



**Reserve Bank of India
Estate Department
Dehradun**

Quotation for Conducting Energy Audit of Reserve Bank of India Office Building at Dehradun

Reserve Bank of India, Dehradun invites Two-part sealed quotation for **Conducting Energy Audit of Reserve Bank of India Office Building, Dehradun** in offline mode. The Schedule of the quotation is as follows:

SCHEDULE OF QUOTATION (SOQ)

a. Estimated cost of the work	₹1,92,045/- (One lakh Ninety Two Thousand Forty Five only)
b. Date of availability of Quotation document on RBI Website	November 18, 2025, from 3:30 PM onwards
c. Earnest Money Deposit	<p>₹3,841/- (Rupees Three Thousand Eight Hundred and Forty One Only) by NEFT</p> <p>NEFT Details:</p> <p>Beneficiary Name: Reserve Bank of India A/C No- 186003001 IFSC – RBIS0DNPA01 (Fifth and tenth digits in IFSC code are zero)</p> <p>The last date of submission of EMD is on December 08, 2025, till 02:30 PM. The transaction reference number shall be submitted with the tender document and mailed to estatedehradun@rbi.org.in</p> <p>* Vendors having MSEs (Micro and Small Enterprises only) Udyam Registration Number (Udyog Aadhar Memorandum Number) irrespective of the category are exempted from the payment of cost of tender documents and submission of EMD at the time of bidding. Bidders must submit MSE (Micro and Small Enterprises only) registration certificate at the time of submission of tender documents (Part I) for claiming exemption of EMD. The documentary evidence should be submitted along with Part-I of the tender.</p>

d. Date of Pre-Bid Meeting	December 01, 2025 at 02:00 PM
e. Last Date of submission of sealed quotation	December 08, 2025, till 3:30 PM at 1st floor, Reserve Bank of India, Plot no. 16 & 17, IT Park, Sahastradhara Road, Dehradun - 248001
f. Date and time of opening of technical bid of quotation	December 08, 2025, at 4:00 PM

Applicants intending to apply will have to satisfy the Bank by furnishing documentary evidence in support of their possessing required eligibility and in the event of their failure to do so, the Bank reserves the right to reject their candidature.

The Bank is not bound to accept the lowest tender and reserves the right to accept either in full or in part any tender and reserves the right to reject all the tenders without assigning any reason therefor. Amendment/ corrigendum to the tender, if any, issued in future will only be notified on the RBI website.

**Regional Director
Reserve Bank of India, Dehradun**



**Reserve Bank of India
Estate Department
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**Regional Director
Reserve Bank of India, Dehradun**



**Reserve Bank of India
Estate Department
Dehradun**

Conducting Energy Audit of Reserve Bank of India Office Building, Dehradun

Name of the Firm/ Company: _____

Address: _____

Date of Pre-Bid Meeting: **December 01, 2025 at 02:00 PM**

Last Date of Submission of sealed quotation: **December 08, 2025 at 3:30 PM**

Date of opening of technical bid (Part I) of quotation: **December 08, 2025 at 04:00 PM**

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Section I
Form of Quotation

Place _____
Date _____

To,

Regional Director
Estate Department
Reserve Bank of India
Dehradun

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 Reserve Bank of India Office Building, Dehradun
b.	Estimated cost	₹1,92,045/- (Rupees One lakh Ninety Two Thousand Forty Five only)
c.	Terms of payment	As per part I of the Quotation document
d.	Earnest money deposit (EMD)	₹3,841/- (Rupees Three Thousand Eight Hundred and Forty One Only)
e.	Time allowed for completion of work at site from 14 th day of issue of work order	30 days.

2. We also agree that our quotation/ rates shall remain valid for acceptance by the Bank for 90 days from the date of opening of the Part-1 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 quotation be accepted, I/we hereby agree to abide by and fulfill all the Terms and Conditions of the quotation and in default thereof, to forfeit and pay to

you or your successors, or assignees or nominees such sums of money (deposited as EMD) 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 quotations either in full or in part without assigning any reason therefor. We have deposited a sum of ₹ 3,841/- as earnest money with the Reserve Bank of India, which shall not 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 Quotation is submitted in sealed envelope.
 - Part I shall have 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 _____ 2025.

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 on the _____ day of _____ between the Reserve Bank of India, Dehradun, 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 Reserve Bank of India Office Building, Plot no. 16 & 17, IT Park, Sahastradhara Road, Dehradun** 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 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 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-in-charge, 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 specifications, 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 specifications 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 30 days** 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, Dehradun.

- 2.11 All disputes arising out of or in any way connected with this agreement shall be deemed to have arisen in Dehradun and only courts in Dehradun 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, Dehradun

(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 Directors who have signed
these signs under common presents in token thereof
in the seal, the signature presence of -
clause should tally
with the sealing
clause in the articles
of association.

1. _____

2. _____

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

SIGNED AND DELIVERED
the Auditor by the hand of
Shri _____
and duly constituted attorney.

Section III

Commercial Conditions

1. Sealed quotations in Two Parts are invited from accredited Energy Auditors for conducting Energy Audit in Bank's office Building at Dehradun.
2. **Eligibility:**
The intending bidders 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 ₹3,841/- (Rupees Three Thousand Eight Hundred and Forty One only) shall be paid by the bidder through NEFT transfer in favor of Reserve Bank of India, Dehradun payable at A/C No. 186003001, IFSC – RBIS0DNPA01 (Fifth and tenth digits in IFSC code are zero).** The reference number for the EMD payment shall be submitted along with Part I of the tender and mailed to estatedehradun@rbi.org.in on or before **02:30 PM of December 08, 2025**. The proof of EMD shall be submitted along with Part I of the tender. The EMD of successful bidder shall be returned only after satisfactory completion of work i.e., audit and submission of final report.
4. **Pre-Bid Meeting:** **A Pre-Bid meeting of the intending bidders will be held at 02:00 PM on December 01, 2025 in Conference Room, RBI Dehradun** to clarify any point/doubt raised by them in respect of the tender. No separate communication will be sent for this meeting. All the intending bidders are advised to be present and study the tender documents. They may indicate any points/conditions/specifications which need to be clarified during the meeting. The issues raised will be discussed, and all the tenderers will be advised suitably. The tenderers are expected to get all the issues clarified during this meeting 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 Quotations along with the reference for EMD submission for the above work shall be submitted in sealed cover addressed to the Regional Director, Reserve Bank of

India, Dehradun, so as to reach him not later than 03:30 PM on December 08, 2025. Quotation received beyond the time period shall not be accepted. The envelopes containing quotation shall be super-scribed "**Quotation for conducting Energy Audit at Reserve Bank of India Office Building, Dehradun (Part-I/ Part-II)**". Part I of the quotation will be opened on December 08, 2025, at 04:00 PM. The EMD of unsuccessful bidder shall be returned to the firm without any interest on award of work to the successful bidder.

6. Part – II of the quotation will be opened on subsequent date under intimation to all the bidders. Bidders 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 the tender Part-II.
7. The quotation/ rates shall be valid for acceptance by the Bank for a period of 90 days from the date of opening of quotation 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 as applicable, cost of transportation/accommodation etc. of the equipment and person deputed and all other cost incidental for carrying out the Energy Audit.
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 terms & condition/ specification of the contract by adding to or omitting any terms & condition/ specification 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 30 Days from 14th day of issue of work order. The site survey, data collection/measurements and draft

report shall be completed in 30 Days (Thirty Days) 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. 100% payment along with submitted EMD amount shall be made within 45 days of submission of the final report to the Bank. For which the firm shall claim the bill against payment of contract amount along with details of Bank Account where the amount is to be credited.
- ii. No interest shall be paid for EMD amount.
- iii. All payments for the work will be made subjected to 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 within 14 (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 (07) 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.

16. Address for correspondence of the quotation is as follows:

**Regional Director,
Reserve Bank of India
Plot no. 16 & 17, IT Park, Sahastradhara Road, Dehradun, 248013**

17. Contact person regarding tender is Shri Vijay Kumar Garg, Assistant Manager, Mob No. 8725001296 (for technical queries) and Shri Sonu Singh Yadav, Manager Mob No: 8141228253 mail id: estatedehradun@rbi.org.in (for other quotation related queries)

18. Insurance Clause:

The contractor shall take all insurances at his own cost to cover all kinds of risks, in the joint names of the **Reserve Bank of India (being first name)** and the contractor before commencement of work and it shall cover the following risks.

- (a) Workmen compensation policy for the employees of the contractor working at RBI.
- (b) Third party liability policy for a total of Rs. 20.00 lakh and with a limit of Rs.2.00 lakh per accident.

Note: These policies should be valid till the completion of the work, even for the extended periods due to any other delays. If the contractor doesn't provide these policies, the Bank reserves the right to take the above insurance policies themselves and recover the cost thereof from the bill of the contractor.

19. All disputes arising out of or in way connected with this Agreement shall be deemed to have arisen at Dehradun and only courts in Dehradun shall have the jurisdiction to determine the same.

20. The firm shall complete the work within the time frame mentioned in the tender, otherwise a penalty @ 0.25 % per week of the contract amount shall be levied for the delayed period up to maximum 10% of the contract cost or bank may terminate the contract and forfeit the EMD amount submitted by the bidder.

21. Prevention of Sexual Harassment at Workplace –

- (a) The firm shall be solely responsible in case of any complaint of sexual

harassment against its employee within the premises of the Bank. The complaint will be filed before the Regional Committee constituted by the Reserve Bank of India and Bank shall ensure appropriate action under the said Act in respect of the complaint.

- (b) Any complaint of sexual harassment from any aggrieved employee of the firm against any employee of the Bank shall be taken cognizance of by the Regional Complaint Committee constituted by the Bank.
- (c) The firm shall be responsible for educating its employees about prevention of sexual harassment at workplace and related issues. The firm shall provide a complete and updated list of its employees who are deployed within the Bank's premises.

25. 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.

Date:

Signature of the Bidder

Place:

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

Introduction

Reserve Bank of India, Dehradun is desirous of undertaking Energy audit of the Electrical/Electromechanical installations provided in the office building at Dehradun. The office building receives power supply at 11 KV from the Electricity supply authorities. In addition, Diesel Generator sets and UPS system of suitable capacities have been installed to meet critical applications during power outages.

Objective

- a. The objective of energy audit is to have Energy Performance Assessment of equipment 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.

Terms & Conditions

A. Equipment/measuring instruments

i) All the equipment/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 equipment/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.

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.

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.

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 equipment is as under:

1. Electricity Supply and Distribution System
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. 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 & outlet water temperatures, gas suctions & 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 of UPS loading, redundancy, operating efficiency, load pattern to suggest measures for energy cost reduction, Measurement and analysis of Harmonics as per standards.

v) Lighting 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.

Study of operating electrical parameters like voltage, current etc. in the lighting circuits.

vi) Diesel generator sets

1. General Inspection of DG sets.
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

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

viii) Fire Hydrant Pumps and Domestic Water Pumps

4. 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 (Two Copies) 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

Office Building details:

Address of the Property: Reserve Bank of India Office Building, Plot no. 16 & 17, IT Park, Sahastradhara Road, Dehradun

Main Block: Basement + G + 1

Annex Block: Basement + G + 1

Parking Block: G+2

Electrical Distribution system of office building:

Sr. No.	Description of System	Capacity
a.	HT Panel	11kV
b.	Transformers (2 Nos.)	11 / 0.433kV, 800kVA
c.	DG Sets (2 Nos.)	810 kVA & 250 kVA
d.	UPS System (3 Sets) (1 W + 1 S)	(1 Set- 2 X 120 kVA & 2 Set – 2 X 20 kVA)

Report

on

Energy Audit of Bank's Office Building

at Dehradun

Duration of Energy Audit:

Name of the Energy Audit Agency: _____

Address: _____

Summary of Recommendations

Remarks

Annexure-I

Details of existing Electrical Systems
(It should be a part of the report)

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 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					

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			

Air Handling Units (AHUs)	Location	Capacity (TR)	Air Flow (CFM)	Motor (KW)	Area catered (M ²)
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 ²)

External Lightening

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

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 ²)	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 ²)	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)

Annexure-II

Performance Evaluation of Main Equipments-Sample Formats

Central AC Plant

Chiller No. _____.

(To be done at three different loading)

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

$$\text{Capacity of the Chiller (TR)} = (T_{in} - T_{out}) * \text{Water Flow rate (LPM)} * 60 / 3024$$

$$\text{Efficiency of Chiller in KW/TR} = \text{Total Power input (in KW)}/\text{Total Tonnage}$$

Air Handling Units

Air Handling Unit (AHU) No. _____

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

$$\text{AHU TR} = 1.699 * \text{Air Flow (CFM)} * \text{Density of Air (Kg/M}^3) * (\text{H}_{in} - \text{H}_{out}) / (4.18 * 3024)$$

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/M³ 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 (P _{disc}) Kg/cm ²	Suction Pressure (P _{suc}) Kg/cm ²	Chilled Water Flow (LPM)	Developed Hydraulic Power (KW)	Measured Input Power (KW)	Pump efficiency	Remarks / Comments / Suggestions

Developed Hydraulic Power (KW) = Flow (LPM) * (P_{disc}-P_{suc}) Kg/cm² *9.81/6000

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

Condenser Water Pump

Condenser Water Pump No. _____

Sr. No.	Discharge Pressure (P _{disc}) Kg/cm ²	Suction Pressure (P _{suc}) Kg/cm ²	Condenser Water Flow (LPM)	Developed Hydraulic Power (KW)	Measured Input Power (KW)	Pump efficiency	Remarks/ Comments/ Suggestions

Developed Hydraulic Power (KW) = Flow (LPM)*(P_{disc}-P_{suc})*9.81/6000

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

COOLING TOWER

Sr. No.	Water inlet Temp. (T _{in})°C	Water outlet Temp. (T _{out})°C	Water Flow (LPM)	Wet Bulb Temp. Twb (°C)	Cooling Tower Capacity (TR)	Cooling Tower Efficiency	IKW/ TR	Remarks/ Comments/ Suggestions

