

TERMS OF REFERENCE (ToR)
Individual Consultant / Firm Engagement

1. About the Organization and Project

WRI India, an independent knowledge organisation registered as the India Resources Trust (IRT), provides objective information and practical proposals to foster environmentally sound and socially equitable development. Know more: wri-india.org

Project:

Public healthcare facilities are increasingly dependent on reliable electricity to deliver quality healthcare services. The growing use of energy-intensive medical equipment, along with supporting infrastructure such as lighting, cooling, ventilation, and water heating systems, has significantly increased electricity demand across healthcare facilities. However, limited visibility into actual energy consumption patterns, equipment performance, electrical distribution systems, and operational practices often results in inefficient energy use, sub-optimal system design, and reduced power reliability.

To address these challenges, IRT is undertaking a detailed energy audit of selected public healthcare facilities to establish a comprehensive understanding of facility-level and equipment-level energy consumption. The study will assess the performance of major medical and non-medical equipment, analyse electrical infrastructure and load distribution, identify opportunities for energy conservation and efficiency improvements, and recommend technically appropriate solutions for demand optimisation and renewable energy integration. The findings will support improved energy planning, enhanced operational efficiency, and the development of resilient, low-carbon healthcare facilities.

Accordingly, IRT seeks to engage a qualified and certified energy auditing firm or energy auditor (consultant) to undertake comprehensive energy audits, collect and analyse technical data, develop evidence-based recommendations, and prepare detailed technical reports and implementation guidance in accordance with the scope of work outlined in this Terms of Reference.

2. Objectives of the Consultancy

- a. Undertake comprehensive energy audits of the identified public healthcare facilities to assess existing energy consumption patterns, electrical infrastructure, power quality, and the energy performance of major medical and non-medical equipment, establishing a robust baseline for energy management.
- b. Identify and evaluate energy conservation and energy efficiency opportunities through detailed technical analysis, including equipment-level performance assessment, load profiling, critical and non-critical load segregation, cost-benefit analysis, and recommendations for operational improvements, efficient technologies, and renewable energy integration where feasible.

c. Develop actionable technical outputs including facility-wise energy audit reports, actionable suggestions with technical specifications, guidance documents, and walkthrough audit tools to support evidence-based planning, future energy planning, and replication of energy audits across healthcare facilities.

3. Scope of Work

A. Energy Audit of healthcare facilities –

- (i) A detailed energy audit will be conducted at each facility to understand existing energy consumption patterns across various building end-use applications such as lighting, air-conditioning, medical use, hot water, etc., at total of 20 healthcare facilities in Tamil Nadu.

Facilities details are as below:

Sl. No.	Facility Name	Facility Type	District	Coordinates (Latitude, Longitude)
1	Cheyyar GHQH	District Hospital	Tiruvannamalai	12.6620°, 79.5435°
2	Tambaram DH	District Hospital	Chengalpattu	12.9452, 80.1344
3	Periyakulam DH	District Hospital	Theni	10.122°, 77.540°
4	Paramakudi DH	District Hospital	Ramanathapuram	9.5432°, 78.5896°
5	Sirkali GH	Sub-Divisional Hospital	Mayiladuthurai	11.239°, 79.736°
6	Udumalpet GH	Sub-Divisional Hospital	Tiruppur	10.5833°, 77.2500
7	Pattukottai GH	Sub-Divisional Hospital	Thanjavur	10.4212°, 79.3179°
8	Sankarankoil GH	Sub-Divisional Hospital	Tenkasi	8.9564°, 77.3152°
9	Kudankulam GH	Sub-Divisional Hospital	Tirunelveli	8.1938°, 77.7058°
10	Sarkarsamakulam	CHC	Coimbatore	11.1353°, 77.0343°
11	Pudhuvayal	CHC	Sivagangai	10.1034°, 78.8462°
12	Navalpattu	CHC	Tiruchirappalli	10.7811°, 78.7764°
13	Theerthamalai	CHC	Dharmapuri	12.1036°, 78.5889°
14	Kulakarai UPHC	UPHC	Chengalpattu	12.9261°, 80.1044°

