



<p><b>INTERNAL QUALITY ASSURANCE POLICY</b></p>	<p><b>SITE-IQA-Policy No:11</b></p> <p>Issue Date:1<sup>st</sup> January 2022, Pages : 01-09</p>
<p><b>Policy Document category</b></p>	<p><b>ENERGY MANAGEMENT, ENERGY AUDIT</b></p>
<p><b>Policy Document Category</b></p>	<p><b>Planning and Development (P&amp;D)</b></p>
<p><b>POLICY</b></p>	<p>A nation is trying to advance in quantity and quality to the Spread of education among the common India and development of their intelligence. In India the entire field of education and other fields of intelligent activities had been monopolized by a handful of men before independence. But today we are marching towards the desirable status of a developed nation with fast strides. But the development should be a sustained one. For achieving such an interminable development energy management is essential. As far as concerning electricity crisis, we are facing lack of electricity during office work. So, institutional management is taking design regarding production of electricity and saving electricity for eco- social aspect. Energy requirement of India is growing and incomplete domestic fossil fuel treasury. The country has motivated strategy to enlarge its renewable energy resources and policy to establish the nuclear power plants. India increases the involvement of nuclear power to largely electrical energy development facility from 4.2% to 9%. India's industrial demand accounted for 35% of electrical power requirement, domestic household use accounted for 28%, agriculture 21%, commercial 9%, and public lighting and other miscellaneous applications accounted for the rest. Energy conservation means reduction in energy consumption without making any sacrifice of quantity or quality. A successful energy management program begins with energy conservation; it will lead to adequate rating of equipment's, using high efficiency equipment and change of habits which causes enormous wastages of energy. By observing all these study lack of electricity and huge electricity demands. It is necessary to plan to being self-sufficient in electricity requirement. In the present study, college electricity audit has been done. In this study considered practical laboratory, instrument, Fans, air conditioners, Computers etc are considered in this study. We have studied total budget of the</p>

	college, total economic investment of college on the electricity.
<b>OBJECTIVES OF ENERGY AUDIT</b>	<p>The objective of the audit was to study the energy consumption pattern of the facility, identify the areas where potential for energy/cost saving exists and prepare proposals for energy/cost saving along with investment and payback periods.</p> <p><b>Primary: --</b></p> <ol style="list-style-type: none"> <li>1) The first objective is to acquire and analyze data and finding the necessary consumption pattern of these facilities.</li> <li>2) The second objective will be to calculate the wastage pattern based on the results of the first objective.</li> <li>3) The final objective is to find and implement solutions that are acceptable and feasible.</li> </ol> <p><b>Secondary: -</b></p> <ol style="list-style-type: none"> <li>1) This would be our first exposure to this field hence experience gain would be vital.</li> <li>2) This project will precede many follow up projects and hence helps to gain technical and management exposure required for future energy projects.</li> <li>3) It is sure to help create a repertoire of vital contacts hence will develop interaction with alumni, faculty and students.</li> </ol> <p>The salient observations and recommendations are given below.</p> <p>SITE uses energy in the following forms:</p> <ul style="list-style-type: none"> <li>➤ Electricity from Electricity Board</li> <li>➤ High Speed Diesel (HSD)</li> </ul> <p>Electrical energy is used for various applications, like:</p> <ul style="list-style-type: none"> <li>➤ Computers</li> <li>➤ Lighting</li> <li>➤ Air-Conditioning</li> <li>➤ Fans</li> <li>➤ Other Lab Equipment</li> </ul>
<b>TARGET AUDITING FOR ENERGY MANAGEMENT</b>	<p>Energy cannot be seen, but we know it is there because we can see its effects in the forms of heat, light and power. This indicator addresses energy consumption, energy sources, energy monitoring, lighting, appliances, and vehicles. Energy use is clearly an important aspect of campus sustainability and thus requires no explanation for its inclusion in the assessment. An old incandescent bulb uses approximately 60W to 100W while an energy efficient light emitting diode (LED) uses only less than 10 W. Energy auditing deals with the conservation and methods to reduce its consumption related to environmental degradation. It is therefore essential that any environmentally responsible institution examine its energy use practices.</p>
<b>METHODOLOGY</b>	<p>The purpose of the audit was to ensure that the practices followed in the campus with the criteria, methods and recommendations used in the audit were based on the identified risks. The methodology includes: preparation and filling up of questionnaire, physical inspection of the campus, observation and review</p>

