

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

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A seminar report of Electrical Energy Conservation & Audit (21EE755) on

ENERGY AUDIT RESULT

By

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2024-2025

DECLARATION

I, Priyam kumar (1AY21CS134) student of B.E, Computer Science and Engineering, Acharya Institute of Technology, Bengaluru-560107, hereby declare that the seminar entitled "**Energy audit result**" is an authentic record of my own work carried out under the supervision and guidance of Mr. G. Gowtham , Assistant Professor, Department , Acharya Institute of Technology, Bengaluru. I have not submitted the matter embodied to any other University or Institution for the award of any other degree.

Date 26/12/24

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Place: Bengaluru

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ACKNOWLEDGEMENT

I express our gratitude to our institution and management for providing me with good infrastructure, laboratory, facilities and inspiring staff, and whose gratitude was of immense help in completion of this report successfully.

I are deeply indebted to **Dr. Rajeswari** Principal, Acharya Institute of Technology, Bangalore, who has been a constant source of inspiration to steer me forward.

I heartily thank **Dr. Ajith Padyana**, Head of the Department, Department of Computer Science and Engineering , Acharya Institute of Technology Bangalore, for his valuable support and for rendering me resources for this seminar work.

I heartily thank **Dr. Shashidhar T. M.** , Head of the Department, Department of and Electrical and Electrical Engineering, Acharya Institute of Technology Bangalore, for his valuable support and for rendering me resources for this seminar work

I specially thank **Mr. G. Gowtham**, Assistant Professor, Department of Electrical and Electronics Engineering who guided me with valuable suggestions in completing this seminar at every stage.

I would like to express our sincere thanks and heartfelt gratitude to our beloved Parents, Respected Professors, Classmates, Friends, and juniors for their indispensable help at all times.

Last but not the least our respectful thanks to the Almighty.

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CHAPTER - 01

INTRODUCTION

Energy is a fundamental resource that powers economic growth and modern living. However, with increasing demand and the pressing need to address environmental challenges, efficient energy usage has become a priority. An energy audit is a systematic evaluation of energy consumption within a facility, organization, or system, aimed at identifying opportunities for energy savings and improving efficiency.

The primary goal of an energy audit is to understand the patterns of energy usage, assess the performance of energy systems, and recommend strategies to minimize energy wastage. These audits not only help in reducing operational costs but also contribute to environmental sustainability by lowering greenhouse gas emissions.

This report presents the results of an energy audit conducted on [specific building, system, or organization]. It outlines key findings, identifies inefficiencies, and provides actionable recommendations to optimize energy usage. The insights derived from the audit serve as a roadmap for implementing cost-effective measures and adopting sustainable energy practices.

By integrating energy efficiency strategies, organizations can play a pivotal role in conserving resources while enhancing productivity and fostering environmental responsibility.

ENERGY AUDIT RESULTS

The energy audit conducted provides a comprehensive analysis of energy consumption patterns, system performance, and potential areas for improvement. The key findings and results are summarized below:

1. Energy Consumption Analysis

- **Total Energy Consumption:** The facility's total energy usage during the audit period was measured at [insert value, e.g., "150,000 kWh"].
- **Peak Usage:** The peak energy consumption occurred during [specify time period, e.g., "weekdays between 9 AM and 5 PM"].
- **Major Energy Consumers:** Equipment such as [list high-energy-consuming devices, e.g., "HVAC systems, industrial machinery, or lighting"] accounted for the majority of energy usage.

2. Efficiency Metrics

- **Energy Efficiency Ratio (EER):** [Provide details if applicable.]
 - **System Performance:** Systems such as [list systems, e.g., "boilers or compressors"] were found to operate at [state efficiency level, e.g., "80% efficiency"].
 - **Wastage Identified:** Energy losses were observed due to [list reasons, e.g., "poor insulation, outdated equipment, or standby power"].
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3. Key Observations

- **Lighting:** [e.g., "Inefficient lighting systems such as incandescent bulbs were identified, leading to excessive energy consumption."]
- **Heating, Ventilation, and Air Conditioning (HVAC):** [e.g., "Outdated HVAC units contributed to a significant share of energy wastage."]
- **Energy Management Practices:** [e.g., "Lack of energy monitoring systems resulted in untracked consumption patterns."]