Sl. No.	Facility Name	Facility Type	District	Coordinates (Latitude, Longitude)
15	Chidambaram UPHC	UPHC	Cuddalore	11.399845°, 79.68912°
16	Kolliyanur PHC	PHC	Villupuram	11.9271°, 79.5502°
17	Mallur PHC	PHC	Salem	11.5455°, 78.1434°
18	A. Mukkulam PHC	PHC	Virudhunagar	9.6894°, 78.2334°
19	Nallur PHC	PHC	Cuddalore	11.5675°, 79.1910°
20*	Salem Government Hospital	Medical College and Hospital	Salem	11.6575°, 78.1583°

****For the Salem Government Hospital, along with the mentioned energy audits, other necessary audits also need to be undertaken, the scope of which is mentioned in the next section.***

- (ii) Participate in meetings (online) with IRT and relevant healthcare facilities when required.
- (iii) Support in skill improvement sessions as defined in the contract to train the admin and team at site to support the audit.
- (iv) Intimate IRT before the audit, on the formats/documents that will be used for the audit for the selected healthcare facilities. The audit will target a total of 18 healthcare facilities; any changes in these locations will be communicated to the consultant at least one week before the start of the audit. As part of the energy audit, the consultant will also be required to take all electrical measurements of electrical assets/loads.
- (v) Perform the energy audit by assessing current energy usage, energy performance of various appliances and equipment, power quality, identification of opportunities for energy efficiency improvement in energy savings and analyse the expected energy savings and payback period but not excluding the scope of energy audit identified by Bureau of Energy Efficiency. Additionally, the auditor shall incorporate the opportunities of passive design features for energy savings.
- (vi) Document the audit responses and data as per the template agreed, with feedback from IRT.
- (vii) Analyze the breakdown of peak energy demand and energy consumption across various end use energy applications within the hospital.

- (viii) Conduct primary and secondary data collection of all major electrical equipment and appliances, both medical and non-medical, being used in the hospital to establish a comprehensive baseline, with specific focus (wherever available) on **CT Machine, Ultrasound Machine, X-Ray Machine, ILR (Ice Lined Refrigerator), Autoclave, Radiant Warmer, Phototherapy Unit, Defibrillator, CPAP Machine, Suction Machine, Oxygen Concentrator, Ventilator, and PSA Plant**, and carry out **room-wise and system-wise bifurcation of loads into essential (critical clinical services) and non-essential loads**, documented through **excel-based load inventory and segregation sheets**, including equipment ratings, connectivity, and supply source.
- (ix) Determine the load profile and power signature of all major equipment and appliances, particularly the identified high-power medical equipment (under point viii), under different operating conditions including start-up, active operation, idle, and standby modes, and compare rated (nameplate) power with actual measured power consumption and standby power. **The auditor shall undertake continuous 24-hour energy monitoring using appropriate data loggers and power quality analysers for the identified electrical feeders and selected major medical and non-medical equipment to capture representative operating profiles, load variations, demand patterns, operating cycles, and energy consumption under actual operating conditions.** The consultant shall further assess the simultaneity of essential and non-essential loads, evaluate power management practices between critical and non-critical loads, identify losses or anomalies attributable to wiring conditions or electrical distribution constraints, and establish baseline performance indicators and comparative energy metrics, including but not limited to:
 - a. kWh per scan (CT, X-ray, Ultrasound, etc.).
 - b. kWh per sterilization cycle (Autoclave).
 - c. kWh per patient or per bed served, where applicable.
 - d. kWh per litre of oxygen produced (PSA Plant).
 - e. kWh per hour of operation (Ventilator, Radiant Warmer, Phototherapy Unit, Oxygen Concentrator, etc.).
- (x) Perform detailed energy analysis to calculate energy performance indicators at both the facility level and end-use application level, using measured power consumption and operating hours of the identified high-power medical equipment to develop accurate equipment-level and facility-level energy metrics.
- (xi) Identify energy conservation measures to reduce energy wastage with zero-cost or minimal-cost implications, with emphasis on operational practices related to the identified medical equipment, including switching-off protocols, reduction of unnecessary standby power, improved scheduling of high-load devices, and basic maintenance-related efficiency improvements.
- (xii) Identify energy efficiency interventions related to the identified high-power medical

equipment and associated electrical systems, and document their technical implications, while retaining the categorization of measures into low-cost, medium-cost, and high-cost interventions as required for informed decision-making.

