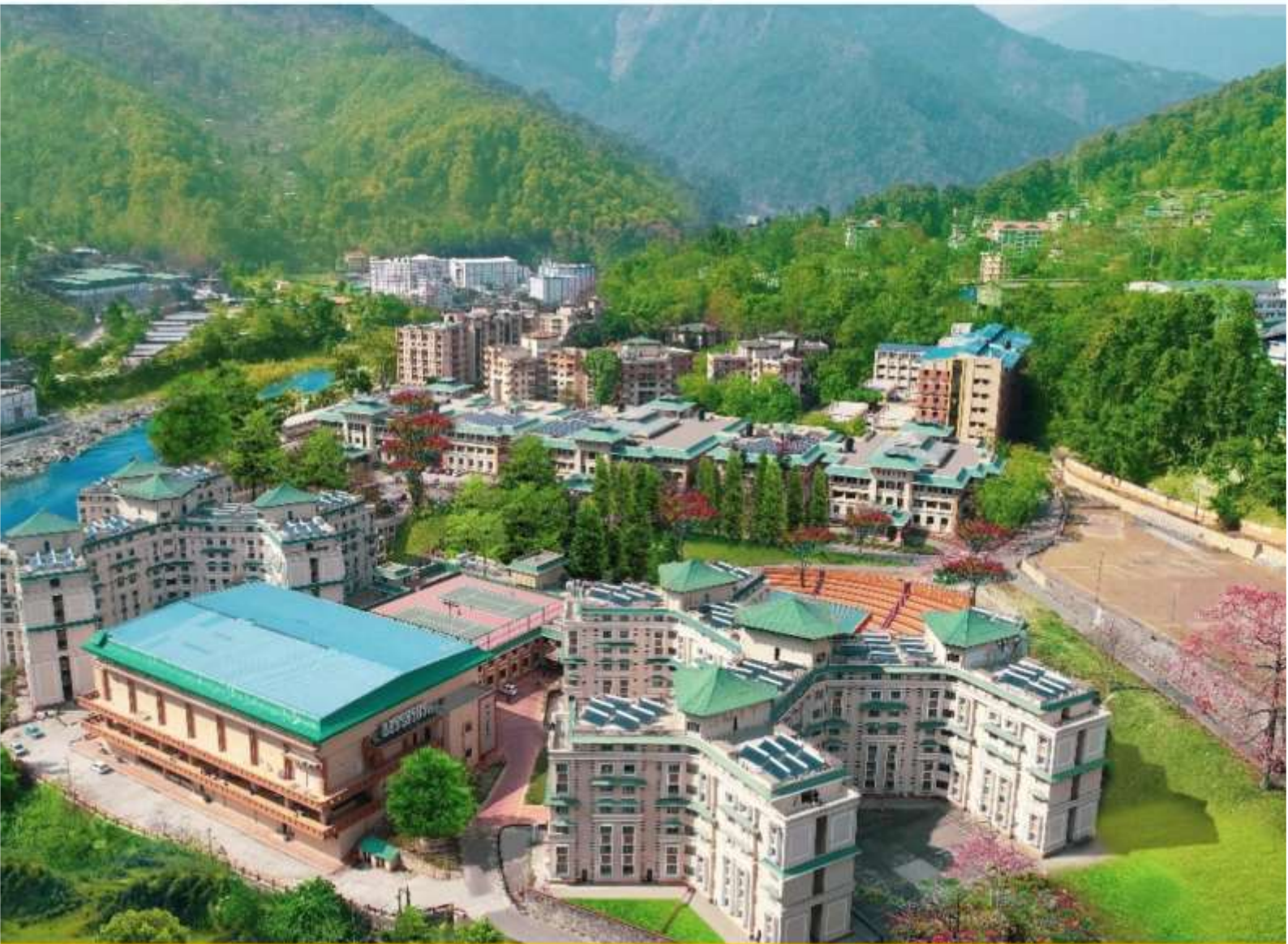




**SMU** SIKKIM  
MANIPAL  
UNIVERSITY

*Accredited by NAAC*



# ENERGY AUDIT REPORT

PREPARED BY  
EHS ALLIANCE SERVICES

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## CERTIFICATE



# CERTIFICATE

PRESENTED TO

## SIKKIM MANIPAL UNIVERSITY (SMU)

Sikkim Manipal University, 5th Mile, Tadong, Gangtok, 737102

Has been assessed by EHS Alliance Services for the comprehensive study of Energy Audit on institutional working framework to fulfill the requirement of

