NUTAN MAHAVIDYALAYA SELU

Nutan Vidyalaya Shikshan Sanstha's

Nutan Mahavidyalaya, Selu Dist Parbhani

Affiliated to

Swami Ramanand Teerth Marathwada University, Nanded

Electrical Audit2020-21

Prepared by Dr. Bhagwat Khemthekar
HoD (Physics Dept.)
Member (Incubation Cell)

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Introduction:

Nutan Mahavidyalya, Selu has been established on 15th June 1968 in the building of Nutan Vidyalya., Selu. The pleasure and proud movement of college is-- Swami Ramanand Teerth visited the college at the time of building construction. The college has been settled in the new building which located at Jintoor Road Selu, on 15th June, 1970. The college has been accredited by NAAC with 'B' Grade in the year 2003 and reaccredited with 'B' Grade in the year 2013. The college has excellent, highly qualified & dedicated faculties with good infrastructure, disciplines and competent administration with the track of good results in all the disciplines.

The National Assessment and Accreditation Council, New Delhi (NAAC) has made it mandatory from the academic year 2016–17 onwards that all Higher Educational Institutions should submit an annual Green Audit Report. Also it is our responsibility to ensure that they contribute towards the reduction of global warming through Carbon Footprint reduction measures. In view of the NAAC circular regarding Green Auditing, the College Management decided to conduct an external Green Evaluation by a competent Green Auditor along with a Green Audit Assessment Team headed by Dr. S. S. Kulkarni, Principal, Nutan Mahavidyalaya, Selu Dist Parbhani.

Objectives:

- To determine the electricity consumption in the campus.
- To increase the renewable energy sources in the campus area.
- To assess whether the measures implemented by Nutan Mahavidyalaya, Selu has helped to reduce the Carbon Footprint.
- To assess whether non-academic activities of the Institution support to Collection, recovery, reuse and recycling of solid wastes etc. which is harmful to the environment.
- Suggestions & recommendations to improve the Green Campus status of the institution.

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Team Members:

The following are the members of the Green Audit Team.

Sr no.	Name	Designation
1	**Dr. P. R. Kanthale**	Head, Department Of Botany, NM Selu
2	**Dr. B. K. Kumthekar**	Head, Department Of Physics, NM Selu
3	**Mr. R. B. Faritkhane**	Lab. Assistant, Department Of Physics, NM Selu
4	**Mr. V. S. Rathod**	Lab. Assistant, Department Of Botany, NM Selu

Energy Consumption in the Campus

There are seven (07) number of electricity meters in the campus. There brief information as follows:

Sr. no	**Meter no.**	**Place in the campus**
1	532530011129	NMS BCA LAB
2	532530027131	NMS BOTANTY LAB
3	532530169156	CHEMISTRY LAB
4	532530166971	WOMEN HOSTEL
5	532530076409	BCA CLASS ROOM
6	532530037390	SRB BOYS HOSTEL
7	532530010475	SRB BOYS HOSTEL

Sr. No.	Name of Particulars	Total No
01	Total No. of Electrical fans	**225**
02	Exhaust fans	**25**
03	Air Conditioner	03
04	Total No. of Tubes	**195**
05	Total No. of LED lamps Total No. of LED tubes	70 100
06	Street LED focus	10
07	Total No. of CFL lamps	50
08	Total No. of Sockets	**450**

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09	**Water Motor** 1 HP 2 HP 3 HP 5 HP RO motors **R.O. Motors** 1KW 250W	**02** **01** **01** **01** **01** **02**
10	Water Cooler	**03**
11	No. of Computer	**112**
12	Printers	**36**
13	Xerox Machine	**05**
14	Inverters	**23**
15	LCD TV	**01**
16	Smart Board	**06**
17	LCD Projectors	**06**

Average Electricity Consumption / Month = **96 KW** Unit

USE OF RENEWABLE ENERGY: There are 05 solar units are working. Each one has 12 W powers. Therefore, total power receive from solar energy is 60 W.

Solar LED Lamps (focus) With Panel Photos

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Solar Units Photo

Solar Water Heater

By using these renewal energy sources, we have reduced one electricity meter. As earlier we have 08 electricity meters but now a day as mentioned above we have 07 meters in our campus.

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CARBON FOOTPRINT REDUCTION

Carbon footprint is historically defined as *the total set of greenhouse gas emissions caused by an individual, event, organization or product, expressed as* ***carbon dioxide equivalent***.

1. Installing energy-efficient lighting system

The Institution has reduced CO_2 emissions indirectly by replacing high energy-consuming electric bulbs with energy-efficient CFL/LED Lamps & tubes lighting systems. To understand the carbon emission reduction, it is appropriate to compare the units of electricity consumed between incandescent lamps and CFL.

The brief explanations of the above statement is as follows

Total no. of incandescent lamps used earlier 50

Average energy consumption by an incandescent lamp 60 W

Energy consumed by lamp is 60X50=3000 watt per hour

Energy consumed by 50 lamps for 5 hr/day 15 kW hr or 15 units

We consider 300 days in a year then 15 kW hrX300 = **4500 kW hr /year**

Energy consumption of 50 lamps for 300 days/year 4500 kW hr or 4500 units

50 incandescent lamps are replaced with 50 CFL

Average energy consumption by CFL lamp 15W

Energy consumed by CFL is 15X50= 750 Watt per hour

Energy consumed by 50 CFL for 5 hr/day 750 X5 = 3.750 kW hr per day

Energy consumption of 50 CFL for 300 days/year **1125 kW hr or 1125 units**

Energy saved by CFL for 300 days/year 4500-1125= 3375 **kW hr or 3375 Units**

Carbon Footprint reduction analysis

1 incandescent bulb consumes 90 units of energy; 1 CFL bulb consumes 22.5 units of energy.