- (xiii) Assess the electrical distribution infrastructure, including cabling, wiring, earthing, and distribution panels, to identify inefficiencies such as voltage drops, I²R losses, poor insulation, undersized conductors, and faulty connections. Evaluate how these factors impact equipment performance, energy consumption, and system reliability, and recommend corrective measures for improvement.
- (xiv) For the proposed recommendations, develop technical specifications along with relevant vendor and manufacturer details for the proposed interventions related to the identified medical equipment and renewable energy supply.
- (xv) Calculate the energy demand and energy consumption under the most optimized operating scenario by incorporating measured equipment-level data, reduced standby losses, improved duty cycles, and **differentiated power supply strategies for essential and non-essential loads**, including recommendations for **load prioritisation, segregation, sequencing, and power management** across grid, backup, and renewable energy systems, and based on this analysis provide recommendations for integrating renewable energy into the health facility, wherever feasible.
- (xvi) Take photographs of audited buildings, electrical infrastructure, and major medical equipment, including **distribution panels, feeders, cabling routes, joints, terminations, and earthing arrangements**, to assess physical condition, identify potential **energy decay due to ageing, undersized, or degraded wiring**, and maintain visual records to allow for comparison in the future, subject to consent from concerned facility officials.
- (xvii) Additionally, the consultant will provide all necessary support to achieve the objectives stated above, including but not limited to arranging and deploying appropriate measuring instruments such as power and harmonics analyzers, tachometers (contact and non-contact), lux meters, thermometers, infrared thermometers (non-contact), thermal imaging devices, ultrasonic flow meters, thermo-hygrometers, conductivity meters, and other relevant tools required for detailed electrical and energy assessment of the identified medical equipment and associated systems.

B. Detailed Water, Waste and Building performance of Salem Government Hospital and Medical College only:

The consultant shall undertake a comprehensive assessment of water management, waste management, building performance and climate resilience at Salem Government Hospital and Medical College, with the objective of identifying technically feasible, financially viable and environmentally sustainable interventions. The scope shall include, but not be limited to, the following:

Water Audit:

- (i) Assess the existing water supply infrastructure, including sources of water (municipal supply, borewells, tanker supply, etc.), storage systems, pumping arrangements, and internal water distribution network, and prepare a schematic water distribution layout for each healthcare facility.
- (ii) Collect and analyse historical water consumption data from available records and meters and determine the overall water consumption profile of each healthcare facility.
- (iii) Conduct a detailed survey of major water-consuming departments and utilities, including wards, operation theatres, laboratories, kitchens, laundries, CSSD, sanitation facilities, cooling systems, residential quarters, and other significant end-use applications.
- (iv) Prepare an inventory of all plumbing fixtures, sanitary fittings, and major water-consuming equipment, including measurement of flow rates and operating characteristics, wherever applicable.
- (v) Assess actual water consumption against applicable benchmark values and standards, including comparison with relevant provisions of the National Building Code (NBC), Uniform Plumbing Code (UPC), and other applicable guidelines for healthcare facilities.
- (vi) Undertake a comprehensive water leakage assessment covering storage tanks, pipelines, plumbing fixtures, valves, pumping systems, and distribution networks, and quantify avoidable water losses, wherever feasible.
- (vii) Assess the existing rainwater harvesting infrastructure, rooftop catchment potential, groundwater recharge systems, and opportunities for augmenting rainwater harvesting capacity.
- (viii) Evaluate wastewater generation, sewage treatment systems, treated water quality, existing reuse practices, and opportunities for maximizing treated wastewater reuse for appropriate non-potable applications.
- (ix) Identify and recommend short-term, medium-term, and long-term water conservation measures for improving water-use efficiency, reducing freshwater demand, and enhancing sustainable water management practices.
- (x) For each recommended water conservation measure, provide a techno-economic analysis including estimated water savings, annual cost savings, investment requirement, simple payback period, implementation priority, and expected environmental benefits.

