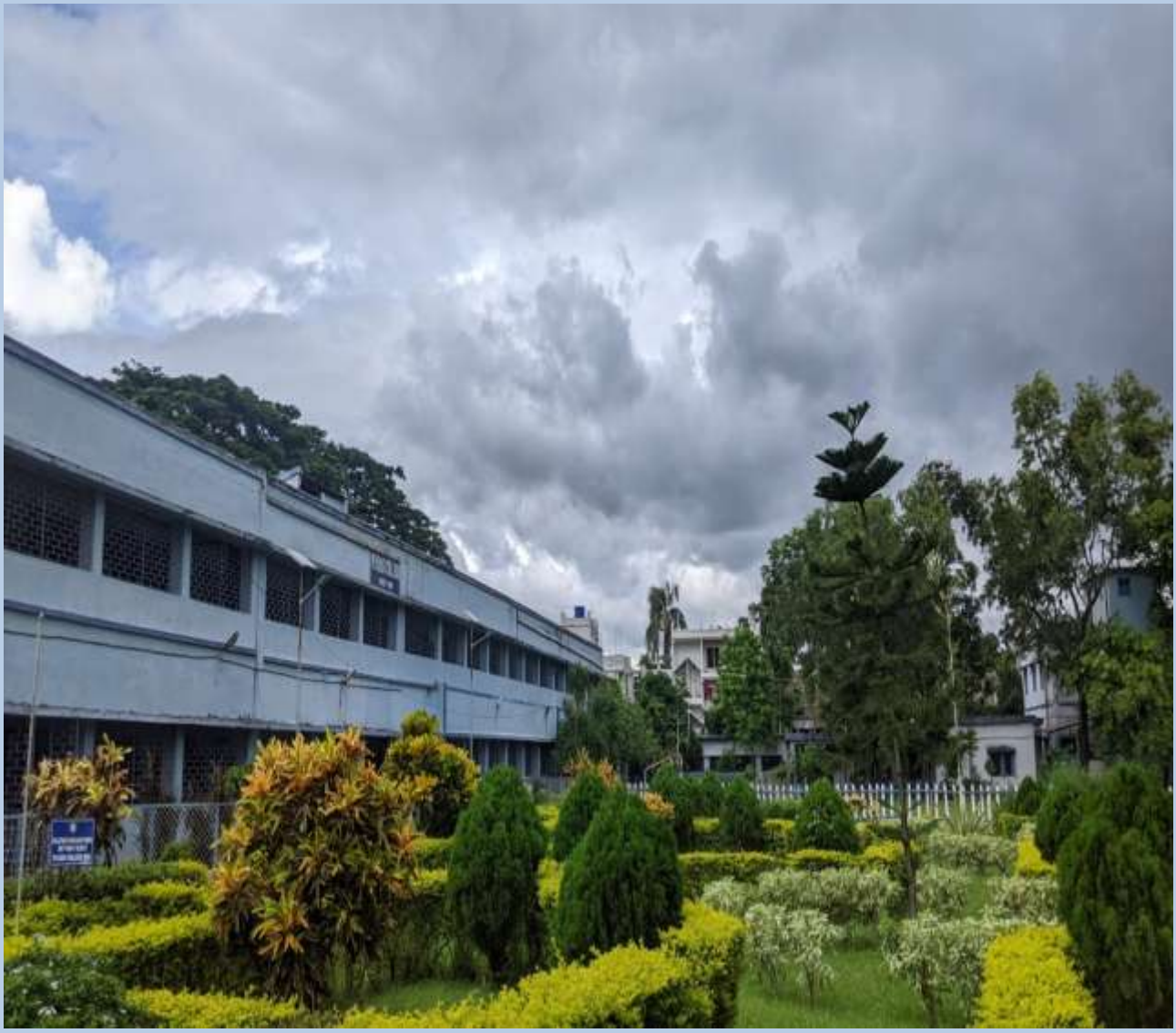
Energy Audit Report for 2020-2021

P N DAS COLLEGE

Affiliated to West Bengal State University (Accredited by NAAC)

Santinagar, Palta, Kolkata-743122



Prepared by

West Bengal Renewable Energy Development Agency (WBREDA), Kolkata

West Bengal Renewable Energy Development Agency (WBREDA)

Department of Non-Conventional & Renewable Energy Sources, Govt. of West Bengal
Bikalpa Shakti Bhawan, J-1/10, EP Block, Sector-V, Salt Lake Electronics Complex, Kolkata - 700091.