4. Recommendations for Improvement

- Replace inefficient lighting systems with LED alternatives to reduce energy usage by [state percentage, e.g., "30%"].
- Install modern HVAC systems with advanced controls to improve efficiency by [state percentage, e.g., "20%"].
- Implement energy management systems to track and optimize consumption in real-time.
- Enhance insulation and seal leaks to minimize heat loss and improve thermal efficiency.

5. Cost and Savings Estimates

- **Initial Investment:** Estimated at [insert amount].
- **Potential Annual Savings:** Projected at [insert amount or percentage].
- **Payback Period:** Calculated to be [insert time frame, e.g., "2 years"].

OBJECT OF ENERGY AUDIT RESULTS

The primary objective of the energy audit is to evaluate and optimize energy consumption within the targeted facility, system, or process. By identifying inefficiencies and opportunities for improvement, the energy audit aims to:

1. Assess Energy Usage Patterns

- Analyze how energy is consumed across various operations or systems.
- Identify peak demand periods and areas of high energy usage.

2. Identify energy-saving opportunities

- Detect inefficiencies in energy-intensive equipment and processes.
- Propose measures to reduce wastage and enhance energy efficiency.

3. Reduce Operational Costs

- Provide actionable recommendations that minimize energy expenses while maintaining performance and productivity.

4. Enhance Environmental Sustainability

- Lower greenhouse gas emissions by promoting efficient energy practices.
- Support the organization's commitment to sustainability goals and regulatory compliance.

5. Improve System Performance

- Ensure all energy-consuming systems operate at optimal efficiency levels.
- Extend the lifecycle of equipment through effective energy management.

6. Facilitate Strategic Decision-Making

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- Offer a detailed understanding of current energy usage to inform investments in energy-efficient technologies.
 - Develop a roadmap for long-term energy sustainability.

IMPORTANCE OF ENERGY AUDIT RESULT

The results of an energy audit play a critical role in understanding and improving energy management within any facility or organization. The importance of these results can be summarized as follows:

1. Improved Energy Efficiency

- Energy audit results identify inefficiencies and recommend strategies to optimize energy consumption. This leads to more effective use of resources and reduced energy wastage.

2. Cost Reduction

- By implementing the audit's recommendations, organizations can achieve significant cost savings through reduced utility bills and lower operational expenses.

3. Environmental Benefits

- The audit results help in reducing carbon footprints by minimizing energy consumption and switching to cleaner, more sustainable energy practices.

4. Regulatory Compliance

- Energy audit results ensure compliance with energy efficiency regulations and standards, avoiding potential fines and legal complications.

5. Enhanced Equipment Performance

- The findings highlight areas where equipment maintenance or upgrades are necessary, ensuring systems operate at peak efficiency and extending their lifespan.

6. Informed Decision-Making

- The detailed insights provided by the audit support strategic planning, investment in energy-efficient technologies, and prioritization of energy-saving measures.

7. Promotes Organizational Sustainability

- Energy audit results align with sustainability goals, demonstrating the organization's commitment to environmental stewardship and social responsibility.
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CHAPTER – 02

METHOD OF ENERGY AUDIT RESULTS

The process of obtaining and analyzing energy audit results involves a structured methodology to ensure accurate and actionable outcomes. The key steps in the method are as follows:

1. Preliminary Assessment (Walkthrough Audit)

- Conduct an initial survey to understand the overall energy consumption patterns.
- Identify major energy-consuming equipment and systems.
- Highlight obvious inefficiencies and potential areas for improvement.

2. Data Collection

- **Energy Bills and Records:** Analyze historical energy consumption data from utility bills.
- **Equipment Performance Data:** Gather operational details such as power ratings, runtime, and maintenance records.
- **On-Site Measurements:** Use tools like energy meters, thermometers, and pressure gauges to record real-time data.