Waste Audit

- (xi) Undertake a detailed assessment of the generation, segregation, storage, collection and disposal of biomedical, general, wet, dry and other relevant waste streams generated at the healthcare facility, based on available records and site-level assessment.

(xii) Assess existing waste management practices and infrastructure, identify gaps and opportunities for waste minimisation, improved segregation, recycling, resource recovery and improved disposal practices, and review applicable records, service arrangements and disposal pathways.

(xiii) Quantify waste generation and, wherever feasible, establish major source-wise or department-wise waste generation profiles and identify opportunities for reducing waste generation and improving resource recovery.

(xiv) Recommend short-, medium- and long-term waste management interventions, including indicative investment requirements, expected benefits, implementation priorities and key operational considerations.

Building and Climate Performance Assessment

(xv) Undertake a climate and site analysis for Salem, including relevant temperature, relative humidity, solar radiation, sun path and wind conditions, and assess their implications for building performance, passive design and climate resilience of the healthcare facility.

(xvi) Develop and calibrate a building energy simulation model for representative hospital buildings/zones using relevant building characteristics, occupancy patterns, HVAC, lighting and equipment loads and available measured/utility data and assess the impact of identified building-level and passive design interventions.

(xvii) Undertake daylight and thermal comfort assessments for representative hospital spaces and identify feasible interventions to improve daylight availability and thermal comfort without compromising clinical, patient safety or operational requirements.

(xviii) Assess the potential impact of future climate conditions on building performance and thermal comfort and recommend appropriate climate-resilient building and retrofit interventions, wherever applicable.

C. Development of documentation on the proposed energy audits along with technical guidelines for conducting walkthrough audits –

- a. Submit a detailed technical report based on the audit findings, feedback, cost- benefit analyses, and discussions with local stakeholders – for each of the health facilities.
- b. Develop a guidance document (maximum 15 pages) for stakeholders in Tamil Nadu to conduct energy audits in other health facilities. This can include the benefits of conducting an energy audit, how frequently an energy audit should be done, what minimum qualifications or experience needs to be considered for engaging certified energy auditors in the state, along with an assessment tool or checklist for smaller facilities with limited resources to conduct a professional energy audit. A separate report is expected on water audits of the Salem Medical College and Hospital.

- c. Collaborate with IRT throughout the process, providing expertise and support as required.

4. Deliverables, Milestones and Payment Schedule

S. No.	Milestone / Deliverable	Detailed Output / Acceptance Criteria	Timeline / Due Date	Supporting Evidence for Review	Payment Terms
1	Contract Kick-off and Inception	Contract signed; inception meeting conducted; audit methodology, workplan, audit formats, data collection templates, deployment schedule, and list of measuring instruments submitted and approved.	Week 1–3	Signed contract, approved workplan, meeting minutes, approved formats	20%
2	Completion of Field Energy Audits and Data Collection	Energy audits completed for all identified healthcare facilities, including electrical measurements, equipment inventory, load assessment, power quality analysis, photographs, and submission of weekly progress reports.	Week 4–8	Weekly progress reports, field records, geotagged photographs, completed data collection formats	40%
3	Submission of Draft Energy Audit Reports	Submission of facility-wise draft energy audit reports, raw and cleaned datasets, load inventory, energy performance analysis, energy conservation measures, energy efficiency recommendations, renewable energy assessment, technical specifications, and cost-benefit analysis.	Week 9–11	Draft reports, digital datasets, recommendation note, technical analysis submitted and accepted for review	20%
4	Submission of Final Reports and Guidance Documents	Incorporation of review comments and submission of final facility-wise energy audit reports, final datasets, guidance document for stakeholders,	Week 12–14	Final approved reports, guidance document, SOP/checklist, complete digital handover	20%