	<p>of the document, interviewing responsible persons and data analysis, measurements and recommendations. The methodology adopted for this audit was a three step process comprising of:</p> <p><b>1. Data Collection</b> – In preliminary data collection phase, exhaustive data collection was performed using different tools such as observation, survey communicating with responsible persons and measurements. Following steps were taken for data collection: The team went to each department, centers, Library, canteen etc. Data about the general information was collected by observation and interview. The power consumption of appliances was recorded by taking an average value in some cases.</p> <p><b>2. Data Analysis</b> - Detailed analysis of data collected include: calculation of energy consumption, analysis of latest electricity bill of the campus, understanding the tariff plan provided by the AP State Electricity Board. Data related to water usages were also analyzed using appropriate methodology.</p> <p><b>3. Recommendation /Suggestions</b>– On the basis of results of data analysis and observations, some steps for reducing power and water consumption were recommended. Proper treatments for waste were also suggested. Use of fossil fuels has to be reduced for the sake of community health.</p>
<p><b>AUDITING FOR ENERGY MANAGEMENT SURVEY FORMS</b></p>	<p>Auditing for Energy Management</p> <ol style="list-style-type: none"> <li>1) List the ways of energy usage in your college. (Electricity, electric stove, kettle, microwave, LPG, firewood, Petrol, diesel and others).</li> <li>2) Electricity bill amount for the last year</li> <li>3) Amount paid for LPG cylinders for last one year</li> <li>4) Weight of firewood used per month and amount of money spent? Also mention the amount spent for petrol/diesel/ others for generators?</li> <li>5) Are there any energy saving methods employed in your college? If yes, please specify. If no, suggest some.</li> <li>6) How much money does your college spend on energy such as electricity, gas, firewood, etc. in a month. (Record monthly for the year 2016).</li> <li>7) How many CFL bulbs have your college installed? Mention use (Hours used/day for how many days in a month)</li> <li>8) Energy used by each bulb per month? (For example- 60 watt bulb x 4 hours x number of bulbs (kwh).</li> <li>9) How many LED bulbs are used in your college? Mention the use (Hours used/day for how many days in a month)</li> <li>10) Energy used by each bulb per month? (kwh).</li> <li>11) How many incandescent (tungsten) bulbs have your college installed? Mentions use (Hours used/day for how many days in a month)</li> <li>12) Energy used by each bulb per month? (kwh).</li> <li>13) How many fans are installed in your college? Mention use (Hours used/day for how many days in a month)</li> </ol>

- 14) Energy used by each fan per month?(kwh)
- 15) How many air conditioners are installed in your college? Mention use (Hours used/day, for how many days in a month)
- 16) Energy used by each air conditioner per month? (kwh).
- 17) How much electrical equipment including weighing balance is installed your college? Mention the use (Hours used/day for how many days in a month)
- 18) Energy used by each electrical equipment per month? (kwh).
- 19) How many computers are there in your college? Mention the use (Hours used/day for how many days in a month)
- 20) Energy used by each computer per month?(kwh)
- 21) How many photocopiers are installed by your college? Mention use
- 22) (Hours used/day for how many days in a month).
- 23) How many cooling apparatus are in installed in your college? Mention use(Hours used/day for how many days in a month)
- 24) Energy used by each cooling apparatus per month? (kwh) Mention use (Hours used/day for how many days in a month)
- 25) Energy used by each photocopier per month? (kwh) Mention the use (Hours used/day for how many days in a month) how many inverters your college installed? Mentions use (Hours used/day for how many days in a month)
- 26) Energy used by each inverter per month?(kwh)
- 27) How many electrical equipment are used in different labs of your college? Mention the use (Hours used/day for how many days in a month)
- 28) Energy used by each equipment per month?(kwh)
- 29) How many heaters are used in the canteen of your college? Mention the use (Hours used/day for how many days in a month)
- 30) Energy used by each heater per month?(kwh)
- 31) No of street lights in your college?
- 32) Energy used by each street light per month?(kwh)
- 33) No of TV in your college and hostels?
- 34) Energy used by each TV per month?(kwh)
- 35) Any other item that uses energy (Please write the energy used per month) Mention the use (Hours used/day for how many days in a month)
- 36) Are any alternative energy sources/nonconventional energy sources employed / installed in your college? ( photovoltaic cells for solar energy, windmill, energy efficient stoves, etc.)Specify.
- 37) Do you run "switch off" drills at college?
- 38) Are your computers and other equipment put on power-saving mode?
- 39) Does your machinery (TV, AC, Computer, weighing balance, printers, etc.) run on standby mode most of the time? If yes, how many hours?
- 40) What are the energy conservation methods adapted by your college?
- 41) How many boards displayed for saving energy awareness?
- 42) How much ash is collected after burning fire wood per day in the canteen?
- 43) Write a note on the methods/practices/adaptations by which you can reduce the energy use in your college campus in future.

