

ENERGY AUDIT REPORT



SESSIONS:2020-21 &2021-22



PATTAMUNDA COLLEGE PATTAMUNDAI

ENERGY AUDIT REPORT



SESSIONS: 2020-21 & 2021-22



PATTAMUNDA COLLEGE PATTAMUNDAI

PREFACE

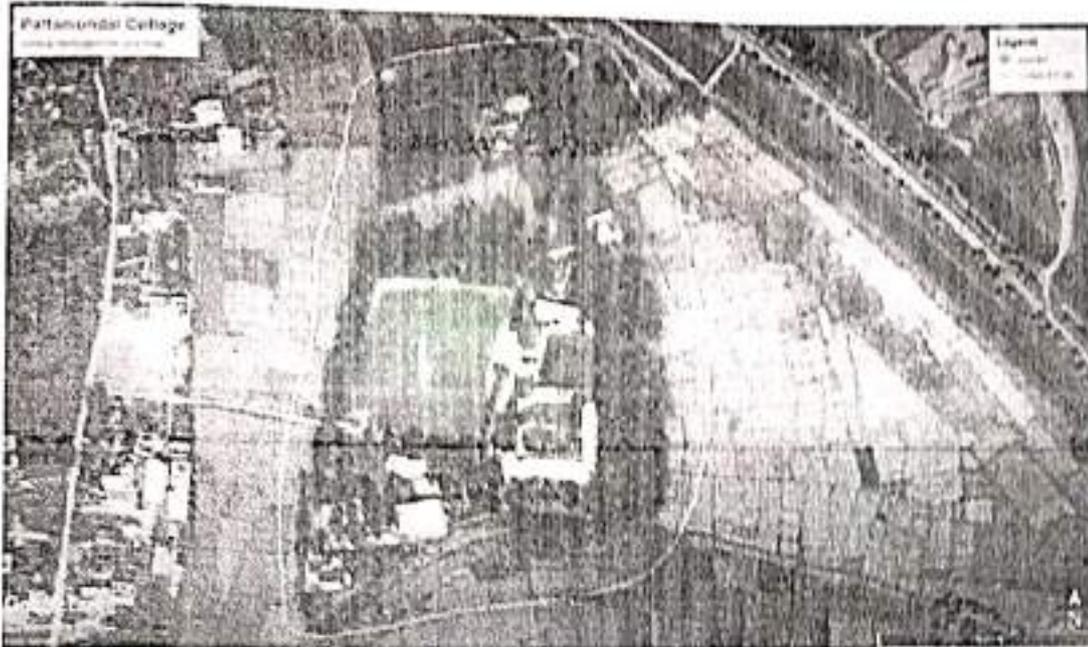
The energy audit of Pattamundai College was undertaken for the session 2020-21 & 2021-22 to assess the quantitative and qualitative aspect of energy data collection for energy audit. The audit team was headed by S.D.O., TPCODI., Pattamundai. The energy audit survey was completed by help of Physics department of the institution. This audit was over sighted to inquire about convenience to progress the energy competence of the campus. To drop of energy utilization whilst cultivate or humanizing comfort, health and safety were of prime interest of audit team. This audit required to recognize mainly energy proficient appliances. Besides, several each day processes concerning common appliances have been provided which facilitate reducing the energy expenditure. All data was collected from each classroom, laboratory, office, auditorium etc for the audit work. The work is completed by considering, how much tubes, fan, A.C.s, electronic instruments, etc are used in each room and part of the campus. The audit team also considered the aspect of Green Energy in the campus. The valuable recommendations were given to improve the energy utilization in the campus in future.

Brief introduction of the College

The genesis of Pattamudai College dates back to the sixties of the last century when its foundation was laid on 1st June, 1967, though it started functioning since 5th July of 1970. This locality, a breadbasket of the district turned proverbially backward both socially and economically as it became the continual haunt of natural calamities like cyclone, flood and drought, as it is even now, and there was no scope at all for higher education, the obvious catalyst for socio-economic transformation. The only college at Kendrapara, some 20 kms away and logistically disadvantageous for access then, had limited scope to cater to the academic need of the aspiring young college-goers of this vast locality. At this crucial juncture, a team of education lovers and activists starting with some college students of this land in Cuttack city, to the local activists and enthusiasts from the social gentry, came forward for establishment of a college for the benefit of all concerned.

Launched as an Arts college with only 128 students, it has grown to its present premier position with two other streams of science and commerce and 1475 students on its rolls with 14 programs at UG level.

With an eventful history of 50 years and a picturesque sprawling campus of 14.6 acres, it is indeed a testimony to the dream and sacrifice of our predecessors. Its alumni, globally positioned today are its identity markers and this institution has been playing a pivotal role in development of its satellite localities. Affiliated permanently to Utkal University, this college has been listed under 2(F) and 12(B) of the UGC Act vouchsafing its academic standard and administrative acumen. The addition of new buildings, hostels, library, laboratories and playground over the years has not only given a new dimension to its infrastructure but also has facilitated the expansion of curricular and extra-curricular horizons. Quite ahead of its contemporaries, it has adopted new technology of ICT facilities, library automation, Wi-Fi campus, online classes, green initiatives, etc by adopting the modern change to meet the expectation of its stakeholders.