S. No.	Milestone / Deliverable	Detailed Output / Acceptance Criteria	Timeline / Due Date	Supporting Evidence for Review	Payment Terms
		walkthrough audit SOPs/ self-assessment checklist, and all supporting documentation. Provide technical support to IRT through review meetings and technical discussions on actionable suggestions relating to recommended energy efficiency and renewable energy measures for up to one month after submission of final reports.			

5. Duration, Level of Effort and Location

a. Contract Duration: Approximately 14 weeks from the date of contract signing, followed by up to one month of post-submission technical support, if required.

b. Estimated Level of Effort: Milestone-based engagement. The consultant shall deploy an appropriately qualified multidisciplinary team to complete all activities within the stipulated timelines, including inception, field audits, data collection, analysis, reporting, stakeholder consultations, and technical support.

c. Work Location: Hybrid engagement comprising:

- Field visits to the identified healthcare facilities for conducting detailed energy audits.
- Remote and office-based work for data analysis, report preparation, stakeholder consultations, and review meetings.

d. Travel Requirement: Yes. The consultant shall undertake travel to all identified healthcare facilities and other locations as required for successful completion of the assignment. All costs related to travel, accommodation, local transportation, logistics, equipment mobilisation, and incidental expenses shall be included in the financial proposal. No separate reimbursement shall be made by IRT. IRT representatives may accompany the consultant during selected site visits at their own cost.

6. Required Qualifications and Experience

The consultant/consulting firm should meet the following minimum qualifications and experience requirements:

- **Educational Qualification**

- Lead Energy Auditor shall possess a Bachelors degree or higher in Electrical Engineering, Energy Engineering, Mechanical Engineering, or a related discipline. Additional qualifications in Energy Management, Renewable Energy, or Energy Efficiency will be preferred.
- Accredited Energy Auditor (AEA) or Certified Energy Auditor (CEA) registered with the Bureau of Energy Efficiency (BEE), Government of India
- The audit team should comprise suitably qualified engineers and technical professionals with relevant educational backgrounds.

- **Professional Experience**

- Minimum three (3) years of demonstrated experience in conducting detailed energy audits of commercial, institutional, industrial, or public sector facilities.
- Experience in conducting energy audits of healthcare facilities will be highly desirable.

- **Technical Expertise**

- Demonstrated expertise in energy auditing, electrical load assessment, power quality analysis, electrical distribution systems, energy performance analysis, and identification of energy conservation and energy efficiency measures.
- Experience in analysing the energy performance of electrical and medical equipment, developing energy performance indicators, conducting cost-benefit analysis, and preparing technically sound recommendations for energy efficiency and renewable energy integration.
- Familiarity with relevant Bureau of Energy Efficiency (BEE) guidelines, applicable Indian Standards, and best practices in energy auditing.

- **Relevant Assignment Experience**

- The Consultant/Firm should have prior experience in conducting energy audits, energy efficiency assessments, or similar technical assignments in healthcare facilities.

Experience in one or more of the proposed project states (Assam, Jharkhand, Rajasthan, and Kerala) will be considered an added advantage. Bidders are encouraged to submit relevant work references and client certificates, where available. Such experience may also be considered for similar assignments in the other project states, as applicable.

- Successfully completed at least three similar assignments involving detailed energy audits or energy efficiency assessments.
- Experience of working with Government departments, public healthcare institutions, public sector organisations, or development partners will be preferred.
- Experience of undertaking field-based assignments in remote or geographically dispersed locations will be an added advantage.
- **Technical Resources and Tools**
 - Ability to deploy qualified personnel and appropriate energy auditing instruments, including power and harmonics analysers, lux meters, thermal imaging cameras, ultrasonic flow meters, earth resistance meter and other relevant equipment required for the assignment.
- **Communication and Analytical Skills**
 - Demonstrated ability to analyse technical data and prepare high-quality technical reports with actionable recommendations.
 - Excellent written and verbal communication skills in English.
 - Proficiency in Microsoft Office applications, particularly MS Excel, MS Word, and PowerPoint, for data analysis, reporting, and presentation.