Memo no: WBREDA//109/MISC/148 Date: 17 / 08 /2021

To
The Principal,
P.N.Das College,
Palta, Dsitrict-24 Parganas (N)

Subject: Energy Conservation practices: 2020-2021

Sir,

With reference to the above subject and visit at your campus , following observations may please be noted for your kind perusal.

Observations:
Through energy audit, it is observed that from energy consumption point of view maximum energy consumption takes place from 200 nos of ceiling fans, which are in operation for 140 days in a year.

Recommendations:
1. The replacement of existing ceiling fans which has been started in phase manner should be continued.
2. To reduce electricity bill further, a 20 kWp (shadow free roof space requirement will be 2400 sq. ft.) roof top grid-connected solar power plant may be installed in Net Metering / Net Billing arrangements.

Yours faithfully,
17/08/2021
Divisional Engineer-II, WBREDA

1. **General Information**

Name : **P N Das College**

Address : **Santinagar, Palta, P.O.-Bengal Enamel, Dist.-North 24 Pgs,Pin-743122,West Bengal**

Mail Id : pndc.principal11@gmail.com Website : https://www.pndascollege.in/

Phone Number : **+033 2592 1327**

Latitude and Longitude : **22°47'2.06"N & 88°22'46.39"E**

Available area of the facility : **4.285 acres**

Population:

Teaching and non-teaching staff : **53** Students : **894**

Facilities

a. Total built-up area around **17340.75** square meters.

b. Numerous classrooms (**20**) and office rooms (**4**) are available for variety of the classes.

c. Adequate number of sanitary facilities (**13**) separate for male candidates and female candidates, staff members (**1**), students (**4**) are available.

d. Number of office rooms (**4**), study rooms (**20**) prevail in the college building.

e. **Two** library buildings are available with a collection of lot of books and magazines.

f. **One** tube well (**6---650 ft**) and **3** wells with submerged pump is available in the campus to cope up with water shortage in the campus.

g. **Three** water cooler of **250L** each and **6** water purifiers are available inside college premise.

h.Four solar street lights of **48 kwh** are available in the campus.

3. Steps Taken and Mechanism

a. The college adapts health, safety, and an environment based codes of practice and relevant guidance and complies with legislation.

b. The college has planned for Solar panel systems on the campus.

c. It uses Green Generator

d. Introduced a single switch for each class rooms

- **Energy Usage**

  Energy Source

  - Major source of energy usage in campus is from electric kettle, microwave at canteen and diesel from transportation.
  - 9847 is the amount of diesel electricity expenses.
  - 4 solar street light installed in college (48 kwh energy use/month),

  Energy Consumption:

  - LED and incandescent bulbs are used in campus, 14 led bulbs(5 hrs/day/month),energy use from CFL-204 kwh/month, 2 incandescent bulb(5 hrs./day for 25 days), and 256 led tube present in college, led bulb(total energy usage-9.28 kwh/month),incandescent bulb(9.23 kwh/month), led tube(368.64 kwh/month), 17 street light run for 8 hrs./day/month, energy use by each bulb(50 watt*8 hrs.*30 days=12 kwh/month per bulb), (165 pcs ceiling fan-80 watt each,approx 100 kwh/month due to lockdown),(2 pcs wall fan-1000 watt each,144 kwh/month),(41 pcs small wall fan-50 watt each, no use due to lockdown).
  - (5 pcs exhaust fan-40 watt each, approx. 15 kwh/month)-total all appliance run for 6 hrs./day for 26 days i.e. total 259 kwh/month, Principal's room(2 pc ac- run maximum 5 hrs. on weekdays-252 kwh/month), office room(2 pcs AC maximum run for 4 hrs. on weekdays-201.6 kwh/month) teachers room 2 pcs AC maximum 4 hrs. on weekdays but not used at all due to lockdown as no teacher came to college, IQAC room 2 pcs AC 2 hrs. for 2 days /month assuming- not used, Auditorium 4 pcs AC 4 hrs. and 2 days in a month-not used at all at all Fridge 2 pcs not used due to lockdown, Aqua guard 5 pcs 27 kwh/month, Motor 3 pcs(1 HP-6.5 kwh/month,2 HP-13 kwh/month,0.5 HP-3.25 kwh/month) , Printer 9 pcs, Laptop 7 pcs 36.4 kwh/month, Projector 13 pcs not used due to lockdown, Router 8 pcs 6.24 kwh/month, Speaker 12 pcs not used due to lockdown, Camera 16 pcs not used due to lockdown,10 desktop computer 8 hrs./day for 12 days due to lockdown 192 kwh/month, Xerox or photocopy machine 2 pcs 4 hrs./day for 12 days 89.28 kwh/month, Cooling apparatus not used at all due to lockdown ,14 electrical equipment's available in lab no use due to lcokdown,1 microwave of 1000 watt present in canteen no use due to lockdown,3 television in hostel no energy use due to lockdown, (Other energy use items include LED metal 2 pcs 50 watt 1 hr./day for 1 day 0.1 kwh,Led panel light 24 pcs 9 watt 4 hrs./day for 2 days 1.728 kwh,LED panel light 10 pcs 15 watt 4 hrs./day for 2 day 1.2 kwh)

Energy Conservation:

- Solar Street Lights have been installed.
- LDR Lights are used.
- A common on/off switch has been fixed outside each classroom,.
- Refrigerator and ACs are operated according to need and time basis.
- Computer are kept in power-saving mode when remains not in use,
- AC run for maximum 5 hrs., Printers run for maximum 2 hrs.
- Awareness about energy conservation is done among the stakeholders through posters and orientation.

Recommendations

Inverter should be installed for energy consumption during sudden load-shedding, switch –off drills can be installed, install rooftop solar plant, one energy audit yearly can be done.

Questionnaire for Energy Management Audit

1. List out ways of energy usage in the campus. (Electricity electric stove, kettle, microwave, incinerator; LPG, firewood, Petrol, diesel and others).

   Electric kettle, Microwave at Canteen, Diesel

2. Electricity bill amount for the last three years.
   2016-2017: Rs. 213197

   2017-2018: Rs: 215622

   2018-2019: Rs: 200263

   2019-2020: Rs. 155296

   2020-2021: Rs. 97105

3. Amount paid for LPG cylinders for the last three years. **College does not buy any LPG Cylinders. Canteen personnel arrange it. Monthly One cylinder is used on an average.**

4. Any other payments towards energy related matters for the last three years in the campus:

Environment Related Expenditure						
Session	Gardening including Gardener's Salary	Ground Dev/ Cleaning Ch.	NSS Activities (Regular)	Electricity EXP.	Others	**Total**
20-21	40820		690	97105		**138615**
19-20	82150	31500	6160	155296		**275106**
18-19	69197	41000	18359	200263	9000	**337819**
17-18	110681	Year	26694	215622		**352997**
16-17	64513	45000	33979	213197	24500	**381189**
Total	**367361**	**117500**	**85882**	**881483**	**33500**	**1485726**

5. Weight of firewood used per month and the amount of money spent? Also mention the amount spent for petrol/diesel/others, if any?

Expenses for Diesel: (The amount is included in Electricity Expenses)

Year	**17-18**	**18-19**	**19-20**	**20-21**
Expenses on Diesel	**16766**	**18504**	**45721**	**9847**

6. Are there any energy saving methods employed in your college? If yes, please specify.
Yes, a) Solar lights have been installed

b) A common on/off switch has been fixed outside each class room

c) LED bulbs are used

d) AC's are operated according to need basis and time basis.