	44) Calculation of energy for electrical appliances
<b>Indirect benefits of Energy Audit</b>	Every time the energy audit is carried out it rekindles the interest in Energy Conservation as an important function. Energy Auditors sharing their experience and knowledge with the plant personnel, helps in fuelling the innovative ideas for further action of reduction in Specific Power consumption (SPC). Any loose connections or heating of cables come to timely vision. For an external agency due to unbiased vision, a few points for energy conservation may be visible each time they perform the audit and this would help in achieving further saving. Inform any irregularities in Energy meter CT connections for rectification
<b>Energy observations</b>	<ul style="list-style-type: none"> <li>❖ Electricity charges Rs. XXXXXXX./month (average of six months)</li> <li>❖ Number of Gas cylinders used per month –XXX-XXX (19 kg cylinder)</li> <li>❖ Cost of Gas cylinders used Rs. XXXXXX/month</li> <li>❖ Number of Generators – X (600 ,500 kVA capacities)</li> <li>❖ Number of LED lights –XXX</li> <li>❖ Number of fans –XXXX</li> <li>❖ Number of Air conditioners - XXX</li> <li>❖ Number of Tube lights – XXXX</li> <li>❖ Number of Transformers – X(450 &amp;150 kVA)</li> <li>❖ Number of Printers –XXX</li> <li>❖ Number of Xerox Machines- X</li> <li>❖ Energy generation by solar panels – XX kW</li> <li>❖ Total electricity consumption of the college is on average of XXXX-XXXX units per day</li> </ul>
<b>Guidelines for most efficient use of ACs</b>	<ul style="list-style-type: none"> <li>• <b>Proper Insulation</b> – Good quality insulation must be maintained in the airconditioned rooms by keeping all doors and windows closed properly so as to prevent cool air go out and hot air come in.</li> <li>• <b>Curtains</b> – Curtains should always be kept on windows to prevent direct sunlight inside the room to avoid heating of cooled air. This reduces AC load significantly.</li> <li>• <b>Maintenance</b> – Proper maintenance and cleaning of ACs is required at regular intervals to make it work at highest efficiency. Any dirt in filter may reduce efficiency of ACs very significantly.</li> <li>• <b>Operation</b> – The ACs should be switched on 15 minutes before actual use and should be switched off before leaving the room.</li> </ul>
<b>Current saving methods adopted in the college</b>	<ul style="list-style-type: none"> <li>➤ Turn off electrical equipment when not in use</li> <li>➤ Use energy efficient light-emitting diode (LED) bulbs instead of incandescent and CFL bulbs</li> <li>➤ Maintain appliances and replace old appliances.</li> <li>➤ Use computers and electronic equipment in power saving mode</li> </ul> <p><b>Use of Master Switch outside each Room:</b> Installation of a master switch outside a room can make it easy for a</p>

person to switch off all the appliances of a room in case someone forgets to switch off while leaving the room. This can help improving energy efficiency

**Use of Motion Sensors in Corridors and Toilets:**

Corridors and toilets have large potential of saving energy by use of automation tools. Motion sensors can be used in those areas to automatically switch on the light when there is any movement of people and switch off the light when there is no movement. This can greatly reduce the total load in corridors and toilets, as the switches for lighting in those areas are often left ON even when there is nobody present there.

**Replacing Geysers by Solar Water Heating System:**

Geysers are the devices with highest non-efficient energy consumption in the residential buildings in the college. It is the appliance where maximum power is wasted while utilizing it. Heating water by electricity is the most inefficient way. Alternatively, heating water for bathing can be accomplished by Solar Water Heating System (SWHS).