7. Commercial Terms and Payment Conditions

- This shall be a fixed-price, deliverable-based consultancy assignment. Payments shall be released only upon submission and written acceptance of the respective deliverables by IRT, in accordance with the agreed payment schedule.
- The financial proposal (no password protection required) shall be all-inclusive and shall cover professional fees and all costs necessary for successful execution of the assignment, including travel, accommodation, local transportation, logistics, deployment of personnel, mobilisation of energy auditing instruments, data collection, software, communication, printing, insurance, taxes, and all other incidental expenses. No additional reimbursement shall be made unless specifically approved in writing by IRT.

- The consultant shall be responsible for arranging all personnel, equipment, software, measuring instruments, and other resources required for completion of the assignment within the agreed contract value.
- Payments shall be linked to clearly defined milestones and deliverables. Submission of invoices shall be accompanied by the relevant supporting documents, including approved deliverables, reports, datasets, meeting records, or other evidence of completion, as applicable.
- The consultant shall address all review comments provided by IRT and submit revised deliverables, where required, prior to final acceptance. Payment shall be released only after written acceptance of the respective deliverable.
- All invoices shall reference the contract number, milestone achieved, and corresponding deliverables, and shall include all documents required for finance processing.
- IRT reserves the right to withhold or defer payment for deliverables that do not meet the agreed quality standards or contractual requirements until satisfactory revisions have been submitted and accepted.

8. Proposal Submission Requirements

Interested consultants/firms shall submit the following as part of their proposal:

- Technical Proposal/Statement of Interest demonstrating the consultant's understanding of the assignment, proposed methodology, implementation approach, quality assurance measures, and work plan.
- Team Composition and Updated CVs of the proposed key personnel, clearly indicating their roles, responsibilities, qualifications, and relevant experience.
- Relevant Experience including details of similar assignments successfully completed in the last 3 years, along with client references, work samples, or completion certificates, where available.
- **Detailed Methodology and Work Plan, including:**
 - Proposed approach and methodology for conducting the energy audits.
 - Audit schedule and deployment plan.
 - Data collection methodology and quality assurance procedures.
 - Roles and responsibilities of the proposed team.
 - List of energy auditing instruments and software proposed to be deployed.
 - Security, confidentiality, and data management protocols.

- Financial Proposal, submitted separately, providing a detailed cost break-up including professional fees, travel, accommodation, logistics, equipment deployment, taxes, and all other incidental costs. The proposal shall clearly indicate the applicable taxes and payment milestones.
- **Declaration(s), including:**
 - Conflict of Interest Declaration.
 - Declaration confirming that the consultant/firm is not debarred or blacklisted by any Government agency or funding organization.
 - Any other compliance declarations, Non-Disclosure Agreement (NDA), or statutory documents, if requested by IRT.

9. Selection Criteria:

- Proposals will be evaluated based on technical quality and financial cost.
- IRT may seek clarifications from applicants during the evaluation process.
- IRT reserves the right to modify or cancel the RFP process, reject any proposal, or make no award at its sole discretion.
- Contracts will not be awarded to organisation's failing to meet our due diligence criteria.
- All proposal preparation and submission costs shall be borne by the applicant. IRT will not reimburse these costs.

Disclaimer

- No part of this Request for Proposal shall be construed as an offer document. The acceptance of a proposal does not contractually bind IRT. The consultant must sign definitive contractual documents governing their relationship with IRT.

Deadline: 15th September 2026

Expression of interest:

All expressions of interest, questions and proposals in response to this RFP must be received via email to the contact below by September 15, 2026

Amittosh.Pandey@wri.org