First, it is appropriate to analyses the carbon emission due to consumption of 4500 units of electricity by 50 incandescent lamps per year. The standard tool of analysis employed in this Green Audit is coal equivalent of electricity.

0.538 kg of coal is required to produce 1 unit of electricity.

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Total units of electricity consumed by 50 incandescent lamps = **4500 units**

Coal equivalent of 4500 units (4500 × 0.538 kg coal) = 2421 kg or **2.4 tonnes.**

1 kg coal emits 2.86 kg CO_2 into the atmosphere.

At this rate, 2421 kg coal emits (2421 × 2.86) = 6924 kg or **6.9 tonnes of CO_2.**

The following are the CO_2 reduction measures adopted in the Institution.

1. CFL

50 incandescent lamps were replaced with 50 CFL which consume 1125 units of electricity.

At this rate the coal equivalent (1125 × 0.538 kg) = **605.25 kg or 0.61 tonnes.**

LED lamps in the campus

The Institution has installed **100 LED** tube lights in the College campus. The power consumption and carbon footprint reduction are discussed below.

Formula for energy consumption

A 100-W bulb left on for 10 hr consumes 100 × 10 = 1000 W hr, i.e. 1 kW hr, which is 1 unit. Similarly a 10-W bulb left on for 100 hr leads to the consumption of 1 unit of electricity. The Institution procured 20-W bulbs numbering 100, which had been fixed in the renovated campus.

Average power consumption analysis

Assumption

On average, a bulb is on for 5 hours per day. The bulbs burn for 300 days in a year. The remaining 65 days are considered holidays. Based on the above information, the total units of power consumed by 100 LED bulbs for 1 year at the rate of 5 hours per day is Watt rating of bulb × unit hour × quantity of bulbs × No. of days = Total units or kW hr.

20 W × 5 hr × 7`0 × 300 = 3,00,000 W, which is **3000 units of electricity**.

It is appropriate here to calculate the quantity of coal required to generate 3000 units of electricity. 0.538 kg coal is required to produce 1 unit of electricity. Hence, the total quantity of coal required to produce 3000 units of electricity is 3000 ×0.538 kg = **1614 kg.**

Carbon reduction through this measure is based on the calculation that 1 kg coal emits 2.86 kg of CO_2.

Hence CO_2 emitted by 1614 kg of coal (1614 × 2.86) = **4616 kg.**

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The real carbon reduction value can be assessed if the energy consumption of 100 LED lights is compared with that of 100 incandescent bulbs. One incandescent bulb consumes 90 units of electricity. Therefore, 100 bulbs consume 9000 units.

But 100 LED tubes consume only 3000 units of electricity. Replacement value in favour of carbon emission is (9000 – 3000) = 6000 units of electricity.

Coal required for generating 6000 units of electricity (6000 × 0.538 kg) = 3228 kg.

Based on the calculation that 1 kg coal emits 2.86 kg CO_2, the total quantity of CO_2 emitted by 3228 kg coal (3228× 2.86) = 9232 kg or **9.2 tonnes**.

Carbon footprint reduction through installation of 100 LED lamps per year is 9232 kg or **9.2 tonnes of CO_2.**

Solar Energy for electricity

Solar energy is the most feasible and viable green energy available around the globe. Its viability is very high in tropical countries like India. **Five** solar panels, each measuring 4 × 3 ft, were installed on the terrace of the college building where light intensity is very high. Each panel produces 12 W of electricity. However, the panels will function effectively only for about 10 months per year (300 days). Monsoon and clouds prevent sun's rays for more than 2 months. At this rate, the 05 panels produce electricity to the tune of 12 W × 05 × 300 days = **18,000 W**, which is equivalent to **18** units of electricity per year. This solar power PV power system is connected to the college grid via a solar string inverter. The 18- kW power generated per year from this solar panel, the coal equivalent (18 × 0.538) = **9.684 kg coal.** The CO_2 equivalent is 9.684 × 2.86 = **27.69 kg.**

Solar energy for Water heater

In campus there is women's Hostel in which consisting 16 rooms. Each room 3 girls are living togetherly. If we use a geyser of 10 liters capacity, it has power consumption 1500 watt per hour. Therefore 16X1500 = 24000 w hr is required.

Total power consumed in year is 24 kwhr X 300 days = 7200 kwhr or 7200 units/year

Instead of this we have used solar water heater for women's Hostel. Therefore,

Coal required for generating 7200 units of electricity (7200 × 0.538 kg) = 3873.6 kg.

Based on the calculation that 1 kg coal emits 2.86 kg CO2, the total quantity of CO_2 emitted by 3873.6 kg coal (3873.6 × 2.86) = 11078.49 kg or **11.07 tonnes**.

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Carbon footprint reduction through installation of Soalr Water heater per year is 11078.49 kg or **11.07 tonnes of CO_2.**

Campus Plantations:

Our total campus area is 113313 sq. M. out of which plantation covered area 16032.54 sq. M. Generally trees absorb CO_2 and emits Oxygen, which is very useful for us. Therefore this plantation plays important role in reduction of CO_2 from environment.

Suggestions & Recommendations:

- Increases the use of CFL/LED lamps
- Use the solar inverter.
- Use the instruments which operates on solar energy
- Increase the number of plants which reduces the greenhouse effect.

Coordinator (IQAC)

Principal
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