Location of Pattamundai College

Objective of Energy Audit

The objective is to acquire and analyses the data to find the possible ways of energyConservation.

It will be useful to calculate the amount of power consumed and wasted in a network ofspecified location.

To find and implement the solutions that is acceptable and feasible.

Scope:

- ✓ Data Collection - walk through audit.
- ✓ Facility Description - characterize building usage, occupancy, size and construction.
- ✓ Component Inventory - detailed components list including utility, life and efficiency.
- ✓ Energy Conservation Measures – identify and evaluate opportunities for cost savings and economic returns.
- ✓ Renewable /Distributed Energy Measures – evaluate economic viability of various renewable/distributed energy technologies.
- ✓ Energy Purchasing and Procurement Strategies – perform utility tariff analysis and assess potential for savings from energy procurement strategies.
- ✓ Awareness – to create awareness regarding efficient energy consumption and to provide with deserving rewards.

Vision of the College

- To make higher education qualitative and value based for the socio-economic transformation of the nation.
- To instill a sense of discipline and morality among the student's community for the making the students socially responsible citizens.

Mission of the College

- To grow into an institution of excellence and exemplary at the university level
- To provide literary, scientific, professional and technical education to the aspiring rural youth at a minimum cost.
- To be recognized as an institution with proven capacity to provide quality education in Science, Commerce & Humanities.
- To create symbiotic relationship with the society to meet the changing needs
- To introduce self-financing courses in multidisciplinary area.
- To adopt continues measures to improve the quality of the programme.
- To provide need-based career-oriented courses to the needs of the society
- To involve the Alumni for all round development of the college

NAAC Accreditation:

Year: 2006

Grade: B+

Courses offered:

The institution offers following programmes which include the different courses as given in the table below.

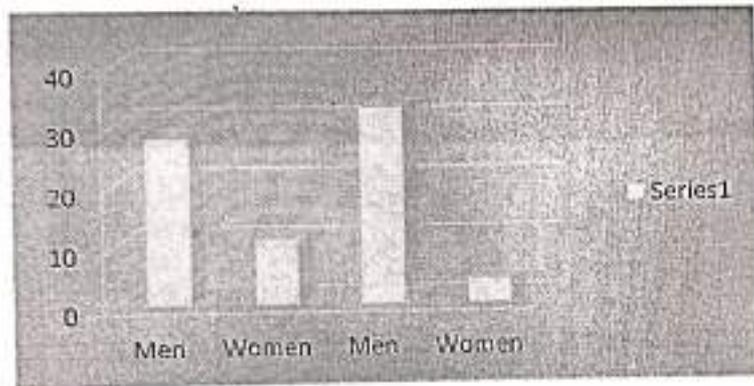
PROGRAMME OFFERED	COURSES OFFERED
Bachelor of Arts	Economics
	Education
	English
	History
	Odia
	Philosophy
	Political science
	Sociology
Bachelor of Science	Botany
	Chemistry

Bachelor of Commerce	Mathematics
	Physics
	Zoology
	Commerce

Strength of Staff (Teaching/ Non-teaching):

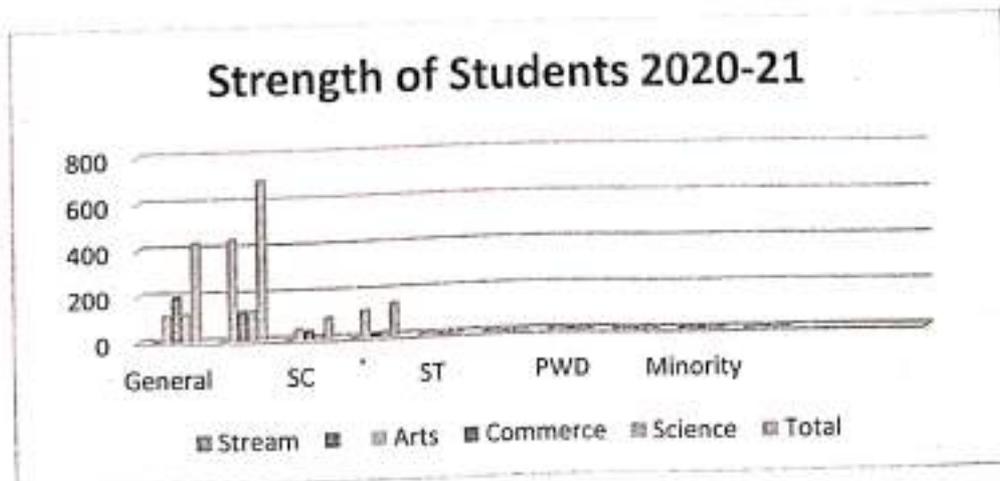
Presently this institution runs with 76 Nos of both teaching and non teaching staff members whose continuous effort makes this institution a glorious one. Among the total staff, detailed analysis of men and women of both the categories are given.

Teaching Staff		Non-Teaching Staff	
Men	Women	Men	Women
28	11	33	4

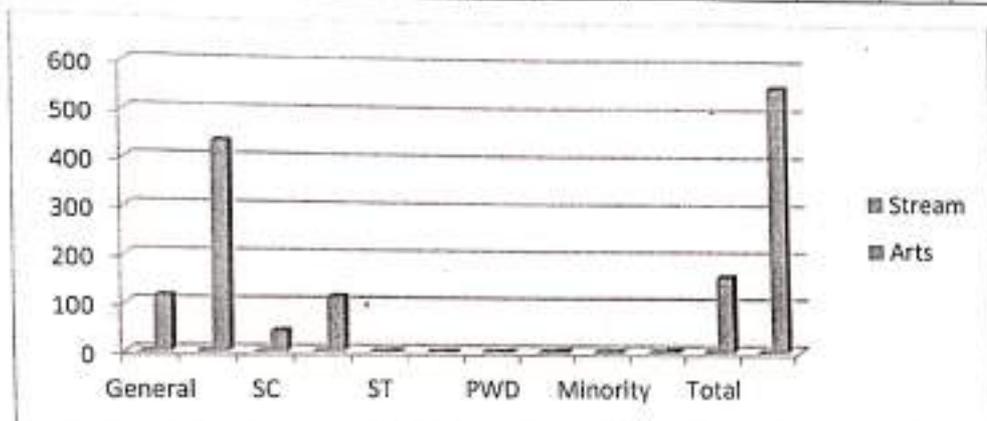


Strength of Students:

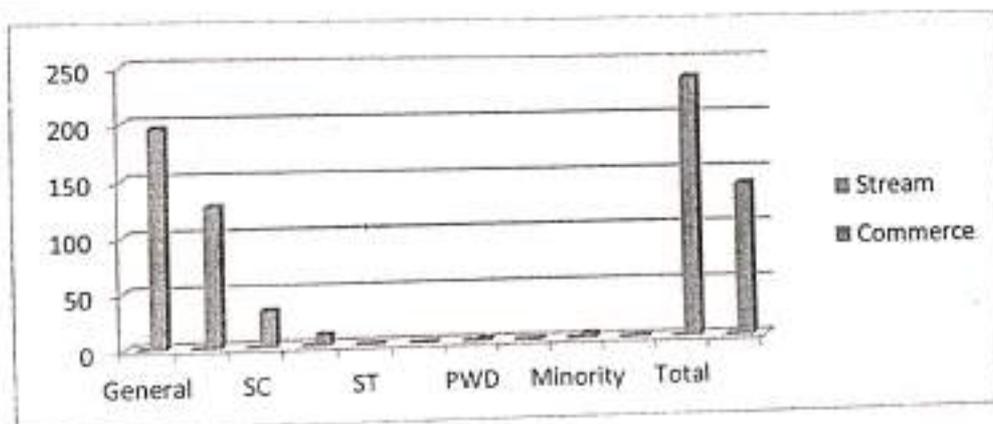
Year	Stream	General		SC		ST		PWD		Minority		Total		Total
		Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	
2020-21	Arts	115	438	43	115	01	01	01	02	00	03	160	559	719
	Commerce	196	126	33	10	00	00	02	00	05	02	236	138	374
	Science	119	127	14	19	01	01	00	00	00	00	134	147	281
	Total	430	691	90	144	02	02	03	02	05	05	530	844	1374



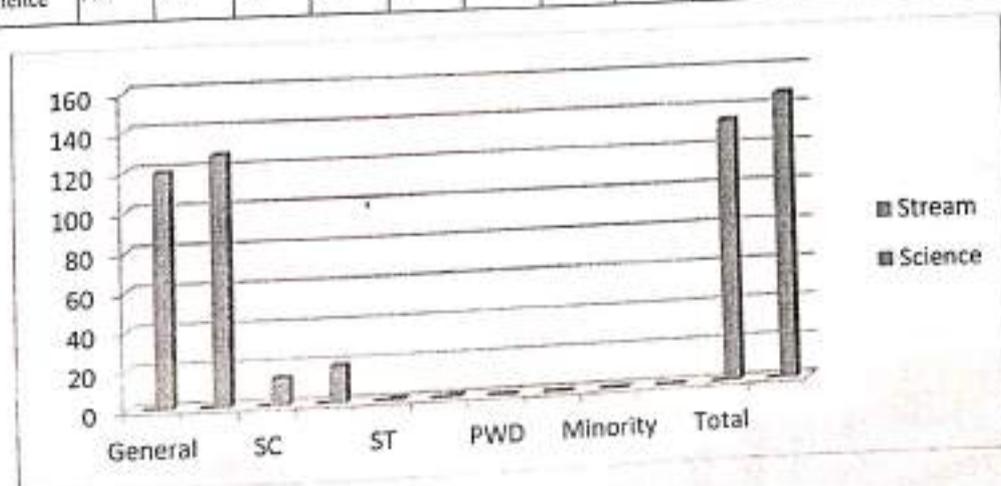
Year	Stream	General		SC		ST		PWD		Minority		Total		Total
		Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	
2020-21	Arts	115	438	43	115	01	01	01	02	00	03	160	559	719



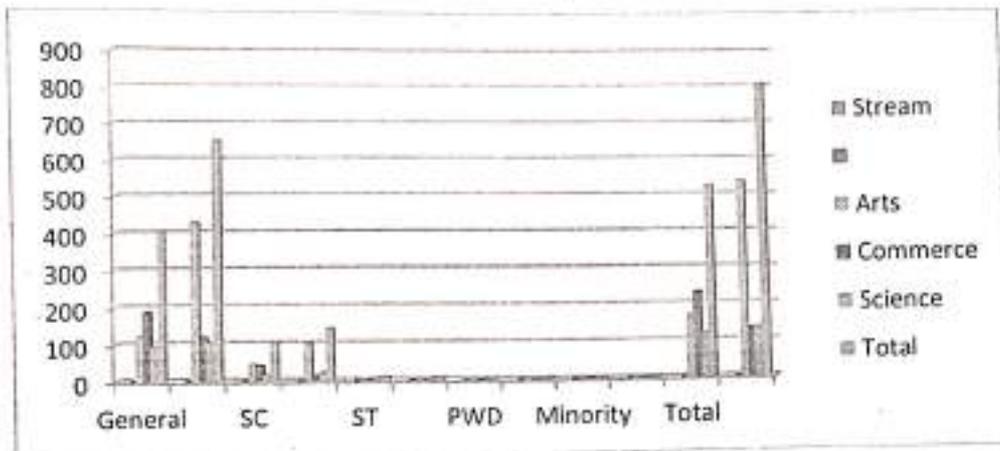
Year	Stream	General		SC		ST		PWD		Minority		Total		Total
		Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	
2020-21	Commerce	196	126	33	10	00	00	02	00	05	02	236	138	374



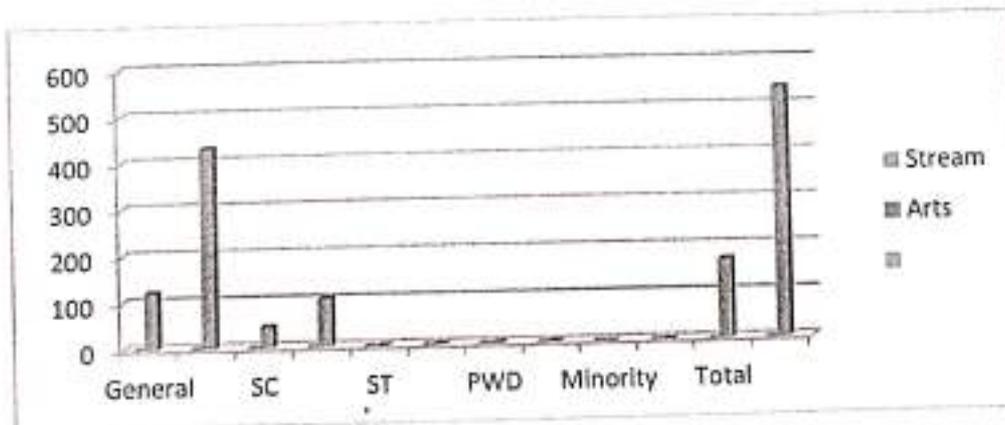
Year	Stream	General		SC		ST		PWD		Minority		Total		Total
		Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	
2020-21	Science	119	127	14	19	01	01	00	00	00	00	134	147	281



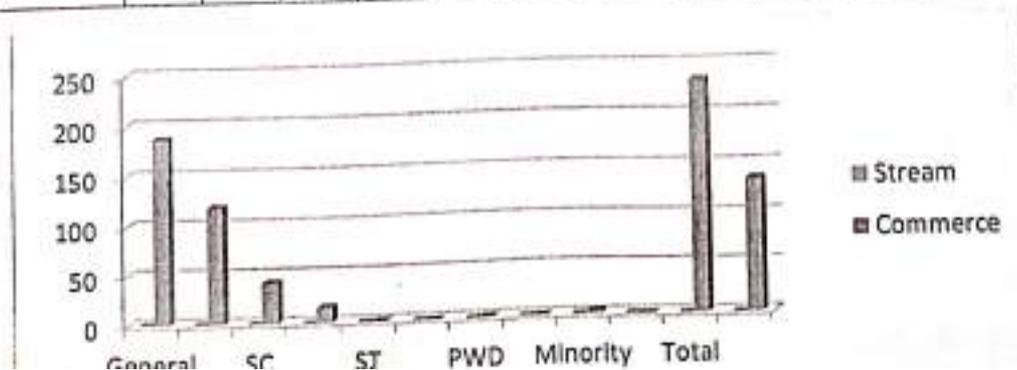
Year	Stream	General		SC		ST		PWD		Minority		Total		Total
		Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	
2021-22	Arts	122	431	46	104	01	02	02	02	00	01	171	540	711
	Commerce	187	119	42	16	01	00	01	00	03	00	234	135	369
	Science	95	104	18	23	10	09	00	00	00	00	123	136	259
	Total	404	654	106	143	12	11	03	02	03	01	528	811	1339



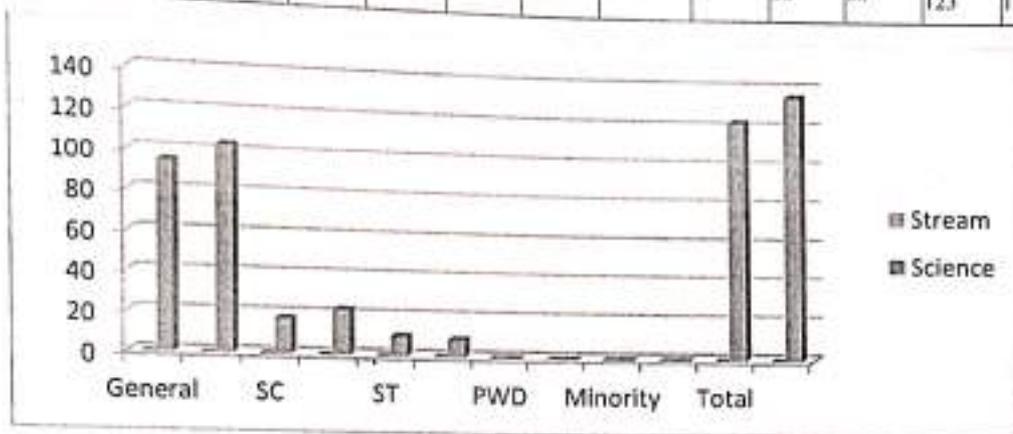
Year	Stream	General		SC		ST		PWD		Minority		Total		Total
		Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	
2021-22	Arts	122	431	46	104	01	02	02	02	00	01	171	540	711



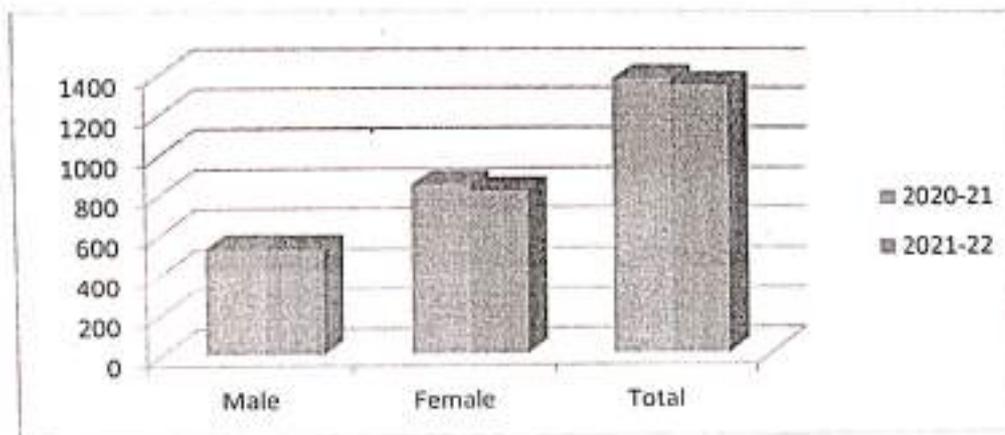
Year	Stream	General		SC		ST		PWD		Minority		Total		Total
		Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	
2021-22	Commerce	187	119	42	16	01	00	01	00	03	00	234	135	369



Year	Stream	General		SC		ST		PWD		Minority		Total		Total
		Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	
2021-22	Science	95	104	18	23	10	09	00	00	00	00	123	136	259



Year	Male	Female	Total
2020-21	530	844	1374
2021-22	528	811	1339



Physical structure (Area/ Built up area/ No. of class rooms/ libraries/ administrative rooms/ laboratories/ auditoriums/ conference rooms/ staff common rooms/ students common rooms/ hostels/ canteens/ others)

The institution has a land area of 14.6 acres of its own which is surrounded with pucca boundary fully to check the free access of the trespassers to overcome any kind of huddles in its academic atmosphere. Out of this, the built up area covers 10299.23m² which includes the physical structures given in the list below to cater the need of the students as well as all other stakeholders. The rest part of the total area covers a huge playground with full of green lands of different plants. Different gardens inside the campus add to its beautification in manyfolds.

Details of physical structures	
Physical Structure	Area/No
Total Area	14.6 Acre
Built Up Area	10299.23 m ²
Class Rooms	32
Libraries	01
Administrative rooms	05
Laboratories	04
Auditoriums	01
Conference rooms	01
Staff common rooms	01
Students common rooms	02
Hostels	03
Canteens	01
Guest House	01
Post Office	01
Staff Quarter	02
Stadium	01
Security Rooms	03
Principal Quarter	01
Cycle Stand	01
Examination Hall	01
Lavatories	14
Gymnasium	01

Construction Area in Sqft.		
Specific area	Size in ft	Total area in ft ² .
Staff Common Room to Boys Lavatories	2(200 X 28)	11200
Administrative Block	2(125 X 28)	7000
Zoology Department	89 X 37	3293
Examination Hall	2(115 X 25)	5750
Room No-01 to 06	145 X 26	37770
Room No-26 & 27	64 X 27	1727
Library Hall	2(137 X 38)	10412
Chemistry, Botany & Math Laboratory	100 X 68	6800
Boys Hostel	92 X 67	6164
Principal Quarter	51 X 34	1734
Guest House	62 X 56	3472
Canteen	34 X 23	782
Old Chemistry Block	87 X 42	3650
Post Office	36 X 46	1656
New OBC Hostel	3(94 X 52)	14664
Ladies Hostel	2 (112 X 90)	20160
Staff Quarter	79 X 35	2765
Cycle Stand	35 X 18	630
Stadium	72 X 31	2232
Security 3 Nos. Room	10 X 12.5	125
	25 X 10	250
	10 X 12.5	125
Total		110860 ft² =10,299.23 m²

Auditing for Energy Management

Energy conservation is an important aspect of campus sustainability which is also linked with carbon foot print of the campus. Energy auditing deals with the conservation and methods to reduce its consumption related to environmental degradation. It is therefore essential that any environmentally responsible institution examine its energy use practices.

METHODOLOGY ADOPTED

The methodology adopted to conduct the Energy Audit of the college had the following components

Onsite Visit

Three day field visit was conducted by the Energy Audit Team. The key focus of the visit was on assessing the status of the energy consumption of the college and energy conservation strategies etc.

Group Discussion

The Group discussions were held with the staff members, students and the management focusing various aspects of Energy Audit. The discussion was focused on identifying the attitudes and awareness towards environmental issues at the institutional and local level.

Energy management

With the help of teachers and students, the audit team assessed the energy consumption pattern and waste generation, disposal and treatment facilities of the college. The monitoring was conducted with a detailed questionnaire survey method.

AUDIT STAGE

The Energy auditing began and energy conservation strategies etc. Different facilities at the college were monitored, different types of appliances and utilities (lights, taps, toilets, fridges, etc.) were determined as well as measuring the usage per item (Watts indicated on the appliance or measuring water from a tap) and identifying the relevant consumption patterns (such as how often an appliance is used) and their impacts. The staff were interacted to get details of usage, frequency or general characteristics of certain appliances.

Energy Audit

A detailed data of consumption of electricity of the institution for the sessions 2017-18, 2018-19 and 2019-20 are given elaborately in table separately. The consumption of electricity is varied with the addition / modification of different items/ instruments. The institution is equipped with modern / updated electric appliances such as 5star rated instruments LED tube and bulbs to reduce the energy consumption. It also tried to add solar energy system to further save and use of green energy.

Data Sheet for Energy Audit of the Session: 2020-21

Room No./ Name	Electrical device/ Items (Bulbs: CFL/ Incandescent/ CFL; AC, Fan/ Computer, Instruments, Other appliances)	Number	Power	Usage Time (Hr/Day)
NAAC	Fan	2	140	5
	LED	3	36	5
	Desktop	2	440	5
	Laptop	1	150	5
	AC	1	1500	2
	Printer	2	440	5
Principal's Office	Fan	3	210	7
	LED	3	36	7
	Laptop	1	150	7
Principal's Rest Room	Fan	1	70	5
	LED	3	36	5
	Desktop	1	220	5
	CCTV DVR	1	220	24
	AC	1	1500	2
	Printer	1	220	5
	Refrigerator	1	125	24
Account Section	Fan	2	140	7
	LED	4	48	7
	Desktop	1	220	7
	Printer	2	220	5
Administrative Office	Fan	2	140	7
	LED	8	96	7
	Desktop	1	220	7
	Printer	1	220	5
Office Veranda	Tube Light	4	48	5
Staff Common Room	Fan	8	560	7
	LED	16	240	7
	AC	3	4500	3
	Water Purifier	1	30	24
Examination Section	Fan	8	560	5
	Tube Light	9	360	5
	Desktop	1	220	5
SAMS	Fan	1	70	5
	Tube Light	2	80	5
	Desktop	3	220	5
	Xerox	1	350	5

Education Seminar	Fan	3	210	5
	Tube Light	3	120	5
	Laptop	1	150	5
Economics Seminar	Fan	3	210	5
	Tube Light	3	120	5
	Laptop	1	150	5
	Printer	1	220	5
Sociology Seminar	Fan	2	140	5
	Tube Light	2	80	5
	Laptop	1	150	5
English Seminar	Fan	1	70	5
	Tube Light	1	40	5
	Laptop	1	150	5
	Printer	1	220	5
Philosophy Seminar	Fan	2	140	5
	Tube Light	1	40	5
	Laptop	1	150	5
Vocational Office	Fan	1	70	5
	Tube Light	2	80	5
Odia Seminar	Fan	3	210	5
	Tube Light	2	80	5
History Seminar	Fan	3	210	5
	Tube Light	3	120	5
	Desktop	1	220	5
Political Seminar	Fan	3	210	5
	Tube Light	3	120	5
	Laptop	1	150	5
Commerce Seminar	Fan	3	210	5
	Tube Light	4	160	5
	Laptop	1	150	5
Ladies Common Room	Fan	2	14	5
	Tube Light	6	240	5
	Fan	9	630	5
Zoology Department	Tube Light	10	400	5
	Laptop	1	150	5
	LED	6	72	5
Motor Room	Motor	1	1492	4
	Bulb	1	40	4
Class Room No 08	Fan	8	560	5
	LED	4	60	5
Class Room No 10	Fan	4	280	5
	LED	3	45	5
Class Room No 09	Fan	1	70	5
	LED	1	15	5

Class Room No 07	Fan	2	140	5
	LED	2	30	5
Class Room No 14	Fan	1	70	5
	LED	1	15	5
Class Room No 15	Fan	1	70	5
	LED	1	15	5
Class Room No 16	Fan	6	210	5
	LED	3	45	5
Class Room No 17	Fan	1	70	5
	LED	1	15	5
Class Room No 18	Fan	1	70	5
	LED	1	15	5
Class Room No 19	Fan	1	70	5
	LED	1	15	5
Class Room No 20	Fan	6	420	5
	LED	3	45	5
Class Room No 21	Fan	8	560	5
	LED	4	60	5
Class Room No 23	Fan	6	420	5
	LED	3	45	5
Class Room No 24	Fan	2	140	5
	LED	2	30	5
Class Room No 25	Fan	10	700	5
	LED	5	75	5
Physics Department	Fan	9	630	5
	LED	13	295	5
	Desktop	1	220	5
	Water Purifier	1	30	24
	Refrigerator	1	125	24
Botany Department	Printer	1	220	5
	Fan	11	770	5
	LED	7	140	5
	Desktop	1	220	5
	Water Purifier	1	30	24
Mathematics Department	Refrigerator	1	125	24
	Fan	4	280	5
	LED	6	9	5
	Desktop	6	1320	5
Chemistry Department	Printer	1	220	5
	Fan	12	840	5
	LED	3	45	5
Library	Tube light	7	280	5
	Fan	25	1750	5
	Tube Light	13	520	5

Boys Hostel	LED	20	300	5
	Desktop	3	660	5
	Printer	1	220	5
	Fan	12	840	5
	Tube Light	16	192	5
	LED	11	132	5
Ladies Hostel	Fan	24	1680	5
	Tube Light	25	1000	5

Data Sheet for Energy Audit of the Session: 2021-22

Room No./ Name	Electrical device/ Items (Bulbs: CFL/ Incandescent/ CFL; AC, Fan/ Computer, Instruments, Other appliances)	Number	Power	Usage Time (Hr/Day)
NAAC	Fan	2	140	5
	LED	3	36	5
	Desktop	2	440	5
	Laptop	1	150	5
	AC	1	1500	2
	Printer	2	440	5
Principal's Office	Fan	3	210	7
	LED	3	36	7
	Laptop	1	150	7
Principal's Rest Room	Fan	1	70	5
	LED	3	36	5
	Desktop	1	220	5
	CCTV DVR	1	220	24
	AC	1	1500	2
	Printer	1	220	5
	Refrigerator	1	125	24
Account Section	Fan	2	140	7
	LED	4	48	7
	Desktop	1	220	7
	Printer	2	220	5
Administrative Office	Fan	2	140	7
	LED	8	96	7
	Desktop	1	220	7
	Printer	1	220	5
Office Veranda	Tube Light	4	48	5
Staff Common Room	Fan	8	560	7
	LED	16	240	7
	AC	3	4500	3
	Water Purifier	1	30	24
Examination Section	Fan	8	560	5
	Tube Light	9	360	5
	Desktop	1	220	5

SAMS	Fan	1	70	5
	Tube Light	2	80	5
	Desktop	3	220	5
	Xerox	1	350	5
Education Seminar	Fan	3	210	5
	Tube Light	3	120	5
	Laptop	1	150	5
Economics Seminar	Fan	3	210	5
	Tube Light	3	120	5
	Laptop	1	150	5
	Printer	1	220	5
Sociology Seminar	Fan	2	140	5
	Tube Light	2	80	5
	Laptop	1	150	5
English Seminar	Fan	1	70	5
	Tube Light	1	40	5
	Laptop	1	150	5
	Printer	1	220	5
Philosophy Seminar	Fan	2	140	5
	Tube Light	1	40	5
	Laptop	1	150	5
Vocational Office	Fan	1	70	5
	Tube Light	2	80	5
Odia Seminar	Fan	3	210	5
	Tube Light	2	80	5
History Seminar	Fan	3	210	5
	Tube Light	3	120	5
	Desktop	1	220	5
Political Seminar Sc	Fan	3	210	5
	Tube Light	3	120	5
	Laptop	1	150	5
Commerce Seminar	Fan	3	210	5
	Tube Light	4	160	5
	Laptop	1	150	5
Ladies Common Room	Fan	2	14	5
	Tube Light	6	240	5
	Fan	9	630	5
Zoology Department	Tube Light	10	400	5
	Laptop	1	150	5
	LED	6	72	5
Motor Room	Motor	1	1492	4
	Bulb	1	40	4
Class Room No 08	Fan	8	560	5
	LED	4	60	5
Class Room No 10	Fan	4	280	5
	LED	3	45	5
Class Room No 09	Fan	1	70	5

	LED	1	15	5
Class Room No 07	Fan	2	140	5
	LED	2	30	5
Class Room No 14	Fan	1	70	5
	LED	1	15	5
Class Room No 15	Fan	1	70	5
	LED	1	15	5
Class Room No 16	Fan	6	210	5
	LED	3	45	5
Class Room No 17	Fan	1	70	5
	LED	1	15	5
Class Room No 18	Fan	1	70	5
	LED	1	15	5
Class Room No 19	Fan	1	70	5
	LED	1	15	5
Class Room No 20	Fan	6	420	5
	LED	3	45	5
Class Room No 21	Fan	8	560	5
	LED	4	60	5
Class Room No 23	Fan	6	420	5
	LED	3	45	5
Class Room No 24	Fan	2	140	5
	LED	2	30	5
Class Room No 25	Fan	10	700	5
	LED	5	75	5
Physics Department	Fan	9	630	5
	LED	13	295	5
	Desktop	1	220	5
	Water Purifier	1	30	24
	Refrigerator	1	125	24
	Printer	1	220	5
Botany Department	Fan	11	770	5
	LED	7	140	5
	Desktop	1	220	5
	Water Purifier	1	30	24
	Refrigerator	1	125	24
Mathematics Department	Fan	4	280	5
	LED	6	9	5
	Desktop	6	1320	5
	Printer	1	220	5
Chemistry Department	Fan	12	840	5
	LED	3	45	5
	Tube light	7	280	5
Library	Fan	25	1750	5
	Tube Light	13	520	5

	LED	20	300	5
	Desktop	3	660	5
	Printer	1	220	5
Boys Hostel	Fan	12	840	5
	Tube Light	16	192	5
	LED	11	132	5
Ladies Hostel	Fan	24	1680	5
	Tube Light	25	1000	5
Auditorium Hall	Fan	24	1680	1
	LED	20	240	1
	LED Halogen	03	60	1
	Sound System	01	250	1

Annual Electricity Bill:

2020-21: Rs 77,582/-

2021-22: Rs 81,681/-

The total energy utilization of the college for different purposes is approximately **17856.97 units/month**. Increased production of solar energy a type of nonconventional category of energy will be a good energy management system for the college. Electricity charges per month are **Rs.100000/month**. Energy saving through the replacement of incandescent bulbs, CFL lamps and tube lights to LED light could be a good option. Energy efficient electrical equipment especially fans and pump sets can be replaced against old ones. Awareness programs for the stakeholders to save energy may also increase sustainability in the utilization of various energy sources.

Availability of solar power with details:

The college has installed a luminous PCU 9.5 KVA solar power system (modifying the earlier luminous PCU 7.5 KVA) in view of conserving conventional energy and switched over to green energy to create not only eco- friendly campus but also generate revenue for the institution. The inverter is installed in the corridor of main building where main drain of current is carried out.



Solar Power Panels installed in the college campus



Control unit of electric energy

MAJOR AUDIT OBSERVATIONS:

Energy management

- ❖ Monthly use of electricity in the college is high. As expansion is going on, the consumption would further increase.
- ❖ The communication process for awareness in relation to energy conservation is inadequate.

SUGGESTIONS & RECOMMENDATIONS:

- ❖ It is recommended to avoid using of more energy consuming older electrical appliances and to replace with more environment friendly and energy efficient appliances like five star rating appliances in the college.
- ❖ Potential for renewable energy sources have to be explored. The advantage of large roof areas of the college can be taken for installing solar grid.
- ❖ It is recommended to use solar powered water heater & cooker in the canteens of college hostels and solar powered street lights.
- ❖ Regular monitoring of equipment and immediate rectifications of any problem should be done.
- ❖ Switch off the electrical appliances used in different rooms immediately after the completion of classes /seminars.

R. Saha
25/09/23
Team Members
Energy Audit

[Signature]
25/9/23
Principal
Pattamundai College
**Principal
Pattamundai College**

[Signature]
Auditor
25.09.2023
Energy Audit
Dy. Manager (Elect.)
MRT Sub-Division, TPCODL
Kendrapara