Range= T_{in}-T_{out}

Approach= T_{out}-T_{wb}

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

$$\text{Cooling Tower Capacity (TR)} = (T_{in} - T_{out}) * \text{Water Flow (LPM)} * 60 / 3024$$

Internal Lightening (Floor wise)

Sr. No.	Floor	Type of fitting	Calculated Wattage per Fitting	Qty	Total Wattage (KW)	Total carpet area covered (M ²)	Light Power Density (W/M ²)	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	lb			

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	lb						

Section V - Safety Code

1. There shall be maintained in a readily available place, First Aid appliance including adequate supply of sterilized dressings and cotton wool.
2. An injured person shall be taken to a public hospital without loss of time, in cases where the injury necessitates hospitalization.
3. Suitable and strong scaffolds should be provided for workmen for all works that cannot safely be done from ground / floor.
4. No portable single ladder shall be over 8 meters in length. The width between the side rails shall not be less than 30 cm. (clear) and the distance between two adjacent rungs shall not be more than 30 cm. When a ladder is used an extra mazdoor shall be engaged for holding the ladder.
5. The excavated material shall not be placed within 1.5 meters of the edge of the trench or half of the depth of trench, whichever is more. All trenches and excavations shall be provided with necessary fencing and lighting.
6. Every opening in the floor of a building or in a working platform shall be provided with suitable means to prevent the fall of persons or materials by providing suitable fencing or railing whose minimum height shall be one meter.
7. No floor, roof or other part of the structure shall be so overloaded with debris or materials as to render it unsafe.
8. Workers employed in mixing and handling material / chemicals etc., shall be provided with protective footwear and rubber hand gloves.
9. Safety belts shall be provided by the contractor and used by the workmen while working from height of more than 3 meters from ground level.
10. (i) No paint / chemicals containing lead products shall be used except in the form of paste or readymade paint.
(ii) Necessary PPE kits, facemasks, hand gloves, boots, etc. should be supplied for use by the workers.
11. Overalls shall be supplied by the Contractor to the painters and adequate facilities shall be provided to enable the working painters to wash during the periods of cessation of work.
12. Hoisting machines and tackles used in the works, including their attachments, anchorage and supports shall be in perfect condition.
13. The ropes used in hosting or lowering material or as means of supervision shall be of durable quality and adequate strength and free from defects.
14. A certificate stating that all the tools, equipment, safety gears, machinery etc., are in order, based on periodical check by the contractor / authorized person of the contractor.

Section VI – Fire/Electrical Code

- i. Cutting / drilling machine and other electrically operated equipment used at site shall be plugged into correctly rated electrical outlets.
- ii. Only ISI marked 3 pin plug and other appliances and equipment shall be used.
- iii. Electrical power cables / wires used shall not have any joints and shall be properly rated.
- iv. All electrical appliances i.e., welding, drilling, cutting machine, air compressors etc. shall be safely and securely earthed to prevent leakage current while in operation.
- v. Two buckets of water and sand shall be kept in an easily accessible area on the site.
- vi. Fire extinguishers recommended and issued by fire officers should be kept on the site.
- vii. Used chemical / paint drums shall be stored in specified store only after closing them properly.
- viii. None of the passages near lift lobby and staircases shall be used for stacking/ dumping any kind of materials / waste / debris.
- ix. None of the fire extinguishers shall be removed / shifted from its designated location.
- x. The power supply shall be switched off from the mains when equipment is not in use.
- xi. Any dust/garbage/debris generated from the work shall be collected on a daily basis, removed from site and stored/disposed of at the designated place in proper manner.
- xii. Battery operated emergency light / torches shall be provided by the contractor to the workmen while working beyond office hours.
- xiii. All the electrical / mechanical / electromechanical appliance shall be connected to sufficiently rated circuit breakers before tapping to a power source.



**Reserve Bank of India
Estate Department
Dehradun**

**Quotation for Conducting Energy Audit of Reserve Bank of India Office Building at
Dehradun**

Price Bid (PART II)

Name of Work: Conducting Energy Audit of Reserve Bank of India Office Building, Plot no. 16 & 17, IT Park, Sahastradhara Road, Dehradun

Name of the Firm/ Company: _____

Address: _____



**Reserve Bank of India
Estate Department
Dehradun**

Bill of Quantity

Name of Work: Conducting Energy Audit of Reserve Bank of India Office Building, Plot no. 16 & 17, IT Park, Sahastradhara Road, Dehradun

Sr. No.	Description	Amount (in ₹)
1	Rate for conducting Energy Audit and Submitting Energy Audit Reports (2 Copies) as per the scope specified in part I. (The rate shall be inclusive of all taxes, duties, levies, insurance, transportation, conveyance halting, and tools/instruments, manpower required for conducting audit & GST etc.)	

Total cost in words: -----

Date:

Seal and Signature of the Agency.

Place: