Abstract
A comparative analysis of energy consumption between non-green buildings with green building has been made in this paper. It has been tried to quantify the energy saving in the Building of Priyadarshini College of Computer Science and Engineering, Greater Noida. Primary weather data has been recorded and tabulated daily as well as monthly. Thermometer, Psychrometer and anemometer {instruments} were used to perform the spot temperature through the day covering time duration of April 2017 to July-2017. The variables under study, temperature and relative humidity were measured in at least fifteen locations on each floor, and all floors were monitored in up to six different locations for each round of measurement that was performed six times (7.00am to 6.00 pm) of two hour’s interval each day. The monthly and annual averages have been calculated for the study which provides a trend of annual as well as monthly fluctuation of relative humidity and temperature. Outdoor airflow rates to each zone were measured by performing a wind speed of the outside air by anemometer.

A comparative analysis of energy consumption of Non-green building with Green building has been made in this study. It has been tried to quantify the energy saving in the Building of Priyadarshini College of Computer Science and Engineering, Greater Noida.

Data Base and Methodology
Primary weather data, temperature & relative humidity were measured by Thermometer & Psychrometer (Instruments) in at least fifteen locations on each floor, all floors were monitored in up to six different locations for each round of measurement performed six times (7.00am to 6.00 pm) of two hour’s interval each day. Data then be recorded and tabulated daily and monthly for time duration of April to July(2017). The monthly and annual averages have been calculated providing a trend of monthly as well as annual fluctuations of relative humidity and temperature. Outdoor airflow rates were calculated by multiplying average velocity to cross-sectional area of the room at the traverse location, by using Anemometer. Ventilation rates were used to determine per person outdoor intake rates.

Based on collected data, annual cost and % of energy saved in non-green and green building was calculated with reference to annual energy consumption in the buildings.

“clothed” with plants on its eastern and western faces and on the roof.

The use of Eco-inventory technique, local geographical area analysis with reference to metrology, non-conventional energy, solar energy, wind energy and geothermal energy, solar water heater, SFL bulb and day lighting arrangement through orientation of building with respect to sun will further reduce the cost of electricity and will consume the energy in proper manner. This study could be extended to several buildings, it is recommended to green building concepts.

Introduction:

- Green buildings have been described as being designed, constructed, operated and maintained to have minimum impacts on the environment, including the indoor environment of the buildings [8].
- In terms of the global environment life-cycle assessment ([LCA] of all components and resources involved with constructing, operating and maintaining a building. In terms of indoor environment, means employing building materials, maintenance products and practices, and operating strategies that provide acceptable indoor air quality (IAQ) to building occupants [4].
- Green buildings are designed to reduce the overall impact of the built environment on human health and the natural environment by:
  - Efficiently using energy, water, and other resources.
  - Protecting occupant health and improving employee productivity.
  - Reducing waste, pollution and environmental degradation.
- A similar concept is natural building, which is usually on a smaller scale and tends to focus on the use of natural materials that are available locally. Other related topics include sustainable design and green architecture.

- Basics Fundamentals
  - 1.Body’s thermostat = 98.60F (37oC), The human body has ways to adjust (increase or decrease) its heat loss,
  - for example by bringing more or less blood to vessels right under the skin to expel heat more effectively. Sweating and the resulting evaporation is another physiological mechanism to expel heat, but it is not one that we would call comfortable.
• This range is limited. Experience reveals that the comfort range for most people extends from 68°F (20°C) to 78°F (25°C) summer. Likewise

• 2. Humidity. Experience reveals that comfort is best achieved within a range of relative humidity. The minimum comfortable level of relative humidity is 20%. Below this, people complain of dry nose, mouth, eyes, and skin, and there is an increase in respiratory illnesses. Furthermore, static electricity and shrinkage of wood are also problems caused by excessively low humidity.

• Relative humidity (RH) is the fraction of water vapor that the air actually contains to the amount that it would contain at the point of condensation, expressed as a percentage. Thus, 0% corresponds to dry air, and 100% to maximally humid air for its temperature. Neither extreme is comfortable.

• Humidity Comfort

• The maximum comfortable level varies with the season. In summer, when the need to expel heat is more important, cooling by evaporation of body moisture is necessary, and RH is best kept below 60%.

• In winter, when getting rid of excess heat is hardly the case, a higher level of humidity can be tolerated, and the maximum RH level is 80%.

• Water exposed to surface-evaporation > humidity in air>equilibrium is eventually reached (water vapours saturated, RH is 100%)>maximum possible level>higher water level causes condensation-back

• This level of saturation varies with temperature.

• 1. If humidity > saturation level, vapor condenses and forms

• Droplets of water on surfaces. Surfaces get wet, and we call that moisture.

• Moisture in buildings is not good because persistent moisture leads to mold.

• If humidity < saturation level, and no exposed water to bring water vapor to the saturated state, the level of humidity lies somewhere between zero and saturation. This amount is measured as 0% of the saturation value.
Energy Considerations

It takes energy to change the temperature of the air:

- Input for heating
- Removal for cooling.

Called sensible heat SH

Likewise, it takes energy to vary the humidity of the air:

- Input to vaporize liquid water into vapor
- Removal to condense vapor into liquid.

Called latent heat LH

Through this standard graph we can assess the winter and summer comfort zones for any particular building:

Summer comfort zone: T18°C - 31.5°C, RH 5% - 25%

Winter comfort zone: T 14°C - 18°C, RH -15% - 80%

CASE STUDY

BUILDING DESCRIPTION

The building of Priyadarshini College of Computer Sciences & Engineering consists of four floors: Ground, First, Second and third Floor.

The building description is as follows:

All floors are made up of class rooms, labs and various offices.

The Description of Built up area and Open Area are as follows

Built up Area = 2993.00 sq.m.

Open Area = 37960.00 sq.m.

STATION: Priyadarshini College of Computer sciences & Engineering, Greater Noida

Monthly Average Temperature (°C) and Relative Humidity (%) from April-2017 to July-2017

<table>
<thead>
<tr>
<th>Month</th>
<th>Monthly Average Temp °C</th>
<th>Monthly Average RH (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>April-2017</td>
<td>32.5</td>
<td>35</td>
</tr>
<tr>
<td>May-2017</td>
<td>36</td>
<td>34</td>
</tr>
<tr>
<td>June-2017</td>
<td>38</td>
<td>40</td>
</tr>
<tr>
<td>July-2017</td>
<td>34</td>
<td>86</td>
</tr>
</tbody>
</table>

Table :1

Graph-1

Graph-1 Shows Monthly Average Temperature and Average Humidity conditions.

We know that 1000 cub ft = 28.32 m³ of space required AC of 1 TR (Ton of Refrigeration) to reduce 10 °C of temperature and consume 1KWH of electrical power as 28.32 m³ of space required 1TR to reduce 10 0C temperature

Hourly Electricity consumption (P) = 1KWH

If the volume of Ground Floor = 6682.60 m³, then the hourly electricity that will be consumed to reduce 10 °C temp. can be calculated as:

Hourly Electrical (P) = 1KWH x 6682.60 m³
A COMPARATIVE STUDY OF NON-GREEN BUILDING AND GREEN BUILDING
BLOCK-A : NON-GREEN BUILDING
BLOCK-B : GREEN BUILDING
BLOCK-A HOURLY ENERGY SAVING IN NON-GREEN BUILDING

<table>
<thead>
<tr>
<th>S No</th>
<th>Floors</th>
<th>Hourly energy saving(KWH) in BLOCK A</th>
<th>Hourly energy saving(KWH) in BLOCK B</th>
<th>Hourly energy consumption (KWH) in BLOCK A &amp; B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gro</td>
<td>29.13</td>
<td>13.31</td>
<td>235.97</td>
</tr>
<tr>
<td>2</td>
<td>Firs</td>
<td>28.53+(28.53x0.10)</td>
<td>13.40+ (13.40 x 0.10)</td>
<td>235.97+(235.97*0.10) =259.56</td>
</tr>
<tr>
<td>3</td>
<td>Sec</td>
<td>31.22+(31.22x0.21)</td>
<td>13.16+ (13.16 x 0.21)</td>
<td>235.97+(235.97*0.21) =285.52</td>
</tr>
<tr>
<td>4</td>
<td>Thir</td>
<td>31.24+31.24x0.45</td>
<td>12.76+(12.76 x 0.45)</td>
<td>235.97+(235.97*0.45) =342.15</td>
</tr>
<tr>
<td>5</td>
<td>Total</td>
<td>143.57K WH</td>
<td>62.47K WH</td>
<td>1123.20K WH</td>
</tr>
</tbody>
</table>

Table: 2

Conclusions:
From this study, it is found that minimum and maximum relative humidity of (34%), (80%) has been recorded in the months of April & July, whereas minimum & maximum temperature of (32.5°C), (38°C) has been recorded in the months of April and June respectively, indicating vast fluctuations, varying rates of cooling, heating and reducing humidity in different seasons involve considerable energy accounting for major impact on the environment.

Energy saved =12.78% (Non green building) 
Energy saved =12.78% (Green building)
The study shows that the cost of electricity for a non-green building of an area 2993.00 sq.m. is about 10% more as compared to same sized building having wooden partition, fall ceiling & curtains etc. Because a partially Green Building consume 5.56% less electricity and will save Rs.1124460.00/year.

Recommendation
- We can grow the more plants or develop a horticulture area in surrounding the building and water circulation system is being set up, to maintain the comfort conditions such as Temperature and Relative Humidity to conserve the energy in the building.
- The relationship among soil, water and vegetation must be study as per the norms establish by Eco-Inventory technique.
- The energy can be conserved using the local geographical area analysis with reference to metrology that is air quality, wind direction, wind analysis and rainfall etc.
- The hydro-geological aspects such as water level, ground water potential, depth of water level, soil type and vegetation density etc. must be studies for proper location of the building.
- It is found that the building materials have got a good impact on the absorption and transfer of heat.
- The relationship among soil, water and vegetation must be study as per the norms establish by Eco-Inventory technique.
- The energy can be conserved using the local geographical area analysis with reference to metrology that is air quality, wind direction, wind analysis and rainfall etc.
- The hydro-geological aspects such as water level, ground water potential, depth of water level, soil type and vegetation density etc. must be studies for proper location of the building.
- It is found that the building materials have got a good impact on the absorption and transfer of heat.
- The use of Non-conventional energy, solar energy, wind energy and geothermal energy, solar water heater, SFL bulb and day lighting arrangement through orientation of building with respect to sun will further reduced the cost of electricity and will consume the energy in proper manner.
- Thus way the conservation of energy may be achieved in a good way by application of Green Building.

<table>
<thead>
<tr>
<th>Blocks</th>
<th>Hourly energy saving cost @5/ unit</th>
<th>Annual energy saving cost</th>
<th>Hourly energy consumption cost</th>
<th>Annual energy consumption cost</th>
<th>Annual energy saving %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non green building A</td>
<td>14.35 5 = 71.78 5 Rs</td>
<td>143.5 7<em>5</em>1 0.30*12 = 84250 Rs</td>
<td>1123.20*5=56 16 RS</td>
<td>1123.20<em>5</em>10<em>30</em>12=202 17600 Rs</td>
<td>2584260/20217600 =12.78%</td>
</tr>
<tr>
<td>Green building B</td>
<td>62.47 5 = 312.35 Rs</td>
<td>62.47 4<em>5</em>30*2 = 4460 Rs</td>
<td>1123.20*5=56 16 RS</td>
<td>1123.20<em>5</em>10<em>30</em>12=202 17600 Rs</td>
<td>1124460/20217600 =5.56%</td>
</tr>
</tbody>
</table>
Table: 3

The enthalpy wheel
The slowly turning wheel absorbs and rejects heat. It is also covered by desiccant that absorbs and rejects humidity.

Figure: 4

REFERENCES
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