ENERGY AUDIT REPORT
OF
SVTKCOLLEGE, DEOLALI CAMP NASHIK
2022-2023

Affiliated to S.P.P.U. | Pune: PU/NS/ASC/029(1984) | AISHE: C- 41392
(NAAC Accredited 'A' Grade with CGPA of 3.11)
(Best College Award by S.P.P.U., Pune 2023)

Edited By
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Department of Physics

NOVA POWER QUALITY

Maratha Vidya Prasarak Samaj's
S.V.K.T. Arts, Science & Commerce College, Deolali Camp- 01

(MAHARASHTRA)

Internal Quality Assurance Cell (IQAC)

Energy Audit Report
(2022-23)
Prepared by

NOVA POWER QUALITY
Plot no 158, Khutwad Nagar,
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NOVA POWER QUALITY

NOVA POWER QUALITY

Manage Energy... Save Money...

"Vishnupriya" Pl. No.158, Near CITU Bhawan, Khutwad Nagar, Nashik - 422008.
Office Contact : 9890692123, 9326049370
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Energy Audit Certificate

This Is to certify that.

S.V.K.T. Arts, science & Commerce Collage,

Deolali Camp - 01

Has successfully undergone the "**Energy Audit**" during the period of 2022-23

under our supervision and the efforts taken by the Management and the faculty towards

energy saving awareness is highly appreciated.

Certificate Issue 17 Aug 23

Certified Energy Manager
EM-1526
Bureau of Energy Efficiency

External Energy Auditor

Sachin Wakhare

NOVA POWER QUALITY

S.V.K.T. COLLEGE DEOLALI CAMP
IQAC
INTERNAL QUALITY ASSURANCE CELL

NOVA POWER QUALITY

Plot no 158, Khutwad Nagar, Kamathwade Area, Nashik 422008
Call - +91- 9890692123, 9326049370 Email - novapowerquality@gmail.com
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Certificate of Energy Audit

This is certified that NOVA POWER QUALITY has completed an Energy audit at S.V.K.T. Arts, Science and Commerce College, Deolali Camp-01. The work of energy audit is completed on 20/07/2023 for the year 2022-23.

Thanking you and assuring of our service always.

Audit Report by

Sachin Wakhare

Energy Auditor

Certified Energy Manager
EM-1526
Bureau of Energy Efficiency

S.V.K.T. COLLEGE DEO... IQAC ... INTERNAL QUALITY ASS...

NOVA POWER QUALITY

Energy Audit Report (2022-23)

PREPARED
BY
SVKT ARTS, COMMERCE AND SCIENCE COLLEGE, DEOLALI CAMP, NASHIK
Email: svktcollege@yahoo.co.in
ENERGY AUDIT TEAM

A) EXTERNAL AUDIT TEAM:

Mr. Sachin Krishna Wakhare,
Energy Auditor
Nova Power Quality.

B) INTERNAL AUDIT TEAM:

Sr. no.	Name of member	Designation	Membership
1	Dr. S. S. Kale	Principal	Chairman
2	Dr. M. K. Zate	Assistant Professor	Coordinator
3	Mr. S.V. Darade	Assistant Professor	Member
4	Mrs. S.S. Sirsat	Assistant Professor	Member

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CHAPTER 1: INTRODUCTION OF COLLEGE & THE ENERGY AUDIT

1.1 About Parent Institution:

Maratha Vidya Prasarak Samaj is 107 years old renowned educational institute in the state of Maharashtra. The Institute was established in 1914 as boarding with 5 Students and a grant of Rs. 1000/- from the then Chhatrapti of Kolhapur, Rajarshi Shahu Maharaj. This 100 years old renowned educational institute is in the jurisdiction of University of Pune. At present the total strength of the students in its 485 branches is 1, 81,683 and total numbers of employees is 7,478. The Annual budget is Rs. 275 Crores.It was one of the greatest milestones in the pre-independence history of Nashik. The well-being in general and education in particular were considered the sole of human being.The great visionaries of MVP Samaj rightly laid the "Well well-being & happiness of masses"as the motto for the samaj. The founders of the samaj were inspired and driven by the great work of Mahatma Jyotiba Phule and Chhatrapati Rajarshi Shahu Maharaj of Kolhapur.The pioneers, devoted and dedicated team of MVP Samaj includes the names of great social workers and educationalists as Karmaveer Raosaheb Thorat, Bahusaheb Hiray, Kakasaheb Wagh, Annasaheb Murkute, Ganpatdada More, Kirtiwanrao Nimbalkar, D.R.Bhosale, and Vithoba Patil Jadhav.M.V.P. Samaj manages more than 325 educational & professional institutions. The spectrum of educational institution encompasses Primary Schools, Secondary Schools, Graduate & Postgraduate Colleges, and Professional & Vocational Colleges. The total strength of students in is over 1, 60,000.The students & professionals produced by the institutions of NDMVP Samaj forum the real backbone of modern society.

1.2 About College:

Maratha Vidya Prasarak Samaj was established by Karmaveer Raosaheb Thorat and his supporters in the year 1914 with the motto: *'Bahujan Hitay Bahujan Sukhay'*, which means **'Education for the Welfare of Masses'**. The primary aim of the founders was to open the vistas of education to the deprived sections of the society. The institute is run on three principles**: Discipline, Quality and Transparency.**It was in the year 1984 considering the need of an educational institute at the Deolali Camp area, the institute established the senior college, now popularly known as SVKT College, Deolali Camp, and Nashik. The college was established as there were students from around 45 remote villages who were deprived from education, especially the girls. Following the footprints of the founders of MVP Samaj, the college makes every attempt to cater to the educational needs to the needy students of the society. Now a day the college has been recognized

as one of the safest colleges for girl students. The College has been awarded with grade 'A' by NAAC during the second cycle of Assessment and Reaccreditation. It has taken many safety measures for girl students resulting into having more than 70% girl students. It runs Undergraduate as well as Post-graduate Programmes. Along with the Conventional Programmes the college has also been approved Skill based courses under B Voc and Community College by UGC (NSQF). The College has an approved Study Centre for Distance Education, affiliated to Yashwantrao Chavan Open University. Now the college is planning to start few more PG Programmes as well as Research Centres in few subjects.Apart from the educational services the college has been known for providing many cocurricular and extra-curricular facilities to students. The NSS unit of the college is actively involved in the various outreach programmes as well as extension activities. As a reward to the attempts made by the college in tree plantation by going beyond the campus, the college has been bestowed with ***VanashreePuraskar*** by the Government of Maharashtra. During the Pandemic situation of Covid- 19, the faculty as well as students of the college actively participated in various activities like distribution of thousands of masks, ration to the needy people, counselling session to overcome the problem of being panic, one student one tree, distributing eye-glasses during the NSS Camp, collection of Ganpati Idol and *Nirmalya*.Since the college is located in the Cantonment area, the NCC proves to be one of the important units. The college has both Boys and Girls NCC. Due to the various activities conducted by the NCC, students have strong fascination for the NCC which has resulted into having many students joined the Armed forces. The NCC cadets get chance to participate in RD Parade Camp, Delhi.It has become the best practice of the college to organise Blood Donation Camp every year.The Arts Circle of the college, too has earned name and fame to the college. It has received many awards at university as well as State level.Since the college has students from lower income group class,the college has started a Snacks Center ***(Puri Bhaji Kendra)*** at a nominal cost of just Rs. 6/-for needy students. It has established RO water purifier as well as drinking water stations each having 8 distribution stations having 36 taps. SVKT College is the only College in Nashik city that provides scholarship from Hindustan Petroleum, NGO to the students belonging to SC, ST, OBC and Physically Handicapped students along with the other government scholarships. Since the college is located in the area of Cantonment Board, it has its own restrictions as far as expansion of infrastructural facilities is concerned. The unique feature of this college is maximum utilization of minimum resources. Following the norms of UGC about teaching 30 % of the syllabus through online mode, the college has adapted the Learning Management System, initiated by SPPU. More than fifty percent of the classrooms have been converted into digital class rooms. The college has

also established a Video Recording Room for recording the lectures to be broadcasted through electronic media

1.2.1 VISION of college

To contribute in nation building by imparting academic excellence, social awareness and inculcating moral and ethical values amongst the students representing different strata of society.

1.2.3 MISSION of college:

To enhance the level of education in rural areas and support students from under privileged, rural and defense background in acquiring education which is appropriate for meeting the current challenges.

1.2.3 Goals:

To ensure good academic education to our students through a disciplined approach and better quality of teachers.

To ensure all round development of students through participation in NCC, NSS and other personality development program.

To promote higher education, competency and enhancement among teaching fraternity and sensible attitude to environmental awareness and social values**.**

1.3: Energy Conservation Committee:

Sr. no.	Name of member	Designation	Membership
1	Dr. S. S. Kale	Principal	Chairman
2	Dr. M. K. Zate	Assistant Professor	Coordinator
3	Mr. S.V. Darade	Assistant Professor	Member
4	Mrs. S.S. Sirsat	Assistant Professor	Member

Table 1: Energy Conservation Committee

1.4 Purpose & Function of Energy Conservation Committee:

The following are among the various functions assigned to the Bureau of Energy Efficiency:

- Creating awareness and proper dissemination of information on energy efficiency and conservation;
- Organising the training for the efficient use of Energy and its conservation, to the personnel associated.
- Promotion of the use of energy-efficient processes, equipment, devices, and systems in the general domain;

1.5. Courses Offered:

Faculty	Program	Subject
Arts	B.A.	English Marathi Hindi Psychology Political Science Economics Geography History
	M.A.	Economics Psychology
Commerce	B.Com.	Business Administration and Marketing
	M.Com.	Business Administration
Science	B.Sc.	Physics Chemistry Mathematics Zoology Botany Microbiology
	M.Sc.	Chemistry Microbiology
Computer Science	B.C.A.	Computer Science

Table 2: The number of courses run in college

1.6 Total Population of College

Sr. No.	Human Resources	Total
1	College Staff(Teaching & Non-Teaching)	82
2	College students (Girls and Boys)	1655
Total		**1737**

Table 3: Human resources

1.7: Introduction of Energy Audit:

An energy audit serves as a comprehensive examination and analysis of an entity's energy consumption, efficiency, and overall energy performance. It is a systematic process designed to identify areas of energy waste, assess the efficiency of energy-consuming systems, and recommend measures to enhance sustainability, reduce environmental impact, and optimize operational costs. In this introduction, we will explore the significance of energy audits, their objectives, and the broader context of energy management.

Significance of Energy Audits:

The escalating energy demand, coupled with concerns about climate change and environmental sustainability, has heightened the importance of effective energy management. Organizations, institutions, and businesses are increasingly recognizing the need to mitigate their carbon footprint, enhance energy efficiency, and reduce reliance on non-renewable resources. Energy audits play a pivotal role in this paradigm shift by offering a systematic approach to evaluate and improve energy consumption patterns.

Driving Forces behind Energy Audits:

Several factors drive the demand for energy audits across various sectors. Foremost among these is the global imperative to address climate change. As nations strive to meet their carbon reduction commitments, organizations are under increasing pressure to optimize energy use and transition to cleaner, more sustainable practices.

Operational efficiency and cost savings are also prominent drivers. Businesses and institutions realize that efficient energy management directly correlates with reduced operational costs. Identifying and implementing energy-saving measures not only contributes to environmental goals but also enhances the economic viability of an organization.

Furthermore, regulatory compliance is a significant factor. Governments worldwide are enacting stringent energy efficiency standards and regulations. Compliance with these standards not only avoids legal ramifications but also positions organizations as responsible corporate citizens.

As per The Energy Conservation Act, 2001, Act No. 52 of 2001,“energy audit” means the verification, monitoring and analysis of the use of energy, including submission of a technical report containing recommendations for improving energy efficiency with cost-benefit analysis and an action plan to reduce energy consumption.

1.8 Objectives of Study:

Energy audits are conducted with a set of clear objectives aimed at achieving sustainable and efficient energy use. These objectives can be tailored to the specific needs and goals of the entity undergoing the audit. Here are the primary objectives of an energy audit:

1.8.1 Identify Energy Inefficiencies:

The foremost goal of an energy audit is to pinpoint areas of energy inefficiency within an organization. This includes analyzing the performance of energy-consuming systems, detecting wasteful practices, and assessing the overall effectiveness of energy utilization.

1.8.2 Assess Energy Consumption Patterns:

Understanding how and when energy is consumed is crucial for optimizing its usage. Energy audits provide a detailed breakdown of consumption patterns, enabling organizations to tailor strategies that align with peak demand periods, occupancy schedules, and operational needs.

1.8.3 Recommend Energy-Saving Measures:

Based on the findings of the audit, a detailed set of recommendations is provided to improve energy efficiency. These measures may include upgrading equipment, implementing energy-efficient technologies, optimizing operational practices, and incorporating renewable energy sources.

1.8.4 Quantify Energy And Cost Savings:

Energy audits aim to quantify the potential energy and cost savings achievable through the implementation of recommended measures. This information is vital for decision-makers to assess the economic viability and prioritize actions that deliver the most significant impact.

1.8.5 Enhance Sustainability and Reduce Carbon Footprint:

As organizations strive to adopt sustainable practices, energy audits play a crucial role in minimizing the carbon footprint. By identifying opportunities for renewable energy integration and energy conservation, audits contribute to broader environmental goals.

1.8.6 Ensure Regulatory Compliance:

Energy audits help organizations stay abreast of and compliant with evolving energy efficiency regulations and standards. Compliance not only avoids legal consequences but also aligns the organization with global sustainability initiatives.

1.8.7 Engage Stakeholders and Raise Awareness:

Energy audits provide an opportunity to engage with internal stakeholders, including employees, management, and investors. Raising awareness about energy efficiency fosters a culture of responsibility and sustainability within the organization.

1.9 Methodology:

1. Site Visit:

Detail the on-site assessment, including measurements of energy-consuming systems, interviews with facility managers, and a review of historical energy consumption data.

2. Data Collection:

Outline the data collected, including utility bills, equipment specifications, occupancy schedules, and any other relevant information.

*3. Energy Consumption Profile***:**

Present a breakdown of energy consumption by source (electricity, natural gas, etc.) and by building or area. Identify major energy-consuming systems.

4. Energy Efficiency Opportunities:

Highlight areas with the potential for energy savings, such as lighting, HVAC systems, insulation, and water heating. Include estimated energy and cost savings for each opportunity.

5. Renewable Energy Options:

Evaluate the feasibility of incorporating renewable energy sources, such as solar panels or wind turbines, to reduce reliance on conventional energy sources.

6. Recommendations:

1. Short-Term Measures:

Provide a list of immediate actions that can be taken to improve energy efficiency, such as upgrading lighting fixtures, implementing HVAC controls, and optimizing equipment schedules.

2. Long-Term Strategies:

Propose long-term strategies for sustainable energy management, including equipment upgrades, building retrofits, and the integration of renewable energy technologies.

Cost-Benefit Analysis:

Conduct a cost-benefit analysis for each recommended measure, considering upfront costs, energy savings, and payback periods.

Conclusion:

Summarize key findings, recommendations, and the overall impact on the college's energy efficiency. Emphasize the benefits of implementing the suggested measures.

Appendices:

Include supporting documents, charts, and graphs that provide additional details on the audit findings.

CHAPTER 2: ENERGY DATA COLLECTION & CONSUMPTION ANALYSIS

2.1: Meter Information

The college has a main power source of electricity Maharashtra Electricity Board. All information is given in tabular form.

Sr. No.	Name of College	Details
1.	Year of Establishment	June 1984.
2.	Carpet-Area (sq.Mt):	3814
3.	Sanctioned Load (KVA):	20 k.Watt.
4.	Type of Supply : (1/3 phase)	3
5.	Tariff Cat : (Commercial/Domestic)	Domestic
6.	Transformer Distance (in Mtr):	155 Mtr
7.	List ways that use energy in your College (Electricity, Diesel, Firewood, etc.)	Diesel Generator, LPG Gas
8.	Alternative energy Sources:	Solar Roof Top System
9.	Energy Conservation and Efficiency Implementation Measures :	Use of LED Lights
10.	Year of Implementation:	2016
11.	Date of previous Energy Audit : (If any)	March-2020

Table 4: Site information

The college uses electricity main source for office work teaching, and laboratory equipment. The LPG gas is used for Laboratory practical purposes only. The Diesel Generator is used for electricity cutoff or emergency use only. Solar panels are used to generate electricity to reduce the electricity bill via the net metering scheme.

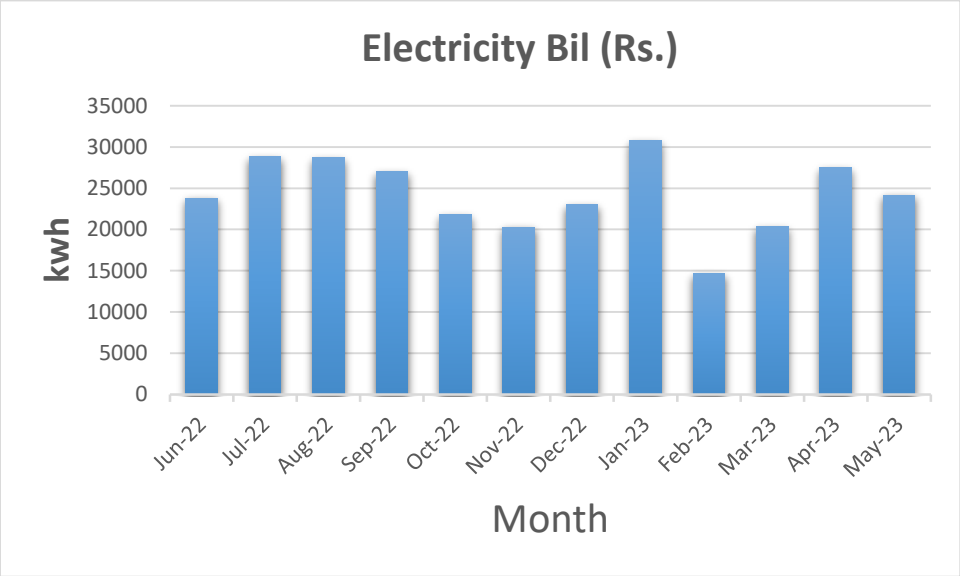
2.2 Electricity Bill Analysis of the College:

Month	Net Reading Unit kwh	Bill (Rs.)
May-23	2,689	24156.35
Apr-23	3,070	27506.67
Mar-23	2,358	20372.29
Feb-23	1,677	14622.88
Jan-23	3,588	30756.69
Dec-22	2,672	23023.27
Nov-22	2,350	20304.75
Oct-22	2,521	21748.44
Sep-22	3,145	27016.62
Aug-22	3,347	28722.02

Jul-22	3,363	28857.11
Jun-22	2,762	23783.1
Total	33,542	290,870

Table 5: Electricity bill month wise

The above table represent the total number of units imported per month from electricity board.The average import units per month and day 2795 kWh. The average rate per unit is Rs. 8.67. The graphical representation of electricity



Graph 1: Electricity bill month wise

2.2.1 Electricity billing profile:

The electricity charges are not constant for every month and day. The various factors effect on it such as power factor (PF), Time of day (ToD) Tariff, and Electricity Demand etc. These factors can be control by consumers. The other factors are wheeling charges, Fuel adjustment charges (FAC), sale tax, fix charges from the side of the electricity Board.

Let us understand the billing charges by electricity bill of month march 2023:

Comment	Type charges	Calculation	Rs.
Demand Charges are fix 384 for zero demand	Demand Charges (A)	384	384
A wheeling charge is a currency per megawatt-hour amount that a transmission owner receives for the use of its system to export energy	Wheeling Charge @1.35	2358x1.35	3183.30
	Energy Charges (B)	2358x4.57	0776.06
Time of day (TOD) tariff applies variable charges depending on what time of day electricity is used.	TOD Tariff EC (C)	0	0
Fuel adjustment charges is variable	FAC@0.9 ps/U (D)	2358x0.9	2122.20

Total electricity bill	Total A+B+C+D	16465.56	
	Electricity Duty on total (21%)	16465.56x0.21	3457.77
	Tax on Sale @19.04ps/U	2358 x 0.1904	448.96
Zero charges because of PF is above 0.9	P.F. Penal Charges/P.F. Inc.	0	0
Demand is less than the sanctioned load i.e. 20 kw	Charges For Excess Demand	0	0
Net Billing charges	Total	20370	20370

Table 6: Electricity charges calculation

4/18/23, 11:02 AM HT/LTIP E-Bill

Maharashtra State Electricity Distribution Co. Ltd.

BILL OF SUPPLY FOR THE MONTH OF Mar 2023

000001954708262

GSTIN: 27AA ECM2933K1ZB Website : www.mahadiscom.in HSN CODE: 27160000

NASHIK CIRCLE:595 NASIK URBAN DN. II : 041 DEOLALI S/DN.: 671 1

Consumer No. : 049085336257
Consumer Name : THE PRINCIPAL M.V.P. SAMAJ PRASARAK NSK
Adresss : DEOLALI COLLEGE LAM ROAD
Village : DEOLALI GAON Pincode : 422401

BILL DATE	07-04-2023	20,370.00
DUE DATE	27-04-2023	
IF PAID UPTO	13-04-2023	20,200.00
IF PAID AFTER	27-04-2023	20,620.00
Last Receipt No./Date		/11-03-2023
Last Month Payment		45,650.00
Scale / Sector		Large Scale/Private Sector

Email ID :				Activity :			
Mobile No. :	91******44	Meter No.:	055-XD490753	Seasonal :	N	Load Shed Ind :	
Tariff :	073 LT-X B I 0-20KW Pub Ser oth	Connected Load (KW):	16 KW	Urban/Rural Flag :	U	Express Feeder Flag :	N
Contract Demand (KVA) :	0.00	40% of Con. Demand(KVA) :	0.00	Feeder Voltage (KV) :	11	LIS Indicator :	
Sanctioned load (KW) :	16 KW						
DTC :	4671337	PC-MR-ROUTE-SEQ :	00-25-0302-0411	BU :	4671	PC :	0

Date of Connection :	31-01-1996	Category :	LT-X B I 0-20KW Pub Ser oth	GSTIN :	
Supply at :	LT	Elec. Duty :	06	PAN :	
Prev. Highest (Mth) :		Prev. Highest Bill Demand (KVA) :			
Security Deposit Held Rs. :	32,150.00	Addl. S.D. Demanded Rs :	00.00		
Bank Guarantee Rs. :	0.00	S.D. Arrears Rs. :	00.00		

BILLING HISTORY

Bill Month	Consumption (Units)	Bill Demand (KVA)	Bill Amount
Feb 2023	1,677	0	14622.88
Jan 2023	3,588	0	30756.69
Dec 2022	2,672	0	23023.27
Nov 2022	2,350	0	20304.75
Oct 2022	2,521	0	21748.44
Sep 2022	3,145	0	27016.62
Aug 2022	3,347	0	28722.02
Jul 2022	3,363	0	28857.11
Jun 2022	2,762	0	23783.1
May 2022	4,984	0	38019.57
Apr 2022	3,198	0	24561.89
Mar 2022	2,091	0	16561.44

CUSTOMER CARE Toll Free No.
1912, 1800-212-3435, 1800-233-3435

Rule & Procedure for Consumer Grievances Redressal is available at www.mahadiscom.in>consumer portal>CGRF Instead of Printed bill , register for E-bill and avail Rs. 10 per bill as a "Go-green " discount.For registration visit at www.mahadiscom.in->consumer portal->Quick access->Go-green request

For making Energy Bill Payment through RTGS/NEFT mode, use following details:

CURRENT CONSUMPTION DETAILS

Reading Date	KWH	KVAH	RKVAH (LAG)	RKVAH (LEAD)	KW (MD)	KVA (MD)
Current 01-04-2023	125818.000	0.000	0.000	0.000	0.000	0.000
Previous 03-03-2023	123245.000	0.000	0.000	0.000		
Difference	2573.000	0.000	0.000	0.000		
Multiplying Factor	1.000	1.000	1.000	1.000	1.000	1.000
Consumption	2573.000	0.000	0.000	0.000	0.000	0.000
LT Metering	0.000	0.000	0.000	0.000	0.000	0.000
Adjustment	-215.000	0.000	0.000	0.000		
Assessed Consump	0.000	0.000	0.000	0.000	0.000	0.000
Total Consumption	2358.000	0.000	0.000	0.000	0.000	0.000

BILLING DETAILS

Billed Demand (KVA)	0	@ Rs.	384
Assessed P.F.		Avg. P.F.	0.000
Billed P.F.	0.000	L.F.	

Consumption Type	Units	Rate	Charges Rs.
Industrial			00.00
Residential	2,358	0.00	10776.06
Commercial			

E.D. on(Rs)	Rate %	Amount Rs.
0.00	0	0.00
16,465.56	21	3457.77
0.00	0	0.00

TOD Zone	Rate	Units	Demand	Charges Rs.
2200 Hrs-0600 Hrs	00.00	0	0.00	0.00
0600 Hrs-0900 Hrs & 1200 Hrs-1800 Hrs	00.00	0	0.00	0.00
0900 Hrs - 1200 Hrs	00.00	0	0.00	0.00
1800 Hrs-2200 Hrs	00.00	0	0.00	0.00

Amount in Words: TWENTY THOUSAND THREE HUNDRED SEVENTY ONLY

Demand Charges	384.00
Wheeling Charge @ 01.35	3,183.30
Energy Charges	10,776.06
TOD Tariff EC	00.00
FAC @ 00.90 Ps/U	2,122.20
Electricity Duty (21.00 %)	3,457.77
other charges	00.00
Tax on Sale @ 19.04 Ps/U	448.96
P.F. Penal Charges/P.F. Inc.	00.00
Charges For Excess Demand	00.00
Debit Bill Adjustment	00.00
TOTAL CURRENT BILL	20,370.00
Current Interest 04-04-2023	00.00
Principle Arrears	-04.51
Interest Arrears	00.00
Total Bill (Rounded) Rs.	20,370.00
Delayed Payment Charges Rs.	254.65
Amount Payable27-04-2023 After Amount Rounded to Nearest Rs.(10/-)	20,620.00

SOLAR NET METER CONSUMPTION DETAILS

SOLAR TARIFF	IMPORT	EXPORT	GENERATION

https://wss.mahadiscom.in/wss/wss 2/4

4/18/23, 11:02 AM HT/LTIP E-Bill

	CURRENT READING	PREVIOUS READING	Units	CURRENT READING	PREVIOUS READING	Units	CURRENT READING	PREVIOUS READING	Units
0000 Hrs-0600 Hrs& 2200 Hrs-2400 Hrs	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00
0600 Hrs-0900 Hrs& 1200 Hrs-1800 Hrs	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00
0900 Hrs - 1200 Hrs	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00
1800 Hrs-2200 Hrs	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00
TOTAL	1,25,818.00	1,23,245.00	2,573.00	20,804.00	20,589.00	215.00	95,520.00	93,668.00	1,852.00
Offset: 215.00	Prvious Banked: 00.00		Current Banked: 00.00		Banking Charge Unit: 00.00			Billed: 2,358.00	

Image 1: Electricity bill copy of March 2023

The above table shows the billing charges in various heads, the first row represents electricity demand charges it is fixed for the type of tariff here it is 384 Rs. The next row represents wheeling charges made for the transmission of electricity and transmission loss per megawatt. Next row represents the ToD tariff. The TOD tariff is a time zone of 24 hours where the unit charges vary.In our bil, it is not applicable. The next row represents Fuel adjustment charges. In our case, it is 0.9 Rs per unit. Next row is sum of all above rows and made electricity total bill.on the total bill, we get an electricity duty charge of 21%. If power factor is lower than 0.9 again penalty charges are made. In our case PF charges are zero.

2.3 Analysis of Connected Load List:

2.3.1 Connected Load:

Table 7: Table shows total number of electronic devices effectively active.

Room No. area	Name	LED tube 20 watt	Fan 50 watt	Projector 250 watt	Smart board 200 watt	CCTV 5 watt	PC 50 watt	Printer 5 watt
S1	class room	2	2	1	0	1	0	0
S2	class room	2	2	1	0	1	0	0
S3	class room	2	2	1	0	1	0	0
S4	class room	2	2	1	0	1	0	0
S5	class room	3	2	1	0	1	0	0
S6	class room	2	2	1	0	1	0	0
S7	Meter Room	4	2	0	0	0	0	0
S8	LMS	4	4	0	0	0	1	0
S10	SDO	2	1	0	0	1	0	0
S25	class room	4	4	1	0	1	0	0
S22	Reading Room	4	4	0	0	1	0	0
S21	Ladies staff	1	1	0	0	0	0	0
S20	Staff Room	4	4	0	0	0	0	0
S19	class room	4	4	1	0	1	0	0
S18	Seminar Hall	10	9	2	0	1	1	0
S17	Girls Wash room	2	2	0	0	0	0	0
S30	class room	4	3	0	1	1	0	0
S32	class room	5	5	1	0	1	0	0
S43	class room	5	4	1	0	1	0	0
S44	class room	5	4	1	0	1	0	0
S45	class room	4	2	0	1	1	0	0
S46	class room	4	2	1	0	1	0	0
S47	class room	4	2	0	0	1	0	0
S48	class room	4	2	0	1	1	0	0
S49	NSS	1	1	0	0	0	0	0
S50	class room	4	2	0	1	0	0	0
S51	IQAC	6	4	1	0	1	0	0
S52	NCC	1	1	0	0	0	0	0
S53	YCMU Centre	1	1	0	0	0	0	0
S54	class room	7	7	1	0	1	0	0
GF1	Porch 1st flo. Back	14	0	0	0	4	0	0

GF2	Porch 1st flo. Front	14	0	0	0	4	0	0
FF1	Ground flo Front	12	4	0	0	4	0	0
FF2	Grond flo. Back	20	2	0	0	4	0	0
S8	Eco department	2	2	1	0	1	2	1
S11	Geography department	4	2	1	0	1	1	1
S12	English dept.	6	6	1	0	1	23	1
S14	Political science	1	1	0	0	1	1	1
S15	Marathi & Hindi dept.	2	1	0	0	1	2	1
S16	Math, psychology dept	5	5	0	0	1	1	1
S16	History department	2	1	0	0	0	1	1
S29	Chem lab 1	7	6	0	0	1	1	0
S31	Chem lab 2	3	3	0	0	1	1	0
S33	Zoo department	2	2	0	0	1	1	1
S34	Chem department	2	2	0	0	1	1	1
S35	Chem Lab3	9	5	0	0	1	1	1
S36	Bot department	2	1	0	0	1	1	1
S37	Bot lab	12	4	1	1	1	1	1
S38	MB lab	7	3	0	0	1	2	1
S39	Math Lab	6	3	0	0	1	21	2
S40	Physics depat and lab	9	6	0	0	1	6	1
S41	Commerce department	4	3	0	0	1	8	1
S44	Class room	4	2	0	0	0	0	0
S24	Library	10	7	0	0	0	6	2
S22	Reading room staff	2	2	0	0	1	0	0
S22	reading room student	4	4	0	0	1	0	0
S25	Exam cell	5	3	0	0	1	2	2
S17	Office	15	7	0	0	1	11	10
S	Outside	0	0	0	0	6	0	0
	Total	292	174	20	5	64	96	31

The above table shows the effective electronic devices used on college campuses. Besides these equipment, some heavy duty devices are not mentioned because of less quantity. These are Air conditioning, Refrigerator, Water Pump, Reverse Osmosis purifier, Xerox machine, water cooler.

2.3.2 Load Analysis:

Table 8: The actual load analysis of all equipment

Sr.No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage per Day Hr.	Power Consumption/ Day (Watt)
A	B	C	D	E = C X D	F	G = E X F
1	Xerox machine	350	3	1050	1	1050
2	Air Condition	2500	4	10000	2	20000
3	Online UPS 10kVA &8kVA	25	2	50	24	1200
4	Water Cooler	200	3	600	2	1200
5	RO system	2500	1	2500	1	2500
6	Flood Lights	100	8	800	12	9600
7	Refrigerator	150	3	450	12	5400
8	Pumping motor	750	1	750	2	1500
	Fan	50	174	8700	6	52200
9	Projector	250	20	5000	1	5000
10	Smart board	200	4	800	3	2400
11	CCTV	5	64	320	24	7680
12	PC	50	96	4800	1	4800
13	Printer standby mode	5	31	155	6	930
14	LED Tube	20	292	5840	5	29200
Day power						144660 W

In the above table, all calculations are made by assuming the maximum operating hours of electronic devices for 24 Hours of the day. The total calculated energy consumption of college in a day is 144.66 Units which is comparable with the actual consumption of 143 units per day. (Refer table No.10.)

2.4: Other energy Sources:

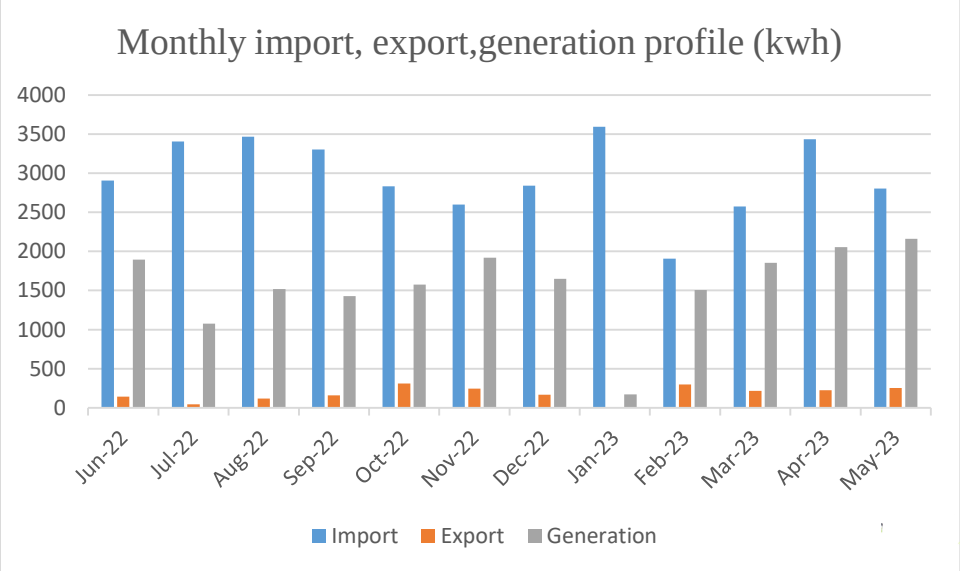
2.4.1 Solar Energy:

The college has grid tie inverter of 15.6 kw capacity. It is connected to grid via net meter. The generated electricity is used by college and excess electricity is exported to the grid. The following table shows the import, export, generation and total consumption by college.

month	Import Unit kw	Export Unit kw	Net reading Unit kw	Generation Unit kw	Consumption Unit kw
Jun-22	2905	143	2762	1896	4,658
Jul-22	3406	43	3363	1077	4,440
Aug-22	3466	119	3347	1516	4,863
Sep-22	3304	159	3145	1429	4,574
Oct-22	2830	309	2521	1574	4,095
Nov-22	2597	247	2350	1921	4,271
Dec-22	2839	167	2672	1649	4,321
Jan-23	3593	5	3588	171	3,759
Feb-23	1906	299	1677	1504	3,181
Mar-23	2573	215	2358	1852	4,210
Apr-23	3432	225	3070	2056	5,126
May-23	2804	252	2689	2159	4,848
Total	35655	2183	33542	18804	52346

Table 9: Monthly import, export, and generation profile of the grid tie system.

From the table, it is clear that the total generation during the year is 18804 kWh units. And total imported units are 33542 kWh. The total consumption of units during the year is 52346 kWh. The average unit per day is 143 kWh. The following graph shows the visual presentation of the monthly import, export, and generation profile of the grid tie system.



Graph 2: Monthly import, export, and generation profile of the grid tie system

2.4.2 Electricity from Diesel Generator:

The college has 15 kVA HPDG of Kirloskar making generator of having engine 20.5 bhp and 15000 RPM speed. The alternator has output 50 kHz frequency, 220 V AC output. With 0.8 PF and 86 % efficiency. It is used only when MSEDCL power cut mode.

The calculation of total number of units generated during the year:

The following table shows the unit generation per liter of diesel for 15 KVA HSDG

Load	Diesel Consumption (Liter)	Unit generation (kVA)	Unit generation (kwh)	Unit/lit
Full Load 100%	4	15	12	3
75% Load	3	10	8	2.6
50% Load	2.2	8	6.4	2.9
Average				2.8 kwh

Table 10: Diesel consumption and unit generation of HSDG

Assuming the 2.8 kWh unit generated for one liter of diesel. During the year 85 liters of fuel were consumed by HSDG.

Therefore total unit = 2.8x85 = **243.1** kWh

Cost per unit is = (Diesel price 85)/Total unit

= (85x85.5)/243.1 = **29.9** Rs/Unit

2.4.3 Energy from LPG Gas:

The college department of botany, physics, microbiology, and chemistry utilizes the LPG cylinder in the Laboratory for experiment purposes. The total number of cylinders utilized during the year is 15.

The calculation of the total number of equivalent units of energy utilized during the year:

The 1 kg of LPG Produces 13.6 kWh equivalent energy.

The one LPG cylinder consists of 14.5 kg of LPG.

Total equivalent unit= 14.5x15x13.6 = **2958 kWh**

Cost per unit is = (LPG price 15)/ Total unit

= (1050x15)/2958 = **5.32** Rs/unit

2.5: Carbon emission and saving profile:

The most of the electricity generation in India are of thermal power plant that produces electricity from coal. That make pollution in the form of CO_2 gas. For generation of 1kwh unit equivalent CO_2 emission is 0.94 kg.

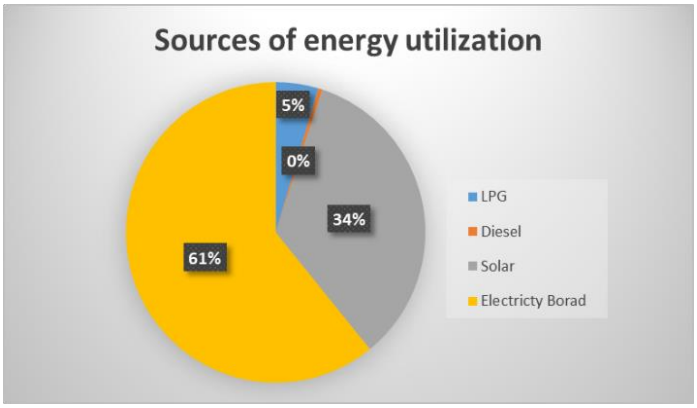
The below table shows the carbon emission and saving.

Type of source	Source	Equivalent in (kwh)	CO_2 Kg	CO_2 Kg
CO_2 emission	LPG	2545.92	2393.16	33880.67
	Diesel	243.1	228.51	
	MSEDCL	33542	31259	
CO_2 Saving	Solar	18804	17675.76	17675.76

Table 11: carbon emission and saving from energy sources

From the above table it is clear that 34.3 % of CO_2 is saved from renewable energy sources. The carbon credit from renewable source is 17.6. (One carbon credit required 1000 Kg of CO_2 Saving). The total carbon emision by energy sources utilized by college is 33880.67 kg.This emission is adjusted by green sources of college campus and Botanical garden.The photo 1 shows the green plants & trees at college campus.Also College arranges program of tree plantation every year outside campus area such as villages, forest for this activity college awarded as vanshree purskar for year 2021-22 year.

Photo 1: Google Map bird eye view college campus



Graph 3: Sources of energy

Chapter 3: Audit Findings and Recommendation

The investigation of Power Consumption data led to the recommendation of a few actions to increase the energy efficiency of the campus. Everywhere necessary, a thorough cost analysis of implementing the suggested action has been carried out. The overall energy efficiency metric has also been included. Here are some essential suggestions for increased energy efficiency.

3.1 Consolidation of Audit Findings:

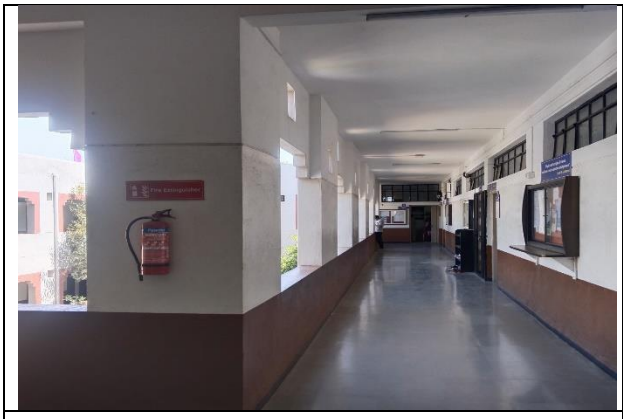
1. The College uses a relatively low amount of electricity per person and it is found to be 19 units per year per person.
2. It is determined that the approach of raising awareness about energy saving through communication is adequate.
3. The outdated FTL, coseffective LED lights are being replaced with energy-efficient technology.
4. No power fctor panelty dtermined from electricty bill documets.
5. The goals for cutting back on fuel, water, and energy use are adequate.
6. Consistently checking the equipment and fixing any issues right away.
7. The carbon emision are maintaned at best level.
8. Proper Load diustribution is maintaned.

3. 2 Recommendations:

1. Clean the roof top system evey week for better performance and keep monitoring on it.
2. Try to keep speed of ceiling fan minimum for power saving.
3. Keep maintanance of HSDG every year.
4. Make computer in sleep mode or switch on after use.
5. Make energy awarness among student and working staff.
6. Keep UPS battery maintanance as per requirement.

PHOTO GALLARY:

These photos are of selected areas only

<table>
<tr><td>  </td><td> 
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<tr><td>Ground floor passge Back side</td><td>Ground floor passge Front side</td></tr>
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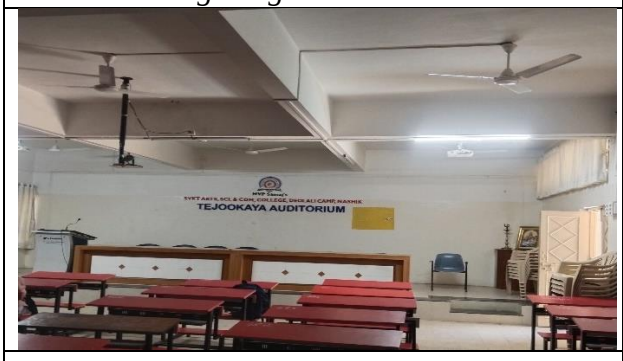
<tr><td>Out side Pasage & green area</td><td>Inside Green area</td></tr>
<tr><td> 
</td><td>  </td></tr>
<tr><td>Seminar Hall</td><td>Office</td></tr>
<tr><td>  </td><td> 
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<tr><td>Plantation Program at Village</td><td>Energy awaness by poster presentaion</td></tr>
</table>

Energy awarness by Exibition

15 KVA : HSDG

Roof Top Solar panel Array

Grid tie Inverter 15.6 kw

IT Lab

Chemistry Lab

Smart Board Class

Class Room: showing fan & LED tube

LIST OF TABLES:

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