3. Energy Usage Analysis

- Categorize energy usage by systems (e.g., HVAC, lighting, machinery).
- Identify peak demand periods and patterns of energy wastage.
- Benchmark energy consumption against industry standards.

4. Identifying Inefficiencies

- Evaluate system performance to detect underperforming equipment.
- Look for issues such as leaks, poor insulation, or outdated technology.
- Identify behavioral factors contributing to energy wastage (e.g., leaving devices on standby).

5. Recommendation Development

- Suggest practical and cost-effective measures to improve energy efficiency.
- Propose equipment upgrades, system optimizations, and process improvements.
- Include renewable energy options and energy management systems if applicable.

6. Cost-Benefit Analysis

- Estimate the initial investment required for implementing recommendations.
 - Calculate potential energy savings and the payback period.
 - Evaluate the long-term financial and environmental benefits.
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7. Reporting the Results

- Present findings in a structured report, including:
 - Energy consumption breakdown.
 - Areas of inefficiency.
 - Proposed solutions and their expected impact.
- Use visual aids such as graphs, tables, and charts for clarity.

8. Monitoring and Verification

- Implement recommendations and monitor energy usage post-audit.
 - Compare actual savings with projected results to measure effectiveness.
 - Make adjustments based on feedback and ongoing observations.
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CHAPTER - 03

KEY AUDITING INSTRUMENTS

Energy audits rely on specialized tools and instruments to collect accurate data on energy consumption, system performance, and environmental conditions. These tools are essential for identifying inefficiencies and recommending solutions. The key auditing instruments include:

1. Power Measurement Tools

- **Clamp Meter:** Measures electrical current in conductors without physical contact. Useful for identifying high energy-consuming equipment.
- **Energy Meter:** Records real-time energy consumption and load profiles over a specific period.
- **Power Quality Analyzer:** Assesses voltage, current, power factor, and harmonic distortions in electrical systems.

2. Temperature Measurement Tools

- **Infrared Thermometer (IR Gun):** Measures surface temperatures of equipment to identify overheating or insulation issues.
- **Thermal Imaging Camera:** Captures heat patterns to locate hotspots, leaks, or inefficiencies in electrical and mechanical systems.

3. Airflow Measurement Tools

- **Anemometer:** Measures airflow rates in HVAC systems to evaluate ventilation efficiency.
- **Manometer:** Gauges air pressure in ducts to detect leaks or blockages.

4. Combustion Analysis Tools

- **Flue Gas Analyzer:** Measures exhaust gases (e.g., CO₂, O₂, CO) to assess the efficiency of boilers and combustion systems.

5. Light Measurement Tools

- **Lux Meter:** Measures light intensity to optimize lighting systems and ensure compliance with standards.

6. Insulation and Heat Loss Tools

- **Ultrasonic Leak Detector:** Detects compressed air or gas leaks in pipelines and systems.
- **Thermal Conductivity Meter:** Evaluates the insulation quality of building materials.

7. Data Logging Devices

- **Data Loggers:** Record energy usage, temperature, and humidity over time for trend analysis.
 - **Smart Meters:** Provide real-time and historical energy consumption data.
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8. Renewable Energy Tools

- **Solar Irradiance Meter:** Measures the solar energy potential for photovoltaic systems.
- **Wind Speed Meter:** Assesses wind energy potential for turbines.

9. Miscellaneous Tools

- **Tachometer:** Measures rotational speeds of motors and fans.
 - **Moisture Meter:** Detects moisture levels in building materials, which may affect insulation and energy performance.
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CHAPTER - 04

CONCLUSION

Energy audits are essential for identifying inefficiencies, optimizing energy consumption, and reducing operational costs in any facility or organization. This report has highlighted the critical role that energy audits play in promoting energy efficiency and environmental sustainability.

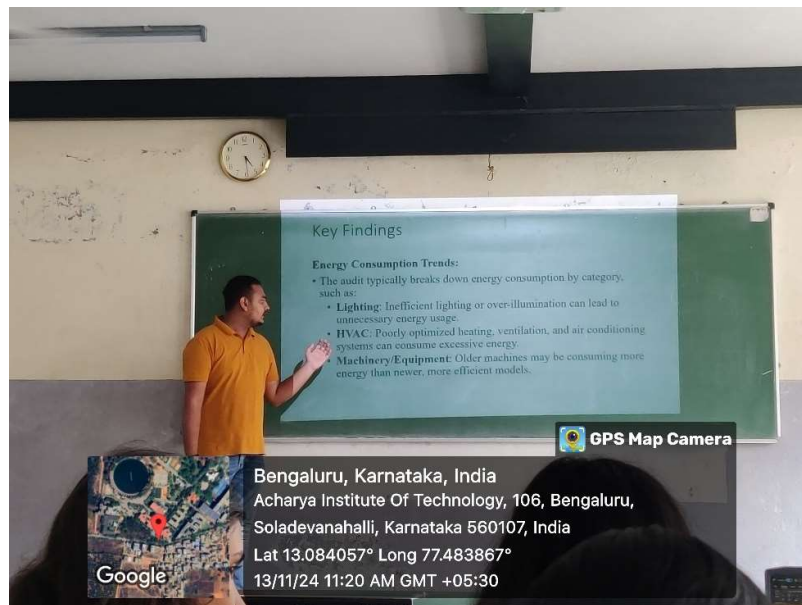
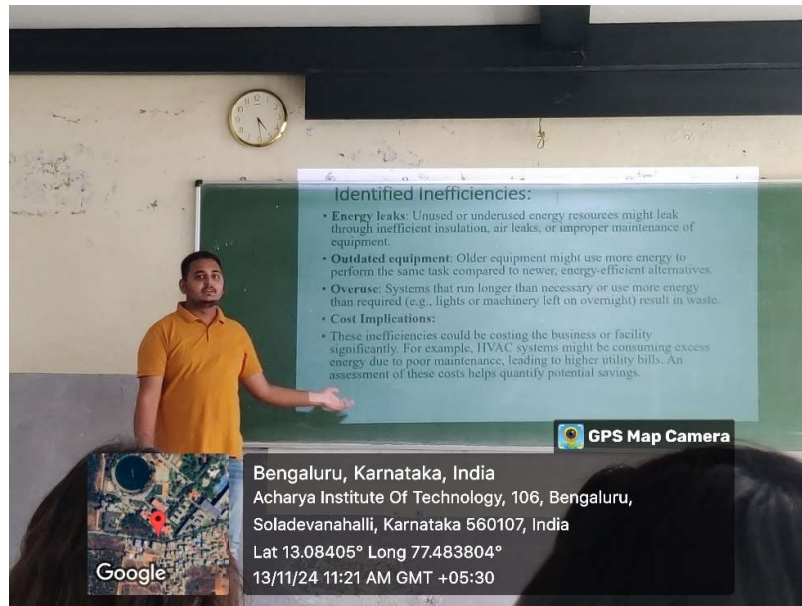
The findings of the energy audit provide actionable insights into energy usage patterns and inefficiencies, allowing organizations to make informed decisions about implementing energy-saving measures. By adopting the recommendations, significant cost savings can be achieved while simultaneously reducing the environmental impact through lower greenhouse gas emissions.

Furthermore, energy audits contribute to compliance with regulatory standards and enhance the organization's reputation as a socially responsible entity. They also pave the way for integrating modern technologies, such as renewable energy systems and energy management tools, fostering long-term sustainability.

In conclusion, the energy audit results serve as a roadmap for improving energy efficiency, minimizing wastage, and contributing to global sustainability efforts. By acting on these insights, organizations can achieve a balance between economic growth, resource conservation, and environmental responsibility, benefiting both present and future generations.

CHAPTER - 05

PHOTO GALLAERY



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