

**ENERGY AUDIT REPORT**

**2019-2020**

**23/December/2019**



Established by Govt. of U.P. u/s 2(f) of UGC Act, 1956 vide U.P. Act 22 of 2010.

**Invertis University**

**Bareilly-Lucknow National Highway, NH-24, Bareilly,**

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**ENERGY AUDIT ASSESSMENT TEAM**

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## 1. INTRODUCTION

Energy Audit needs to be done to Identify Energy saving Opportunities in a facility or areas with excess use of Energy compared with set up standards. Energy audit is an effective tool of energy management to use Energy effectively and efficiently. Energy today has become a key factor in deciding the product cost at micro level as well as in dictating the inflation and the debt burden at the macro level. Energy cost is a significant factor in economic activity at par with factors of production like capital, land and labour. The imperatives of an energy shortage situation calls for energy conservation measure, which essentially mean using less energy for the same level of activity. Energy Audit attempts to balance the total energy inputs with its use and serves to identify all the energy streams in the systems and quantifies energy usages according to its discrete function. Energy Audit helps in energy cost optimization, pollution control, safety aspects and suggests the methods to improve the operating & maintenance practices of the system. It is instrumental in coping with the situation of variation in energy cost availability, reliability of energy supply, decision on appropriate energy mix, decision on using improved energy conservation equipment's, instrumentation's and technology.

## 1. OBJECTIVES OF ENERGY AUDIT

An energy audit is an inspection survey and analysis of energy flows for energy conservation in a building and in an organization. It may include a process or system to reduce the amount of energy input into the system without negatively affecting the output.

  
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The specific objectives of Energy audit are:

- Verify the steps adopted for energy management in the campus
- Spot the inefficient or inadequate practices, if any
- Improve the energy preserving measures and methods
- Identify potential energy saving opportunities
- Formulate feasible steps and measures to be adopted in the campus

## 2. ENERGY AUDIT METHODOLOGY

Energy audits are primarily classified into:

- Preliminary Audit
- Detailed Audit

A Preliminary Audit uses existing data to look extensively at the existing energy consumption patterns and identifies the areas for improvement, sets "reference points", and identifies areas for more in-depth study. A Detailed Audit is more comprehensive and is carried out in phases, evaluating all major energy using systems. It estimates energy savings and cost, and accounts for the energy use of all major equipments. Since the Detailed Audit is meant for industry, and because of the limited size and the amount of energy consumption of the institution, the Preliminary Audit method was chosen for this year.

## 3. STEPS OF ENERGY AUDIT

### Phase I

- Collections of data on operational parameters, energy consumption both normal and electrical.

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- Study of the specific energy consumption.
- Study of the power sources, distribution system and drive controls, load factor and efficiency of large motors (above 10 kW), process automations, plant illuminations etc.
- Collection of requisite data and analysis and identification of specific areas with potential for conservation of electrical energy.
- Study of limitations, if any, in the optimal use of electrical energy.
- Formulation of specific recommendations along with broad system concept for conservation of electrical energy.
- Formulating tentative time schedule for implementation of the recommendation.
- Undertaking broad cost benefit analysis in terms of savings in energy consumption per unit of production and pay-back period.

#### Phase II

- Compiling the data in order to produce a draft report.
- Re-examining of the data collected for the final report.
- Preparing an action plan based on the outcome, where there is a need for improvement.
- Implementing strategies for further action plan based on the final report of green audit.

#### **4. GEOGRAPHICAL LOCATION OF INVERTIS UNIVERSITY**

Invertis University is situated on Bareilly-Lucknow NH-24, 24 km distant from the national capital Delhi and state capital Lucknow. It is situated within the geo-position between latitude  $28.2923317^{\circ}\text{N}$  and longitude  $79.4915667^{\circ}\text{E}$  in Bareilly, Uttar Pradesh India. The campus is just 12km

  
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away from the Bareilly Railway Station and Roadways Bus Stand equally. The campus has built over an area of 23.5 acres of land.



## 5. SOLAR PLANT OF INVERTIS UNIVERSITY

Invertis University is contributing to the larger picture of effective energy management and conservation as we have a massive number of solar panels on every building and most of the requirement of the electricity we are collecting from there only. Here we have some specification of our solar plant agreement:

*Solar Plant Agreement: Uttaranchal Welfare Society and Siddhesh Multi Commodities LLP.*

*Capacity: 800 kW*

*Commissioned date: 30 March 2017*

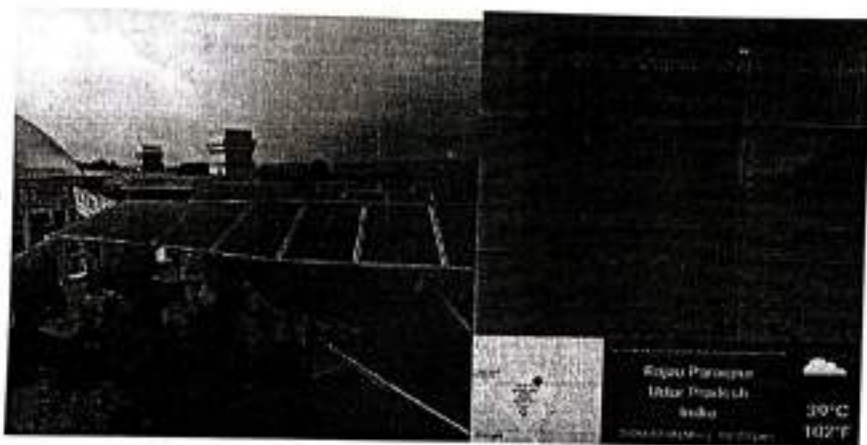
*The Plant consists of 29 inverters and 13 meters for reading. Solar panels are from Vikram Solar and the panel model number is 320.*

  
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*Extra Solar power generated is exported to Madhayanchal Vidhut Nigam through Net Metering system.*

We also ensures the regular maintenance and working of the solar plant and highly committed to contributing to save energy and its resources to which we as one nation can allocate the saved resources in the development of our country.



## 6. Major Findings

### I. Establish and identify the energy consumption in the organization:

- The computer labs and engineering workshops record the highest consumption based on end use.
- The computer Block records the highest rate of consumption.

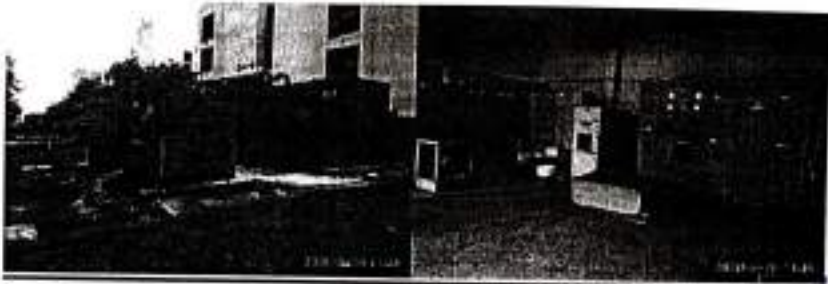
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- Laboratory equipments show the highest rate of consumption equipment-wise.
- The month of March shows the peak in consumption.
- The time slots in the Afternoon record the highest consumption on a normal working day.
- Major part of electric consumption is depending on solar panels.
- There are a number of unused sockets and redundant power points causing power wastage.
- There seem to be a lack of judicious use of power among students and staff. During the study, it was found that lights, fans and computers were kept on working mode in many rooms, without a single person present.

**Estimate the scope for saving:** The study could identify a large scope for saving energy in the campus, including.



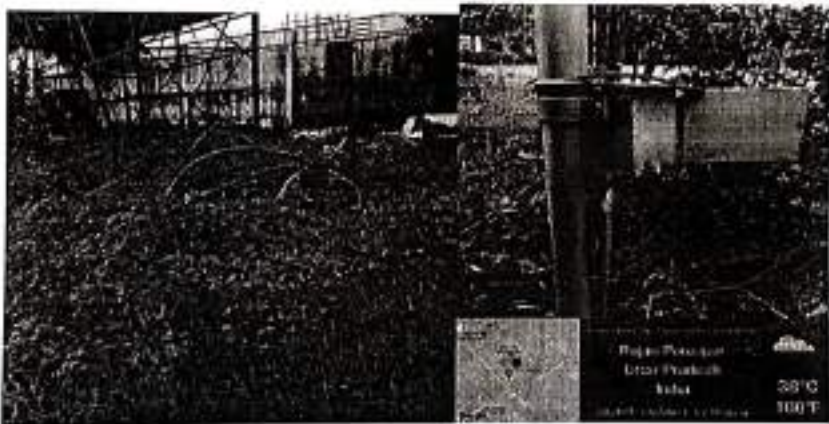
### Recommendations

- Updating of technologies in laboratory equipments.
- Replacing old electrical cables and pipelines.

  
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- Replacing incandescent bulbs with LEDs.
- Ensuring even lighting facilities in rooms.
- Replacing old gadgets with new advance electronic gadgets.
- Encouraging students and staff to switch off electrical gadgets and turn off the water taps when not in use.
- Replace old pipelines with new ones, and latest motors for pumping water.
- New buildings to be constructed should follow the pattern and assure natural light and air passage, to reduce loss of energy.
- Replace old electrical cables with new ones.



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