7. What are the types of bulbs used in campus?

Ans:- **LED, Incandescent.**

8. Provide a list of number of bulbs each type.

Ans:-

1. LED bulb	**14 pcs**
2. Incandescent bulb	**2 pcs**
3. LED Tube	**256 pcs**

9. Provide the total energy utilization by each types of bulb per month

1. LED bulb (5hrs/day for 12 days)	**9.28 kwh/month**
2. Incandescent bulb (5hrs/day for 12 days)	**9.23 kwh/month**
3. LED tube (6hrs/day for 12 days)	**368.64 kwh/month**

10. How many CFL bulbs has your college installed? Mention use

(Hours used/day for how many days in a month)

Ans:- **Street light- 17 pieces. (8hrs/day for 30 days.)**

11. Energy used by each bulb per month?

Ans:- **50 Watt *8hrs *30days= 12 kwh/month per bulb.**

12. How many LED bulbs has your college installed? Mention use

(Hours used/day for how many days in a month)

Ans:- **14 LED. (5hrs/day for 30 days)**

13. How many Incandescent (tungsten) bulbs has your college installed? Mention use

(Hours used/day for how many days in a month)

Ans:- **2 Incandescent (5hrs/day for 25 days)**

14. How many fans installed in the campus? Mention use

(Hours used/day for how many days in a month)

Ans:-

Ceiling fan	**165 pcs**
Wall fan (big)	**2 pcs**
Wall fan (small)	**41 pcs**
Exhaust fan	**5 pcs**

(6hrs/day for 26 days)

15. Energy used by all fans per month?(kwh)

Ceiling Fan(165pcs-80watt each)	**Approx. 100 kwh/month (Due to lockdown)**
Wall fan(big) (2pcs-1000watt each)	**144 kwh/month**
Wall fan (small) (41pcs-50 watt each)	**Negligible due to lockdown**
Exhaust fan (5pcs-40watt each)	**Approx. 15 kwh/month**
Total	**Approx. 259 kwh/month**

16. How many air conditioners are in use in the campus? Mention time of their usage

(Hours used/day for how many days in a month)

Principal's Room	**2pcs(maximum 5hrs on weekdays)**
Office room	**2 pcs (maximum 4hrs on weekdays)**
Teachers room	**2 Pcs(maximum 4hrs on weekdays)**
IQAC room	**2pcs(Only at the time of meeting)(assuming 2hrs for 2days in one month)**
Auditorium	**4 pcs (Occasionally for conducting any programme)(assume 4hrs and 2 days in a month)**

17. Energy used by all air conditioners per month?(kwh) (**Calculated for 12 Days/month Due to Pandemic situation**)

Principal's Room	**252 kwh/month**
Office room	**201.6 kwh/month**
Teachers room	**Not used due to lockdown**
IQAC room	**Not used due to lockdown**
Auditorium	**Not used due to lockdown**

18. How many electrical equipments including weighing balance used in the campus?

Mention time of their usage (Hours used/day for how many days in a month)

Fridge	**2pcs**
Aquaguard	**5pcs**
Motor	**3pcs(1HP,2HP,0.5HP)**
Printer	**9pcs**
Laptop	**7pcs**
Projector	**13pcs**
Router	**8pcs**
Speaker	**12pcs**
Camera	**16pcs**

19. Energy used by such electrical equipment per month?(kwh)

Ans:-

Fridge	**Not used due to lockdown**
Aqua guard	**27 kwh/month**
Motor	**1hp= 6.5kwh/month, 2hp= 13kwh/month, 0.5hp=3.25kwh/month**
Printer	**46.8kwh/month**
Laptop	**36.4kwh/month**
Projector	**Not used due to lockdown**
Router	**6.24kwh/month**
Speaker	**Not used due to lockdown**
Camera	**Not used due to lockdown**

20. How many computers were in use in the campus? Mention time of their usage

(Hours used/day for how many days in a month)

Ans:- **10 pcs Desktop. (8hrs/day for 12days) (due to lockdown)**

21. Energy used by all computers per month?(kwh)

Ans:- **192 kwh/month.**

22. How many photocopier machines are installed and in use at present in the campus?

Mention time of their usage (Hours used/day for how many days in a month)

Ans:- **2pcs and all are in use. (4hrs/day for 12 days)**

23. Energy used by all photocopier per month?(kwh) Mention time of their usage

(Hours used/day for how many days in a month)

Ans:- **89.28 kwh/month (4hrs/day for 12 days)**

24. How many cooling apparatus are present in the campus? Mention time of their usage (Hours used/day for how many days in a month)

Ans:- **Not used due to lockdown**

25. Energy used by all cooling apparatus per month? (kwh) Mention time of their usage

(Hours used/day for how many days in a month)

Ans:- **NA**

26. How many inverters did your college install? Mention time of their usage

(Hours used/day for how many days in a month)

Ans:- **None**

27. Energy used by each inverter per month?(kwh)

Ans:- **N.A.**

28. How many electrical equipment are installed in different labs (methods that are not included in the above calculations) in the campus? Mention time of their usage (Hours used/day for how many days in a month)

Ans:-

Chemistry lab	**2**
Physics lab	**12**

29. How many electrical equipments are available in all labs in the campus?

Ans:- **14**

30. Energy used by all equipments together per month?(kwh)

Ans:- **Not used due to lockdown**

31. How many heaters used in the canteen of your college? Mention time of their usage (Hours used/day for how many days in a month)

Ans:- **1 Micro oven(1000 watt)**

32. Energy used by each heater per month?(kwh)

Ans:-**Not used due to lockdown**

33. No. of Street lights in your college?

Ans:- **17 CFL, 4 Solar.**

34. Energy used by all street lights per month? (kwh)

Ans:- **CFL= 204kwh, Solar=48kwh**

35. No. of televisions in your college and hostels?

Ans:- **3 Televisions.**

36. Energy used by all TV's per month? (kwh)

Ans:- **None. (TVs are not used)**

37. Any other items that uses energy(Please write the energy used per month) Mention time of their usage (Hours used/day for how many days in a month)

Ans:-

Items	**No and wattage**	**Kwh/month**
LED metal	**2pcs-50 watt(assume 1hr/day for 1 day)**	**0.1kwh**
LED Panel Light	**24pcs-9 Watt(assume 4hr/day for 2day)**	**1.728kwh**
Led panel light	**10pcs-15 watt(assume 4hr/day for 2 day)**	**1.2kwh**

38. Does the campus have any alternative energy sources/nonconventional energy sources?

(photovoltaic cells for solar energy, windmill, energy efficient stoves etc.) Specify.

Ans:- **Yes. 4 solar street lights.**

39. Do you run "Switch Off" drills at college?

Ans:- **No**

40. Are your computer and other equipment put on power-saving mode?

Ans:- **Yes when it remains idle.**

41. Does your machinery (TV, AC,Computer,Weighing balance, printers etc.) runs on stand by modes of the time? If yes how many hours?

Ans:- **TV is not used, AC's are run for maximum 5 hours, Printers are used maximum 2 hours**

36. What are the energy conservation methods adapted by your college?

Ans:- **(i) Solar lights have been installed**

(ii) a single switch has been set up outside each class room.

(iii) LED lights have been installed in the campus

(iv) AC, Coolers etc. are used as per restricted duration.

37. Is there any public awareness systems informing the necessity of energy conservation in the campus?

Ans:- **Postering in different places, Awareness among the students at the time of orientation.**

38. Write a note on the Methods/practices/adaptations by which you can reduce the energy use in your college campus in future.

Ans:- **Our main aim in this regard is to install a rooftop solar plant for sufficient energy supply**