will be advised suitably. The tenderers are expected to get all the issues clarified before filling up the tender and therefore should desist from deviating from the Bank's tender conditions/specifications in their technical (Part I) and Price bids (Part II).
5. The tenders and proof of EMD for the above work shall be submitted in separate sealed covers addressed to Shri Ajay Kumar, Regional Director, Reserve bank of India, New Delhi, so as to reach him not later than 02.00pm on February 03, 2021. The envelopes shall be super-scribed "**Tenders for conducting energy audit for Bank's office building at New Delhi (Part-I/ part-II)**". Part-I of the tenders will be opened on the same day at 3.00 pm.
6. Part-II 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 forms. Incomplete tenders are liable for rejection. No terms and conditions or any other information/ enclosures shall be included in tender Part-II.
7. The tenders shall be valid for acceptance by the Bank for a period of 90 days from the date of opening of tender Part-I and shall be extended by such period as may be mutually agreed to.
8. **Prices:** The price quoted for the work shall be firm till completion of the work and shall include all taxes including service tax as applicable and cost of transportation/accommodation etc. of the equipments and persons deputed.
9. 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.

10. The employer reserve 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.

11. **Completion Period**: The time for completion of the entire work is six weeks from tenth day after the date of letter advising acceptance of tender. The site survey, data collection/measurements and draft report shall be completed in six weeks and the final report shall be submitted within seven days thereafter.

12. **Terms of payment**

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

- i) 80% of the quoted amount after completion of energy audit and submission of draft report to the Bank. Draft report and final reports should include all the required information and audit findings in the format indicated in this tender including the annexures.
- ii) Balance 20% of the quoted amount on submission of the final report to the Bank

All payments for the work will be made after statutory deductions.

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 fourteen 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 shall clarify in writing to the employer that the Auditor.

Date:  
Place:

Signature of tenderer  
Name and Address

### List of clients

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

Sr. No.	Details	Name of client (1)	Name of client (2)	Name of client (3)
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 New Delhi is desirous of undertaking Energy audit of the Electrical/Electromechanical installations provided in the office building at New Delhi. The office building receives power supply at 11 KV from the Electricity supply authorities. In addition, diesel generator set and UPS system of suitable capacities have been installed to meet critical applications during power outages.

#### **2. Objective**

- a. The objective of energy audit is to have Energy Performance Assessment of equipments 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.
- 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. Equipments/measuring instruments**

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

1. Three-phase Power analyser
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.

## **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 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.
5. Energy Audit should be conducted in conformity to the relevant BEE directives including Part III Sec4, 116 No.2/11(6)/05-BEE, dated 28-04-2010 or the latest, if any published.

### **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, fans
7. Kitchen Equipment's
8. Water Pumps, Fire Pumps
9. Lifts
10. DG sets
11. CVPS and SBS machines

12. Any other existing electrical system not mentioned above

**C. The energy audit of the electrical installation shall cover, in particular, 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 (T<sub>sa</sub>), Return air temperature (T<sub>ra</sub>), Chilled Water Inlet and outlet temperature i.e. T<sub>in</sub>, T<sub>out</sub> 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 and fans**

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 lightening 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 equipments**

1. Examination of the performance of the existing kitchen equipments, measurement of power consumption etc to improve efficiency and optimizing power consumption.
2. To look possibilities to reduce energy use by incorporating energy efficient equipments.

**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.

**D. Energy Audit Report**

The report shall contain complete building information, inventory of all equipments. 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 equipments, 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 New Delhi

Duration of Energy Audit:

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

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

\_\_\_\_\_

## **Summary of Recommendations**

**Remarks**

Annexure –I

**Details existing Electrical Systems**

**Details of Power Supply :**

Sanctioned Load (KVA)	
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	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 Equipments:**

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 efficiency	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	Calculated 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.)	Generated 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						



**Reserve Bank of India  
Estate Department  
New Delhi**

Tender for  
Conducting Energy Audit of Bank's Office Building  
at New Delhi

**PART II**

Name of the Tenderer: \_\_\_\_\_

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

\_\_\_\_\_

**Due Date of Submission** : 2.00pm on February 03, 2021  
**Date of opening of Part I of tender** : 3.00pm on February 03, 2021  
**Venue** : Estate Department

**Reserve Bank of India  
Estate Department  
New Delhi**

**Bill of Quantity**

**Name of Work: Tender for Conducting Energy Audit of Bank's Office Building at  
New Delhi**

<b>Sl. No.</b>	<b>Description</b>	<b>Qty</b>	<b>Rate excluding service tax(Rs.)</b>	<b>Service tax as applicable (Rs.)</b>	<b>Total rate = (4) + (5) (Rs.)</b>
<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>	<b>(6)</b>
<b>1</b>	Rate for conducting Energy Audit and Submitting detailed Energy Audit Reports as per the scope specified in the tender Part-I.	L.S.			

Date:

Seal and Signature of the agency

Place: