

## **7. Energy Efficiency**

Energy conservation is the utmost important in Green & Environment Audit. Entire Nation and all States of our country are canvassing and encouraging people of India to save energy. We are falling short of energy as compared to its generation and usage.

Ministry of New and Renewable Energy, Government of India of India is promoting use of Green and Hybrid Energy. Government of India has come up with ECBC code-2005 revised in 2017 with amendment in 2022. All Public buildings, Institutions, Commercial complexes, Factory buildings Residential complexes have to follow ECBC-2017 norms.

***College has taken a pro-active step of procuring LED lighting fixtures and BEE star rated electrical equipment and ceiling fans for all its spaces including notification to use the same at the time of replacement and for new construction. This has been done even before the Green & Environment Audit could take place. College has a good practice to purchase and install only LED lighting fixtures and purchase all equipments of BEE star rated.***

## **7.1 Implementation of ECBC/ASHRAE/LPD Norms**

The College has yet to undertaken Energy Audit for its campus Building, which should be taken up soon.

Even then College Administration has taken up series of steps to reduce the energy consumption on the campus. College has taken a policy decision to install LED lighting fixtures only and purchase all electric equipment with minimum BEE 3 Star Rating.

The College has further taken a decision to retrofit its buildings as energy efficient / green buildings and construct all its new buildings as energy efficient / green buildings.


The College designs the building to comply with Energy Conservation Building Code (Revised Version May, 2017) (or) ASHRAE Standard 90.1-2010 (without amendments) through one of the following approaches:

Performance based approach (Whole building simulation) OR Prescriptive approach. Energy Efficient Buildings have savings over more than 40% in electric consumption over ECBC norms or ASHRAE norms. The College confirms that the total annual energy consumption of the building should not exceed the total base case energy consumption computed, as per ECBC (or) ASHRAE Standard 90.1-2010.


The Lighting Power Density (LPD) in the building interior, exterior and parking areas are reduced by minimum 10% over ECBC base case.

Compliance for the lighting power density is shown either through 'Building Area Method' or 'Space Function Method'. Exterior areas illuminated by lighting only is considered for lighting power density calculations. The LPD includes power consumption of complete fixture, including lamps and ballasts

**COLLEGE GREEN POLICY NOTIFICATION**



**Government Science College, Idar**  
At & Post: Sapavada, Idar, Sabarkantha



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Ref.: No. JGSC/MKM/2022/78

Date: 26/02/2022

**CIRCULAR**

**Subject:- Green Policy of the College**

Hon'ble Prime Minister Narendra has made the pledge to cut its emissions to net zero by 2070, the first time India has set a net zero target, at the Glasgow summit during during November, 2021.

The University has formed it's Green Policy in view of the above said pledge by our Hon'ble Prime Minister.


All departments are requested to implement this "**Green Policy**" of the college strictly in letter and spirit. The Green Policy of the College is also mandatory form NAAC point of view.

Implementing this Green Policy will not incur an expenditure of single rupee but will set an exmple before students, society and staff regarding our concern for the "Climate Change" and Environmental Conscious Life Style. What is needed today is Mindful and Deliberate Utilization, instead of Mindless and Destructive Consumption.

**GREEN POLICY OF THE COLLEGE**

**1. Energy Efficiency Measures**

- (i) Motivate and Encourage "Save Energy" measures on campus by requesting all concerned to switch off lights, fans and Air-Conditioners when room and class room is not occupied.
- (ii) Place Sinages in each room and class room to "Switch Off" lights, fans and AC when not is use.
- (iii) Purchase/Replace ceiling fans with BEE 5 star rating.
- (iv) Purchase/Replace energy efficient lighting fixtures in form of LED
- (v) Purchase/Replace electrical equipments such as AC, water coolers, refrigerators, microwave, etc with only BEE 5 star rating.
- (vi) Energy Audit



## **7.2 Total Energy Consumption & Equivalent CO<sub>2</sub> Emission**

The data based on electrical bills collected from College reveals that the total Electrical energy units consumed on Campus per month is approx. **15,000 (KWh)**. This includes **air conditioners**, which consumes about **50%** of electricity

Hence total annual energy consumption is  $15,000 \times 12 = 1,80,000$  units per annum.

One Unit equals 1000 watts (1KWhr.) It requires 0.538 Kg or approximately  $\frac{1}{2}$  Kg of coal to produce 1 unit of electricity.

Total quantity of coal required to produce **1,80,000** units of electricity is  $(1,80,000 \times 0.538 \text{ Kg coal}) = 96,840 \text{ Kg}$  or 96.84 tons of coal.

### **Co<sub>2</sub> emission by coal**

One Kilogram of coal emits 2.86 Kg. of CO<sub>2</sub> thereby increasing the carbon footprint which in turn contributes to global warming.

Therefore 96.84 tons of coal consumed indirectly by the College through consumption of 1,80,000 units of electricity led to the emission of  $(96,840 \text{ Kg of coal} \times 2.86 \text{ Kg CO}_2) = 2,76,962.4 \text{ Kg}$  or **276.96 tons of CO<sub>2</sub> the atmosphere.**

### **7.3 Solar Panels on Grid**

***The College has installed 45.00 KW solar panels and this has offsets entire energy consumption on the campus.***

These Solar panels are connected to Grid through Net Metering and hence the cost of batteries to store solar energy generated is saved. Furthermore, these batteries are harmful to environment.

These solar panels generate 45 Kw per hour, however the panel will function effectively only for about 5 hours per day. Hence total solar energy generated per day will be  $45 \times 5 = 225$  Kw/day

***Total solar energy generated per year will be  $225 \text{ Kw} \times 365 = 82,125 \text{ Kw}$ .***

***The coal equivalent  $82,125 \times 0.538 = 44,183.25 \text{ Kg. coal}$ .***

***The CO<sub>2</sub> equivalent is  $44,183.25 \times 2.86 = 1,26,364.095$***

***$1,26,364.095 \text{ Kg} = 126.36 \text{ tons}$***

***Hence Co<sub>2</sub> reduction because of proposed solar panels on the campus is 126.36 tons.***

***Hence the College has contributed towards reduction of 25% emission due to consumption of energy & also contributed towards Zero Emission Policy of Nation.***



***SOLAR PANELS OF 45 KW ON-GRID i.e. NET METERING***



## 7.4 Energy Efficiency & Conservation

College building has air-conditioners, which confirms and considers unitary air-conditioners with BEE 1-star rating.

College verifies and ensure that the building's equipment & systems are commissioned to achieve performance as envisaged during the design stage. College is also proposing to submit measurement & verification plan for yearly reporting.

***All Lighting fixtures are LED. All electrical equipment are minimum BEE 3 Star Rated. All ceiling fans are BEE star rated. Proper signages are placed Save Energy and Put Off lights when not in use.***

The College has installed energy efficient pumps. The building design is such so as to attract maximum daylighting, which reduces artificial lighting load during daytime.

The College has placed signages to **“Save Energy”** and other similar kind of signages at all class rooms and wash rooms to motivate and create awareness amongst students and staff to save water.



***SIGNAGES & ENERGY CONSERVATION***



***ENERGY EFFICIENT LED LIGHTING FIXTURES & CEILING FANS***





***ENERGY EFFICIENT SPLIT AC OF BEE 1 STAR RATING &  
REFRIGATOR OF BEE 5 STAR RATING***



## **7.5 Outdoor Light Pollution Reduction**

Light pollution on the campus is reduced to increase night sky access and enhance the nocturnal environment. Exterior lighting are designed such that no external light fixture emits more than 5% of the total initial designed fixture Lumens, at an angle of 90 degrees or higher from nadir (straight down). LED lights are not used for exterior lighting system, which is the improper way of energy efficient steps.

The center-to-center distance between exterior lighting electric poles and their height is calculated so as to avoid any overlap of night light and also to lit only drive way. The bracket and the angle of bracket also play an important role for the same. Finally, the lighting fixture is selected so as to illuminate only drive way.



**REDUCE NIGHT LIGHT POLLUTION BY PLACING LED**



***REDUCE NIGHT LIGHT POLLUTION BY PLACING LED***



## 7.6 Energy Performance Index

Energy performance index (EPI) is total energy consumed in a building over a year divided by total built up area in kWh/sq m/year and is considered as the simplest and most relevant indicator for qualifying a building as energy efficient or not.

EPC ratings are given to properties and are represented on a scale from A (most efficient) to E (least efficient). The EPC contains information about a property's energy use and typical energy costs, as well as recommendations about what you can do to save energy at home and make your property cheaper to run.

Enhance energy efficiency of the building to reduce environmental impacts from excessive energy use

***EPI range for buildings having less than 50% occupied area as air conditioned (kWh/m<sup>2</sup>/year) IS 75-65 for Hot & Dry climate zone. This value is applicable only for day use office buildings which operate for 260 to 300 days in a year.***

Electricity consumption details including utility power, captive generation and renewable energy of preceding 1 year

The total annual energy consumption is 1,80,000 kW

The total Built up area is 5,521 sq.mt.

***Hence EPI = 1,80,000/5521 = 32.60 kWh/m<sup>2</sup>/year, which is far below the given limit.***