ENERGY AUDIT REPORT 2018-2023

GOVERNMENT POST GRADUATE COLLEGE UNA (H.P)

राजकीय स्नातकोत्तर महाविद्यालय ऊना (हि.प्र.)

ACKNOWLEDGEMENTS

We express our sincere gratitude to the Government P.G. College Una for giving us an opportunity to carry out the project of Energy Audit. We are extremely thankful to all the staffs for their support to carry out the studies and for input data, and measurements related to the project of Energy audit.

College Team Members

1 Satdev Bhardwaj Officiating Principal

2 Dr. Darshan Dhiman IQAC Coordinator

Also congratulating our Energy audit team members for successfully completing the assignment in time and making their best efforts to add value.

Energy Audit Team

S.N.	NAME	DESIGNATION	Role
1	Dr. Madan Lal	ASSISTANT PROFESSOR (PHYSICS) Govt. College UNA	CONVENOR
2	Er. Neeraj Kirti	Junior Engineer HPSEBL, UNA	AUDITOR
3	Prof. Sham Singh	ASSISTANT PROFESSOR (Economics) Govt. College UNA	MEMBER
4	Prof. Jag Mohan	ASSISTANT PROFESSOR (Maths) Govt. College UNA	MEMBER
5	Prof. Vipul Gautam	ASSISTANT PROFESSOR (Tourism) Govt. College UNA	MEMBER
6	Prof. Parveen Saini	ASSISTANT PROFESSOR (Commerce) Govt. College UNA	MEMBER

ENERGY AUDIT CERTIFICATE

It is certified that an energy audit has been conducted at Government Post Graduate College Una District Una Himachal Pradesh energy cost, energy supply reliability and methods to reduce energy consumption has been assessed.

Dr. Madan Lal

Convenor

Er. Neeraj Attri
Addl. Assistant Engineer
(E) Section HPSEB Ltd.
Una, Distt.Una (H.P.)
Auditor

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1.General Information

The study team conducted the energy audit at Government P.G. College Una in 1st week of April, every year . The purpose of the energy audit was to address the status of the Electrical systems, Energy uses, performance assessment of various facilities like A.C. system, Fans, lighting system, Pumps etc.

General Information About the College	
Location	Near Indira Stadium Nangal -Una Road Una District Una Himachal Pradesh -174303
Establishment year	1st July, 1968
Campus Area	130005 sq. mts
Build Up Area	27301.05 sq. mts
Open Space & ground	102703.95 Sq. mts
Affiliation	Himachal Pradesh University Shimla
Approved By	UGC Delhi
Departments	26
Faculties	45+
No of Courses	26 courses across 6
Mode of Education	Full Time
Official Website	www.https://www.govtpgcollegeuna.in

2. Brief History

Govt. PG College Una has the rare distinction in Himachal Pradesh to be the first college with potential for excellence crowned by UGC. Since 1968, the year of inception, the college has added many feathers to its cap and has passed the test of time. The faculty is committed to impart the contemporary and best education to the students. Govt. College Una embarked on its evolution in 1968 from a rented building of local DAV School. In 1993 the college shifted to its own building on Una-Nangal road. The College has completed 43 glorious years and during this it has registered tremendous growth in terms of enrolment, infrastructure diversification of options for the students etc. The growing aspirations of students and parents across the cross section of society are reflected in an increasing demand for education especially for job oriented professional courses in higher education system. Govt. P.G. College Una has taken a lead among all the colleges of the state to start MBA and MCA simultaneously from this academic session i.e. 2012-13. The college was accredited with 'B' Grade by NAAC Peer team during their visit in year 2016.

Energy Auditing

Energy audit is a routine procedure of monitoring power consumption of the institute performed on annual basis. As per the Energy Conservation Act, 2021 Section 14(c), applies to industries with 5000kW and higher consumption. Institute carryout energy audits by college committee members along with designated member of Himachal Pradesh State Electricity Board Limited (HPSEBL). Energy Audit is defined as "the verification, monitoring and analysis of use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption".

For the successful implementation of an energy efficient campus, Govt. P.G. College Una has focused a lot on the enhancement and awareness among the students, teachers, and other members of the institution on Energy alternatives such as solar energy etc.. As the issue of saving our environment has attained a

global prominence in the contemporary time, Govt. P.G. College Una has also considered it extremely essential to work sincerely in the matter of environment consciousness parallelly with green energy initiatives. In it strive for a clean, green and energy efficient campus, every possible step is taken by every member or cell of the institution to create a sense of responsibility among the students pertinent to the sustenance of health environment in the form of various programmes and project works.

3. INTRODUCTION

Energy processes involve generation, transmission, distribution and efficient use. It is important to reduce wastage and maximize efficiency. It ensures productive use of energy. EC Act 2001, Section 14(c) applies to industries with 5000kW and higher consumption. Institute carryout energy audits by college committee members along with designated member of Himachal Pradesh State Electricity Board Limited (HPSEBL). Bureau of Energy efficiency under Union Ministry of Power, created in 2002 under2001 energy conservation act, is responsible for conservation and efficient use of energy.

Energy Audit in college

Energy audit has been carried out with verification of energy use practices, technical analysis, suggestions to improve efficiency and way to reduce energy cost along with consumption.

The process has been carried out in three stages:

Stage 1

Collection of information:

Data was collected using various methods such as Physical observations, survey with team visit around the campus.

1) Study Team visited Administrative Block, Science Block, Arts Block, Library Block, MBA/MCA Block, PTA Block, Canteen and Hostel.
2) Data of appliances used and usage practices were collected through observation.
3) Average power consumption was noted down.

Stage II

Analysis of data was done that included power consumption bills received from Himachal Pradesh State Electricity Board Limited (HPSEBL).

Stage III

After thorough observations and analysis, team recommended various steps to reduce energy consumption.

4. Energy Audit

4.1 First Stage of Energy Audit

4.1.1 Collection of data:

- On Grid Top Roof Solar Panel installed on PTA Block.
- Electricity bill for last five years.
- Energy consumption Electric Stove uses per year.
- Money spent by college on power and LPG.
- Number of Fluorescent tubes, LED Bulbs, CFL, Incandescent bulbs used in college and their energy consumption.
- Number of ceiling fans and their energy consumption.
- Number of computers and their energy consumption.
- Number of Refrigerators and their energy consumption
- Number of Photo copier machine and their energy consumption
- Number of Air conditioners and their energy consumption.
- Number of Inverters and their energy consumption.
- Generator set and its energy consumption.
- Number of Heaters and their energy consumption.

- Number of Streetlights & Solar street lights and their energy consumption.
- Public address system and it's energy consumption.
- Number of interactive panels and their energy consumption.
- Number of CCTV Surveillance cameras in college premises
- How many boards displayed for awareness of energy saving.

4.2 Second Stage of Energy Audit

Energy audit process was carried out by audit study team by walking through all departments, blocks, playground, library, corridors, canteen and Hostel.

➢Team noted details of various appliances and their usage.

➢Staff and students were interviewed to get usage details.

➢Documents like electricity bills and LPG consumption were reviewed.

➢Campus visit was carried out to see solar lights, street lights

➢LPG cylinders use in Labs and canteen were counted.

4.2.1 Sources of Energy

Table 1: Different Sources of Energy

S.N.	Equipment Type	Capacity	Total Numbers	Remarks
1	On Grid Roof Top Solar Panel	15 KWps	1	Installed in the PTA Block
2	Transformer	11/0.4 KV @50 KVA	1	Installed in the campus by HPSEBL
3	Generator	100KVA (Diesel)	2	1 Installed outside Science Block 2. Adjoining Library block(75-80% efficiency each)
4	Inverter	Max. output= 1.6KVA	1	Fuel Kerosene/gasoline at Physics Lab

4.2.2 Power Consumption:

Table 2: Month wise details of Electricity Bill

		Consumer ID-100008002460			Consumer ID-100008002461			Consumer ID-100008002462		
Year	Month	A/c 1241209897			A/c 1241209898					
		New	Old	Difference	New	Old	Difference	New	Old	Difference
2019	January	5953	5074	879	118,254.700	117,460.400	794.300	76,323.160	76,155.700	167.460
2019	February	6438	5953	485	119,012.100	118,254.700	757.400	76,778.610	76,323.160	455.450
2019	March	1	6438	-6437	119,817.400	119,012.100	805.300	77,358.170	76,778.610	579.560
2019	April	275.8	1	274.8	120,982.100	119,817.400	1,164.700	77,539.220	77,358.170	181.050
2019	May	1082.7	275.8	806.9	122,109.700	120,982.100	1,127.600	77,958.867	77,539.220	419.647
2019	June	2131.8	1082.7	1049.1	122,999.600	122,109.700	889.900	78,035.920	77,958.867	77.053
2019	July	3197.8	2131.8	1066	123,863.000	122,999.600	863.400	78,859.080	78,035.920	823.160
2019	August	5459.8	3197.8	2262	124,809.200	123,863.000	946.200	79,761.580	78,859.080	902.500
2019	September	7789.9	5459.8	2330.1	126,119.800	124,809.200	1,310.600	80,867.060	79,761.580	1,105.480
2019	October	10331.7	7789.9	2541.8	126,852.300	126,119.800	732.500	81,804.270	80,867.060	937.210
2019	November	11452.5	10331.7	1120.8	127,681.400	126,852.300	829.100	82,728.660	81,804.270	924.390
2019	December	12152.2	11452.5	699.7	129,356.700	127,681.400	1,675.300	83,140.020	82,728.660	411.360
2020	January	13318.5	12152.2	1166.3	130,847.900	129,356.700	1,491.200	83,563.050	83,140.020	423.030
2020	February	14154.9	13318.5	836.4	131,924.900	130,847.900	1,077.000	84,480.310	83,563.050	917.260
2020	March	14954.8	14154.9	799.9	132,453.900	131,924.900	529.000	85,409.340	84,480.310	929.030
2020	April	15486.2	14954.8	531.4	132,610.100	132,453.900	156.200	85,844.320	85,409.340	434.980
2020	May	15903.1	15486.2	416.9	132,841.900	132,610.100	231.800	86,192.270	85,844.320	347.950
2020	June	16152.1	15903.1	249	133,164.100	132,841.900	322.200	86,371.560	86,192.270	179.290
2020	July	16587.5	16152.1	435.4	133,524.700	133,164.100	360.600	86,530.970	86,371.560	159.410
2020	August	16919.1	16587.5	331.6	133,969.000	133,524.700	444.300	86,694.080	86,530.970	163.110
2020	September	17433.5	16919.1	514.4	134,459.500	133,969.000	490.500	86,958.150	86,694.080	264.070
2020	October	17944.4	17433.5	510.9	134,944.600	134,459.500	485.100	87,542.260	86,958.150	584.110
2020	November	18588.6	17944.4	644.2	135,272.400	134,944.600	327.800	88,528.660	87,542.260	986.400
2020	December	18851.6	18588.6	263	135,559.200	135,272.400	286.800	89,601.023	88,528.660	1,072.363
2021	January	19,926.600	18851.6	1075	136,276.000	135,559.200	716.800	90,186.364	89,601.023	585.340

2021	February	20,851.100	19,926.600	924.5	137,303.400	136,276.000	1,027.400	90,771.704	90,186.364	585.340
2021	March	21,297.100	20,851.100	446	138,127.000	137,303.400	823.600	91,357.045	90,771.704	585.340
2021	April	21,646.800	21,297.100	349.7	138,697.700	138,127.000	570.700	91,942.385	91,357.045	585.340
2021	May	21,297.100	21,646.800	-349.7	139,005.700	138,697.700	308.000	92,527.725	91,942.385	585.340
2021	June	21,646.800	21,297.100	349.7	139,357.500	139,005.700	351.800	93,113.066	92,527.725	585.340
2021	July	21,951.200	21,646.800	304.4	140,033.500	139,357.500	676.000	93,698.406	93,113.066	585.340
2021	August	22,552.500	21,951.200	601.3	140,517.800	140,033.500	484.300	94,283.746	93,698.406	585.340
2021	September	23,340.200	22,552.500	787.7	141,148.500	140,517.800	630.700	94,869.087	94,283.746	585.340
2021	October	25,192.900	23,340.200	1852.7	141,837.700	141,148.500	689.200	95,454.427	94,869.087	585.340
2021	November	26,219.200	25,192.900	1026.3	142,441.000	141,837.700	603.300	96,039.768	95,454.427	585.340
2021	December	26,758.200	26,219.200	539	143,367.600	142,441.000	926.600	96,625.108	96,039.768	585.340
2022	January	27,836.200	26,758.200	1078	143,694.000	143,367.600	326.400	496.500	96,625.108	-96,128.608
2022	February	28,145.700	27,836.200	309.5	144,357.100	143,694.000	663.100	787.180	496.500	290.680
2022	March	28,866.700	28,145.700	721	144,967.700	144,357.100	610.600	961.130	787.180	173.950
2022	April	29,745.600	28,866.700	878.9	145,855.300	144,967.700	887.600	1,295.310	961.130	334.180
2022	May	30,479.300	29,745.600	733.7	146,793.000	145,855.300	937.700			0.000
2022	June	31,596.100	30,479.300	1116.8	147,289.500	146,793.000	496.500	10,170.880	1,295.310	8,875.570
2022	July	32,718.100	31,596.100	1122	148,120.900	147,289.500	831.400	11,332.560	10,170.880	1,161.680
2022	August	34,147.000	32,718.100	1428.9	148,768.300	148,120.900	647.400	12,106.330	11,332.560	773.770
2022	September	35,800.800	34,147.000	1653.8	149,469.200	148,768.300	700.900	12,972.190	12,106.330	865.860
2022	October	37,522.500	35,800.800	1721.7	150,089.700	149,469.200	620.500	13,748.330	12,972.190	776.140
2022	November	38,735.300	37,522.500	1212.8	150,766.500	150,089.700	676.800	15,181.480	13,748.330	1,433.150
2022	December	39,446.100	38,735.300	710.8	151,426.200	150,766.500	659.700	16,385.190	15,181.480	1,203.710
2023	January	40,315.200	39,446.100	869.1	151,921.400	151,426.200	495.200	16,601.000	16,385.190	215.810
2023	February	41,871.200	40,315.200	1556	152,269.700	151,921.400	348.300	16,601.000	16,601.000	0.000
2023	March	42,491.400	41,871.200	620.2	153,034.000	152,269.700	764.300			0.000

		CONSUMER ID - 100003026763			CONSUMER ID - 100003026762			CONSUMER ID - 100003026761		
Year	Month	A/c 1241201536			A/c 1241201535			A/c 1241201534		
		New	Old	Difference	New	Old	Difference	New	Old	Difference
2019	January	11,238.00	11,094.00	144.00	29,543.00	29,117.00	426.000	10,623.00	10,288.00	335.000
2019	February	11,334.00	11,238.00	96.00	29,877.00	29,543.00	334.000	10,909.00	10,623.00	286.000
2019	March	11,435.00	11,334.00	101.00	30,229.00	29,877.00	352.000	11,094.00	10,909.00	185.000
2019	April	11,595.00	11,435.00	160.00	30,485.00	30,229.00	256.000	11,472.00	11,094.00	378.000
2019	May	11,741.00	11,595.00	146.00	30,728.00	30,485.00	243.000	12,226.00	11,472.00	754.000
2019	June	11,758.00	11,741.00	17.00	31,012.00	30,728.00	284.000	13,253.00	12,226.00	1,027.000
2019	July	11,825.00	11,758.00	67.00	31,331.00	31,012.00	319.000	14,294.00	13,253.00	1,041.000
2019	August	11,906.00	11,825.00	81.00	31,748.00	31,331.00	417.000	14,890.00	14,294.00	596.000
2019	September	11,983.00	11,906.00	77.00	32,192.00	31,748.00	444.000	15,544.00	14,890.00	654.000
2019	October	12,031.00	11,983.00	48.00	32,504.00	32,192.00	312.000	15,739.00	15,544.00	195.000
2019	November	12,059.00	12,031.00	28.00	32,760.00	32,504.00	256.000	15,879.00	15,739.00	140.000
2019	December	12,106.00	12,059.00	47.00	33,116.00	32,760.00	356.000	16,093.00	15,879.00	214.000
2020	January	12,153.00	12,106.00	47.00	33,410.00	33,116.00	294.000	16,256.00	16,093.00	163.000
2020	February	12,158.00	12,153.00	5.00	33,736.00	33,410.00	326.000	16,487.00	16,256.00	231.000
2020	March	12,194.00	12,158.00	36.00	34,059.00	33,736.00	323.000	16,756.00	16,487.00	269.000
2020	April	12,282.00	12,194.00	88.00	34,199.00	34,059.00	140.000	16,963.00	16,756.00	207.000
2020	May	12,282.00	12,282.00	0.00	34,459.00	34,199.00	260.000	16,963.00	16,963.00	0.000
2020	June	12,282.00	12,282.00	0.00	34,714.00	34,459.00	255.000	17,053.00	16,963.00	90.000
2020	July	12,282.00	12,282.00	0.00	34,873.00	34,714.00	159.000	17,118.00	17,053.00	65.000
2020	August	12,282.00	12,282.00	0.00	35,112.00	34,873.00	239.000	17,269.00	17,118.00	151.000
2020	September	12,282.00	12,282.00	0.00	35,278.00	35,112.00	166.000	17,426.00	17,269.00	157.000
2020	October	12,282.00	12,282.00	0.00	35,511.00	35,278.00	233.000	17,600.00	17,426.00	174.000
2020	November	12,282.00	12,282.00	0.00	35,776.00	35,511.00	265.000	17,703.00	17,600.00	103.000
2020	December	12,282.00	12,282.00	0.00	36,051.00	35,776.00	275.000	17,856.00	17,703.00	153.000
2021	January	12,290.00	12,282.00	8.00	36,341.00	36,051.00	290.000	18,076.00	17,856.00	220.000
2021	February	12,327.00	12,290.00	37.00	36,552.00	36,341.00	211.000	18,227.00	18,076.00	151.000

2021	March	12,384.00	12,327.00	57.00	36,856.00	36,552.00	304.000	18,350.00	18,227.00	123.000
2021	April	12,390.00	12,384.00	6.00	37,099.00	36,856.00	243.000	18,421.00	18,350.00	71.000
2021	May	12,390.00	12,390.00	0.00	37,300.00	37,099.00	201.000	18,485.00	18,421.00	64.000
2021	June	12,391.00	12,390.00	1.00	37,513.00	37,300.00	213.000	18,554.00	18,485.00	69.000
2021	July	12,394.00	12,391.00	3.00	37,698.00	37,513.00	185.000	18,798.00	18,554.00	244.000
2021	August	12,410.00	12,394.00	16.00	37,918.00	37,698.00	220.000	19,123.00	18,798.00	325.000
2021	September	12,422.00	12,410.00	12.00	38,232.00	37,918.00	314.000	19,613.00	19,123.00	490.000
2021	October	13,224.00	12,422.00	802.00	38,563.00	38,232.00	331.000	19,969.00	19,613.00	356.000
2021	November	14,053.00	13,224.00	829.00	38,901.00	38,563.00	338.000	20,136.00	19,969.00	167.000
2021	December	14,053.00	14,053.00	0.00	39,236.00	38,901.00	335.000	20,433.00	20,136.00	297.000
2022	January	50	14,053.00	-14,003.00	39,556.00	39,236.00	320.000	20,683.00	20,433.00	250.000
2022	February	71	50	21.00	39,556.00	39,556.00	0.000	20,894.00	20,683.00	211.000
2022	March	143	71	72.00	39,570.00	39,570.00	0.000	21,388.00	20,894.00	494.000
2022	April	162	143	19.00	39,570.00	39,570.00	0.000	21,981.00	21,388.00	593.000
2022	May	184	162	22.00	39,570.00	39,570.00	0.000	22,669.00	21,981.00	688.000
2022	June	260	184	76.00	39,570.00	39,570.00	0.000	23,223.00	22,669.00	554.000
2022	July	260	260	0.00	39,570.00	39,570.00	0.000	23,771.00	23,223.00	548.000
2022	August	270	260	10.00	39,570.00	39,570.00	0.000	24,494.00	23,771.00	723.000
2022	September	341	270	71.00	39,570.00	39,570.00	0.000	25,702.00	24,494.00	1,208.000
2022	October	380	341	39.00	39,570.00	39,570.00	0.000	26,464.00	25,702.00	762.000
2022	November	417	380	37.00	39,570.00	39,570.00	0.000	27,153.00	26,464.00	689.000
2022	December	463	417	46.00	39,570.00	39,570.00	0.000	27,795.00	27,153.00	642.000
2023	January	511	463	48.00	39,570.00	39,570.00	0.000	28,303.00	27,795.00	508.000
2023	February	537	511	26.00	39,570.00	39,570.00	0.000	28,711.00	28,303.00	408.000
2023	March	595	537	58.00	39,570.00	39,570.00	0.000	29,128.00	28,711.00	417.000

		CONSUMER ID - **100001586802**			CONSUMER ID **-100003026759**		
Year	Month	A/c 1241201344			A/c 1241201532		
		New	Old	Difference	New	Old	Difference
2019	January	2,476.00	2,431.00	45.00	17,344.00	17,289.00	55.000
2019	February	2,506.00	2,476.00	30.00	17,408.00	17,344.00	64.000
2019	March	2,545.00	2,506.00	39.00	17,479.00	17,408.00	71.000
2019	April	2,608.00	2,545.00	63.00	17,543.00	17,479.00	64.000
2019	May	2,700.00	2,608.00	92.00	17,598.00	17,543.00	55.000
2019	June	2,788.00	2,700.00	88.00	17,823.00	17,598.00	225.000
2019	July	2,889.00	2,788.00	101.00	17,942.00	17,823.00	119.000
2019	August	3,068.00	2,889.00	179.00	18,120.00	17,942.00	178.000
2019	September	3,282.00	3,068.00	214.00	18,413.00	18,120.00	293.000
2019	October	3,378.00	3,282.00	96.00	18,637.00	18,413.00	224.000
2019	November	3,410.00	3,378.00	32.00	18,641.00	18,637.00	4.000
2019	December	3,436.00	3,410.00	26.00	18,670.00	18,641.00	29.000
2020	January	3,574.00	3,436.00	138.00	18,670.00	18,670.00	0.000
2020	February	3,598.00	3,574.00	24.00	18,732.00	18,670.00	62.000
2020	March	3,637.00	3,598.00	39.00	18,806.00	18,732.00	74.000
2020	April	3,672.00	3,637.00	35.00	18,841.00	18,806.00	35.000
2020	May	3,672.00	3,672.00	0.00	18,841.00	18,841.00	0.000
2020	June	3,684.00	3,672.00	12.00	18,841.00	18,841.00	0.000
2020	July	3,707.00	3,684.00	23.00	18,841.00	18,841.00	0.000
2020	August	3,733.00	3,707.00	26.00	18,841.00	18,841.00	0.000
2020	September	3,797.00	3,733.00	64.00	18,841.00	18,841.00	0.000
2020	October	3,858.00	3,797.00	61.00	18,883.00	18,841.00	42.000
2020	November	3,891.00	3,858.00	33.00	18,898.00	18,883.00	15.000
2020	December	3,925.00	3,891.00	34.00	18,913.00	18,898.00	15.000
2021	January	3,985.00	3,925.00	60.00	18,919.00	18,913.00	6.000
2021	February	4,004.00	3,985.00	19.00	18,958.00	18,919.00	39.000
2021	March	4,049.00	4,004.00	45.00	18,988.00	18,958.00	30.000
2021	April	4,072.00	4,049.00	23.00	19,002.00	18,988.00	14.000
2021	May	4,083.00	4,072.00	11.00	19,002.00	19,002.00	0.000
2021	June	4,095.00	4,083.00	12.00	19,014.00	19,002.00	12.000

2021	July	4,152.00	4,095.00	57.00	19,118.00	19,014.00	104.000
2021	August	4,236.00	4,152.00	84.00	19,270.00	19,118.00	152.000
2021	September	4,324.00	4,236.00	88.00	19,481.00	19,270.00	211.000
2021	October	4,404.00	4,324.00	80.00	19,680.00	19,481.00	199.000
2021	November	4,432.00	4,404.00	28.00	19,730.00	19,680.00	50.000
2021	December	4,457.00	4,432.00	25.00	19,794.00	19,730.00	64.000
2022	January	4,474.00	4,457.00	17.00	19,818.00	19,794.00	24.000
2022	February	4,530.00	4,474.00	56.00	19,838.00	19,818.00	20.000
2022	March	4,530.00	4,530.00	0.00	19,905.00	19,838.00	67.000
2022	April	4,586.00	4,530.00	56.00	20,023.00	19,905.00	118.000
2022	May	4,670.00	4,586.00	84.00	20,125.00	20,023.00	102.000
2022	June	4,781.00	4,670.00	111.00	20,249.00	20,125.00	124.000
2022	July	4,835.00	4,781.00	54.00	20,330.00	20,249.00	81.000
2022	August	4,913.00	4,835.00	78.00	20,561.00	20,330.00	231.000
2022	September	5,068.00	4,913.00	155.00	20,819.00	20,561.00	258.000
2022	October	5,123.00	5,068.00	55.00	20,947.00	20,819.00	128.000
2022	November	5,153.00	5,123.00	30.00	21,017.00	20,947.00	70.000
2022	December	5,294.00	5,153.00	141.00	21,099.00	21,017.00	82.000
2023	January	5,314.00	5,294.00	20.00	21,182.00	21,099.00	83.000
2023	February	5,329.00	5,314.00	15.00	21,275.00	21,182.00	93.000
2023	March	5,362.00	5,329.00	33.00	21,335.00	21,275.00	60.000

		CONSUMER ID 200003002510			CONSUMER ID - 200003002511		
Year	Month	A/c 1241201536					
		New	Old	Difference	New	Old	Difference
2021	July	958			918	0.000	918.000
2021	August	1,937.00	958	979.00	1,887.00	918	969.000
2021	September	2,848.00	1,937.00	911.00	3,304.00	1,887.00	1,417.000
2021	October	3,664.00	2,848.00	816.00	4,266.00	3,304.00	962.000
2021	November	4,130.00	3,664.00	466.00	4,542.00	4,266.00	276.000
2021	December	4,986.00	4,130.00	856.00	5,121.00	4,542.00	579.000
2022	January	5,676.00	4,986.00	690.00	5,611.00	5,121.00	490.000
2022	February	6,327.00	5,676.00	651.00	5,646.00	5,611.00	35.000
2022	March	6,858.00	6,327.00	531.00	6,012.00	5,646.00	366.000
2022	April	7,861.00	6,858.00	1,003.00	6,687.00	6,012.00	675.000
2022	May	9,300.00	7,861.00	1,439.00	8,013.00	6,687.00	1,326.000
2022	June	11,265.00	9,300.00	1,965.00	8,994.00	8,013.00	981.000
2022	July	13,102.00	11,265.00	1,837.00	9,612.00	8,994.00	618.000
2022	August	14,701.00	13,102.00	1,599.00	10,649.00	9,612.00	1,037.000
2022	September	16,364.00	14,701.00	1,663.00	12,435.00	10,649.00	1,786.000
2022	October	17,600.00	16,364.00	1,236.00	13,385.00	12,435.00	950.000
2022	November	18,459.00	17,600.00	859.00	14,185.00	13,385.00	800.000
2022	December	19,592.00	18,459.00	1,133.00	16,499.00	14,185.00	2,314.000
2023	January	20,390.00	19,592.00	798.00	18,184.00	16,499.00	1,685.000
2023	February	20,794.00	20,390.00	404.00	19,477.00	18,184.00	1,293.000
2023	March	21,321.00	20,794.00	527.00	19,806.00	19,477.00	329.000
2023	April	21,640.00	21,321.00	319.00	20,150.00	19,806.00	344.000

CONSUMER ID -200018000562					
Year	**Month**	**Unit Produced by solar Panel**	**Year**	**Month**	**Unit Produced by solar Panel**
2020	February	0.000	2021	October	675.000
2020	March	79.000	2021	November	690.000
2020	April	650.000	2021	December	1,190.000
2020	May	650.000	2022	January	1,890.000
2020	June	650.000	2022	February	2,780.000
2020	July	650.000	2022	March	4,200.000
2020	August	650.000	2022	April	5,000.000
2020	September	650.000	2022	May	5,780.000
2020	October	650.000	2022	June	6,595.000
2020	November	650.000	2022	July	7,420.000
2020	December	650.000	2022	August	8,792.000
2021	January	650.000	2022	September	9,399.000
2021	February	650.000	2022	October	10,252.000
2021	March	650.000	2022	November	10,836.000
2021	April	650.000	2022	December	11,778.000
2021	May	650.000	2023	January	12,819.000
2021	June	650.000	2023	February	13,526.000
2021	July	650.000	2023	March	14,214.000
2021	August	660.000	2023	April	15,426.000
2021	September	660.000			

Monthly average consumption of units in last five years:

Consumer ID	A/c	Units
100008002460	1241209897	623.62
100008002461	1241209898	592.880
100008002462	---	992.56
100003026763	1241201536	174.98
100003026759	1241201532	84.21
100003026761	1241201534	314
100003026762	1241201535	173.98
100001586802	1241201344	61
200003002510	1241201536	574.5
200003002511	-	550.16
Total Unit consumed per month		4141.89
Average Monthly Bill@5.50/-		22780.39

4.2.3 Energy Usages as per observations

On the basis of data collected with documents in record and information collected, following energy consumption was noted:

- Electricity bill – Rs 22780 /Month
- GENERATOR- 100 kVA (each)
- Diesel consumption per month- 20 liters (each)
- Total energy cost @Rs 85/liter- Rs1700/- each

Table No 3 Different Energy Usage

S.N.	Name	Numbers	S.N.	Name	Numbers
1	Fluorescent	513	13	Photostat Machine	2
2	LED Bulb	76	14	Laptop	6
3	CFL	17	15	Fax Machine	2
4	Incandescent Bulb	4	16	Air Conditioner	18
5	Ceiling Fan	412	17	Interactive Board Panels	13
6	Digital Podium	10	18	Geyser& Heater	2+22=24
7	Solar Street Light	5	19	Refrigerator	9
8	Computer/ Desktop	255	20	Lab Equipment's	72
9	Laser printer	43	21	Public Address System	78
10	Projector	22	22	LPG Cylinder	3
11	Water Cooler	12	23	CCTV Cameras	40
12	Submersible Pump	1	24	Wall Mounted Fan	14

Table No.4 Energy Consumption per day (in Kwh) by different usages

S.N.	Name	Numbers	Average Time Usage	Wattage (in Watts)	Energy Consumption per day in (Kwh)
1	Fluorescent	513	10	20	102.6
2	LED Bulb	76	10	11	8.36
3	CFL	17	10	23	3.91
4	Incandescent Bulb	4	10	100	4
5	Ceiling Fan	412	6	28	69.21
6	Digital Podium	10	0.5	150	5
7	Solar Street Light	5	10	15	0.75
8	Computer/ Desktop	255	6	150	229.5
9	Laser printer	43	1	375	16.12
10	Projector	22	0.5	150	1.65
11	Water Cooler	12	12	750	108
12	Submercible Pump	1	1	1000	1
13	Photostate Machine	2	0.5	1100	1.1
14	Laptop	6	5	30	0.9
15	Fax Machine	2	0.5	15	0.01
16	Air Conditioner	18	6	2000	216
17	Interactive Board Panels	13	5	250	1.62
18	Geyser& Heater	2+22=24	0.5	2000	24
19	Refrigerator	9	22	150	29.7
20	Lab Equipments	72	2		
21	Public Address System	78	0.5	1100	39
22	LPG Cylinder	3	5	NA	NA
23	CCTV Cameras	40	24	50	48
24	Wall Mounted Fan	14	4	50	0.28

4.2.4 Energy Saving Practices:

➢Switch off electrical equipment's when not in use.

➢Avoid artificial lighting during day time.

➢Unplug overhead Projectors, Interactive Panels when not in use.

➢If Air conditioner is in use, then keep doors closed to maintain the Temperature.

➢Remember to turn the lights, fans and any other electrical appliances off while leaving a class room.

➢Master switches installed outside rooms.

➢Timely switch off water motor installed in campus

➢Use lights and fans as when as required . Do not switch on all the lights and fans of the room

➢Don't overcool; Set room temperature to 24°C–27°C , while using Air Conditioners.

➢CFLs are being replaced by more efficient LEDs.

➢Use computers and electronic equipment's in power saving mode.

4.2.5 Recommendations for Better Energy Efficiency

Energy audit team recommended certain steps for improving energy efficiency. Through Cost Analysis of certain appliances team recommended measures that need to be performed along with general measures for energy efficiency. Described below are some important recommendations for better energy efficiency:

4.2.5.1Low or No Investment

i) Housekeeping

Curtains - Curtains play vital role in saving energy as follows:

Day Light: with curtains moved aside we can use day light against lamps to save energy.

Direct sun light: This can heat up room and increase consumption of energy by ACs. There is need to keep curtains on windows to prevent direct sunlight inside the room

to avoid heating of cooled air. This can reduces AC load significantly.

ii) Better Practices for use of Air Conditioners

College has in total 18 split type AC's which make a very large part of total energy consumption of the campus. But, at many places it was found that AC is not used with best recommended practices. Even simple things, such as insulation, are not taken care of. Window panes were found broken at many places. Also, at certain places ACs were found to be used without keeping curtains. These poor practices account for increase in AC load and thus consumption.

Some Highlights given below for most efficient use of ACs:

Proper Insulation-Good quality insulation must be maintained in the air- conditioned rooms by keeping all doors and windows closed properly so as to prevent cool air go out and hot air come in.

Operating - The ACs should be switched on 15 minutes before actual use and should be switched off before leaving the room.

4.2.5.2 Low Investment Few year time of Replacement,

4.2.5.1.1 To Replace CFLs and Incandescent bulbs with LEDs lamps

The traditional 23W CFLs and 100W Incandescent bulbs at some places in campus indicate a total of 17 CFLs and 04 incandescent bulbs. If these CFLs and incandescent bulbs are replaced by LEDs 10-12W power can be saved per CFL/incandescent bulb.

Cost Analysis of Replacing CFLs with LEDs:

Total No. of CFLs in Campus = 17

Power consumption of CFL = 391W

Total No. of Incandescent bulbs in Campus = 04

Power consumption of Incandescent bulbs = 400W

Average Power of LED = 11W

Power saved per LED against CFL = 12W

Power Saved per LED against Incandescent bulb=89W

Total Power saving = 924 W

Average Use of CFL per year =17* 10 hours*365=62.05KWh

Average Use of Incandescent bulbs per year = 4*10 hours*365=14.6 KWh

Total Energy saved per year = 924*10*365=3372.60 KWh

Saving in Rs. Per year =3372.60 *5.5=18549/-

Average Cost of Replacing each CFL and Incandescent bulb = Rs 100

Total Cost of Replacing all CFLs and Incandescent bulbs = Rs 2100

Capital Cost Recovery time = 10 months

Hence, the capital cost recovery time for replacing all CFLs of the campus is within 10 months.

4.2.5.3. High/medium Investment with Long Term Replacement

1. Energy substitution (electrical energy to solar energy)

There is a high electrical Energy consumption in College which needs to be substituted with alternate energy source. A very good option is solar energy. Energy consumption of solar street light put in use in college campus in September, 2024 has saved energy at nominal cost of their installation.

- ✓ Cost analysis of solar Energy lights is as under
- ✓ Watt hour per day- 15W*10Hr*6No=900Wh
- ✓ Total watt peak rating- 15W
- ✓ No. of Solar street lights in campus-05
- ✓ Cost of Street lights-Rs2500*05No=Rs1 2500/-
- ✓ *KWH saved per month- 20W*05No*10Hr*30days=30KWh
- ✓ Annual savings in Rs. – 30KWh*12 months*Rs5.50=Rs1980/-
- ✓ Payback period- 5 years one month.

4.2.5 Observations by Energy audit team

- Regular monitoring of electrical equipment's is undertaken and immediate maintenance, rectification is done.
- Energy efficient equipment's are placed in place of outdated non efficient.
- Efforts to reduce energy consumption at all places are satisfactory.
- Electricity bill per month is not high.

4.2.7. Final Findings by Energy Audit Team

The Govt. P.G. College Una is relatively low power consumption category building. However, there is lot of potential for energy saving and some of the critical / high priority areas are:

- Communication for awareness to save Energy is adequate.
- The average power factor is ….0.97
- During the college operating time Power factor is between 0.95 to 1.00, which is fine as per the standards
- Electrical load assessment is being calculated.
- Power consumption per month in campus is not high.
- Efforts to save energy are sufficient.
- Energy efficient equipment is replacing old ones in phased manner.
- Equipment's are regularly monitored by electricity committee and replacement /rectification is done in a routine manner.
- Water Tank Overflow Alarm Wired Sensor Security System is required for all water supply tanks.
- In college campus switch off the light & fan in all washroom, when not in use; occupancy sensors may be installed.

4.3 Energy Generation through On Grid Top Roof Solar Panel

Solar power sector in India has emerged as a fast upcoming section in last few years. It supports the government agenda of sustainable growth, while, emerging as an integral part of the solution to meet the nation's energy needs and an essential player for energy security.

An on-grid or grid-tied solar system is a system that works along with the grid. This means that any excess or deficiency of power can be fed to the grid through net metering. Government Post Graduate College Una is opting for an On-grid solar system with capacity 15Kwp, to get a chance to enjoy credit for the excess power produces and save on their electricity bills per month to selling it to Himachal Pradesh State Electricity Board Limited (HPSEBL).

Top Roof Solar Panel Installed on PTA Block

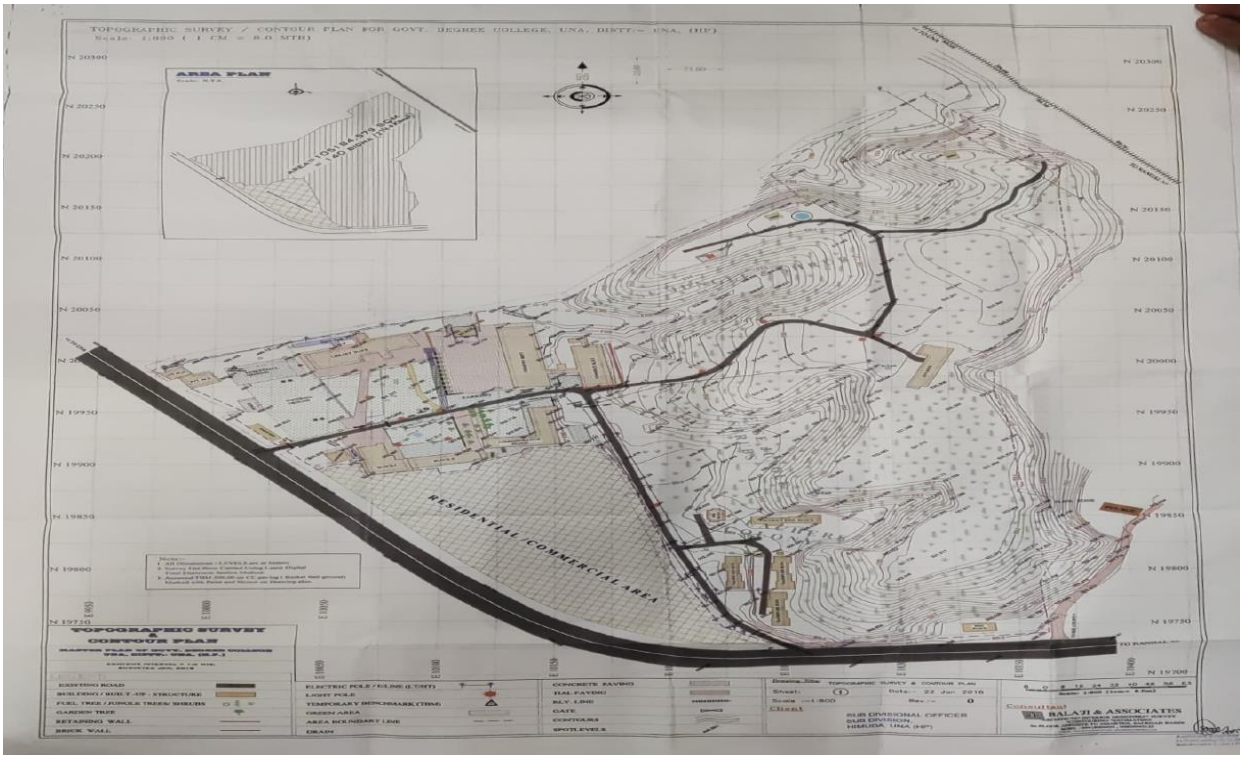
Moreover, Government P.G. College Una is having lots of space on the roof which can be used for solar power plant. Now, the auditing team observed that the Government P.G. College Una has more open space on building to install top roof solar panel. Hence it is recommended that the streetlights of Government P.G. College Una be replaced with Solar Street lights.

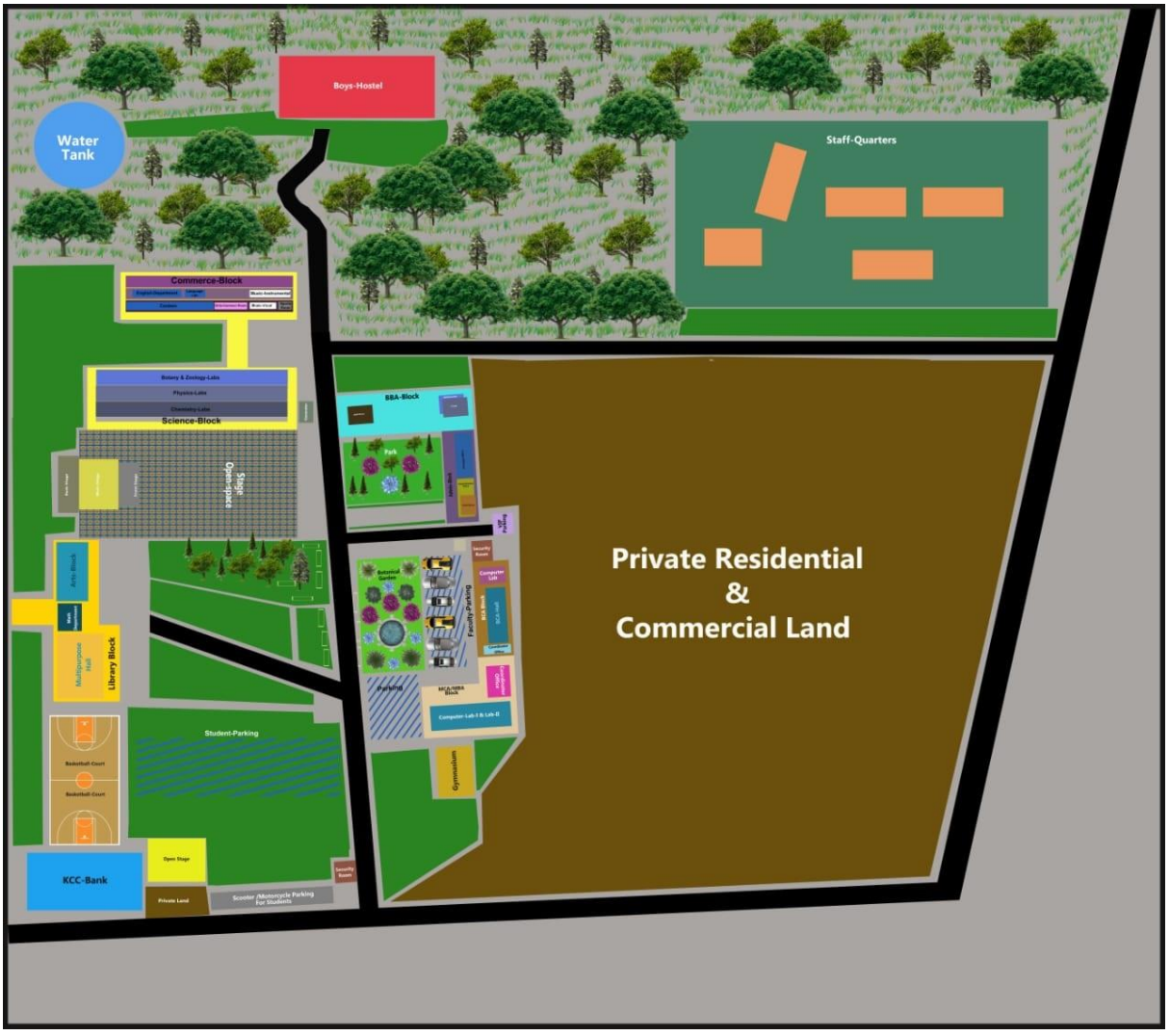
Energy Saving by Using Top roof Solar Panel on PTA Block			
S.N.	**Particular**	**Units**	**Value**
1	Installation of Solar Power	Kwp	15kwps
2	Annual Generation	Kwh/year	18000
3	Electrical Unit Cost	Rs./Kwh	5.5
4	Annual Monetary Value	Rs/year	99000
5	Investment	Rs./Kwh	580000
6	Simple Payback Period	Months	64

4.4 Action Plan

Energy audit is an important process. Energy saving methods need to be adopted and implemented every year to make the college environmentally sustainable. Energy audit recommendations need to be implemented before the next audit.

5. Roadmap & Photograph of College:




Boys-Hostel
Water Tank
Staff-Quarters
Commerce-Block
Science-Block
Open-stage
Stage
BBA-Block
Park
Private Residential
&
Commercial Land
Arts Block
Multipurpose Hall
Library Block
Student-Parking
Basketball-Court
Basketball-Court
KCC-Bank
Open Stage
Private Land
Scooter /Motorcycle Parking For Students
Security Room
Botanical Garden
Faculty-Parking
Computer Lab
Parking
MCA/MBA Block
Computer-Lab-I & Lab-II
Gymnasium


Guidelines for using electrical appliances
1. Switch off all the appliances when they are not in use.
2. Avoid artificial lighting in day time.
3. Unplug overheated projectors, computers, and smart boards when not in use.
4. If Air conditioner is in use, then keep doors closed to maintain the temperature.
5. Remember to turn the lights, fans and any other electrical appliances off when you leave a classroom.
6. Timely switch off the water motor installed in the campus.
7. Use lights and fans as required; do not switch on all the lights and fans of the room.
8. Don't overcool, set your room temperature to 24°C-27°C, While using Air Conditioners

6. References:

- Record available with college office.
- Power consumption bills from Himachal Pradesh State Electricity Board Limited.
- Physical observations and studies.
- Internet websites.
- Energy Conservation Act 2010.