<p><b>DUTIES OF PROFESSOR IN-CHARGE</b></p>	<p>Energy Management</p>	
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<p><b>COMMITTEE FOR ENERGY AUDIT</b></p>	<ol style="list-style-type: none"> <li>1. Professor in-charge Energy Conservation facilities, SITE</li> <li>2. Prof &amp;HOD, Dept of EE Engg, SITE</li> <li>3. Associate Prof, Dept of EE Engg, SITE</li> <li>4. Asst. Prof, Dept of EE Engg, SITE</li> </ol>
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<p><b>INVENTORY OF ELECTRICAL</b></p>	<p>Si. No</p>	<p>BL OC K</p>	<p>Nu mbe r of</p>	<p>Nu mbe r of</p>	<p>Nu mbe r of</p>	<p>Nu mbe r of</p>	<p>Num ber of</p>	<p>Nu mbe r of</p>	<p>Nu mbe r of</p>	<p>Nu mbe r of</p>	<p>Nu mbe r of</p>	<p>N O O</p>
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APPLIANCES FOR A.Y 21-22	NA ME	Tub e Ligh ts	Fans	LED	Wall Fans	Stan ding Fans	Exha ust Fans	Heat ers	Cool ers	Frid ge	F A / C	
INVENTORY OF WATER PUMPS FOR A.Y 21-22	Pump location		Type of Pump		Flow M <sup>3</sup> /hr		Motor rating (kW)		Hours of use /day			
INVENTORY OF UPS FOR A.Y 21-22	SL. No	BLOCK	FLOOR	UNIT RATING	NO. OF BATTERIES	RATING OF BATTERIES	POWER FLOW					
INVENTORY OF A/C FOR A.Y 21-22	SL.NO		NAME		NO OF A/C		TON					
POWER CONSUMPTION AS PER ELECTRICITY BILL AND ENERGY AUDIT	For the academic year 2021-22											
	Sr.No	Months		Consumption Unit (KWhr) as per electricity bill				Consumption Unit (KWhr) as per energy audit				
	1											
	2											
	3											
	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
Yearly Total Power Consumption in KWhr												
Monthly Average Power Consumption in KWhr												
(Consumption Unit (KWhr) as per electricity bill)-(Consumption												

	<b>Unit (KWhr) as per energy audit) =</b> <b>By adopting energy measures, the total number of units saved per annum</b> = <b>Total money saved per annum as per audit</b> =
<b>FINDINGS OF ENERGY AUDITING</b>	Energy audit is an effective tool in identifying and perusing a comprehensive energy management program. A careful audit of any type will give the organization a plan with which it can effectively manage the organization energy system at minimum energy cost.
<b>USE OF RENEWABLE ENERGY</b>	<p>The committee has taken up the following activities to reduce the use of conventional energy</p> <ul style="list-style-type: none"> <li>➤ To stick posters on all switch boards in the campus advocating power saving</li> <li>➤ To replace electrical regulators with electronic regulators.</li> <li>➤ To conduct energy audit for the whole college with the help of authorized agency.</li> <li>➤ To use solar energy to preheat the boiler feed water in hostel.</li> <li>➤ To use natural/forced draught to enhance cooking stove efficiency in hostel.</li> <li>➤ To arrange a guest lecture on importance of renewable energy.</li> <li>➤ To conduct paper presentation &amp; poster presentation competition for EEE and ME students</li> </ul>
<b>RECOMMENDATIONS FOR BETTER ENERGY EFFICIENCY</b>	<ul style="list-style-type: none"> <li>➤ Replace all old motors by energy efficient motors</li> <li>➤ Replacing conventional choke of all FTL's by Electronic choke.</li> <li>➤ Use of motion sensors in corridors and toilets, Avoiding Using photocopier Machine In The Sleepy Mode when not in use</li> <li>➤ Replacing all FTL's by LED lights of equal similarities</li> <li>➤ Replacing all Laser Printers by Ink-jet Printers</li> <li>➤ Replacing CRT monitors of PC's with LCD monitors</li> <li>➤ Replacing old UPS by energy efficient UPS</li> <li>➤ Regular maintenance of batteries</li> <li>➤ Automate your appliances with smart assistants.</li> <li>➤ Bring in more natural light with mirrors and bright walls.</li> <li>➤ Switch out incandescent lights.</li> <li>➤ Unplug battery chargers when not in use.</li> <li>➤ Automate thermostat according to the time of day.</li> <li>➤ Set your computer to sleep or hibernate mode when not in use</li> <li>➤ Use electric kettle to boil water instead of a microwave in hostels and guest houses</li> </ul>



	<ul style="list-style-type: none"> <li>➤ Install low-flow shower heads in hostels</li> </ul>
<b>Salient Features and Benefits of solar System</b>	<ul style="list-style-type: none"> <li>➤ A clean, silent and eco-friendly source of power</li> <li>➤ Solar modules convert sunlight into electricity without pollution</li> <li>➤ Negligible maintenance as there are no moving parts and maximum reliability</li> <li>➤ Long life span of solar modules</li> <li>➤ Modular design and easily expandable</li> <li>➤ Simple installation: can be mounted on roof top or ground</li> <li>➤ Can be installed at point-of use to avoid transmission losses</li> <li>➤ Energy Independence</li> <li>➤ Protection against future escalation of energy costs</li> <li>➤ Available throughout the year</li> </ul>
<b>Related/Supportive Documents</b>	Guidelines for Autonomous Colleges, AICTE, AQAR & NAAC
<b>Responsible for</b>	Professor in-charge, Energy Conservation facilities, SITE
<b>Functional Reporting</b>	Principal, Dean(P&D)
<b>Administrative Reporting</b>	Administrative Officer
<b>Custodian</b>	Administrative Officer

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