## ENERGY AUDIT

The energy-saving initiatives carried out by the College have been verified in the report submitted and were found to be satisfactory.

The efforts taken by management and faculty towards all types of energy used in the College and sustainability are highly appreciated and noteworthy.



SIGNATURE



03.08.2022

DATE OF AUDIT

## ACKNOWLEDGEMENT

EHS Alliance Services would like to thank the management of Sikkim Manipal University (SMU), Gangtok for assigning this important work of Energy Audit. We appreciate the co-operation to the teams for completion of assessment.

We would like to specially thank ***Lt Gen (Dr) Rajan S Grewal - Vice Chancellor, SMU*** for giving us an opportunity to evaluate the environmental performance of the campus

We would also like to thank ***Col Manoj Kumar(Retd) - Head Engineering - Infrastructure and Facilities, SMU***, for his continuous support and guidance, without which the completion of the project would not have been possible. We are also thankful to other staff members who were actively involved while collecting the data and conducting field measurements.

We are also thankful to

***Prof. (Dr) KS Sherpa - Registrar, SMU***

***Dr Murlidhar V Pai - Dean, SMIMS***

***Prof. (Dr) G L Sharma - Director SMIT***

***Col V S Yadav (Rtd.) - Head General Services, SMU***

***Col D B Chhetri (Rtd.) - Head Administration, SMIT***

***Mr. Sebom Mukherjee - Dy. Manager (Housekeeping), SMIT***

## DISCLAIMER

EHS Alliance Services Energy Audit Team has prepared this Energy Audit Report for SMU based on input data submitted by the representatives of University complemented with the best judgment capacity of the expert team.

While all reasonable care has been taken in its preparation, details contained in this report have been compiled in good faith based on information gathered.

It is further informed that the conclusions are arrived following best estimates and no representation, warranty or undertaking, express or implied is made and no responsibility is accepted by Audit Team in this report or for any direct or consequential loss arising from any use of the information, statements or forecasts in the report.

If you wish to distribute copies of this report external to your organization, then all pages must be included.

EHS Alliance, its staff and agents shall keep confidential all information relating to your organization and shall not disclose any such information to any third party, except that in the public domain or required by law or relevant accreditation bodies. EHS Alliance staff, agents and accreditation bodies have signed individual confidentiality undertakings and will only receive confidential information on a 'need to know' basis.



**Vijay Singh**  
Lead Auditor EMS & Energy



**Dr. Uday Pratap**  
Co-Auditor EMS & Energy

## **ABBREVIATION**

<b>A</b>	<b>Amps</b>
<b>AC</b>	<b>Air Conditioner</b>
<b>AC</b>	<b>Alternating Current</b>
<b>AMET</b>	<b>Academy of Maritime Education and Training</b>
<b>CFL</b>	<b>Compact fluorescent lamp</b>
<b>CIP</b>	<b>Comprehensive Inspection Programme</b>
<b>DC</b>	<b>Direct Current</b>
<b>HSD</b>	<b>High Speed Diesel</b>
<b>Hz</b>	<b>Hertz</b>
<b>kg</b>	<b>Kilogram</b>
<b>kVA</b>	<b>kilo-volt-ampere</b>
<b>kW</b>	<b>kilo Watts</b>
<b>kWh</b>	<b>kilowatt hour</b>
<b>kWp</b>	<b>Kilowatt peak</b>
<b>LED</b>	<b>Light Emitting Diode</b>
<b>LPG</b>	<b>Liquefied Petroleum Gas</b>
<b>MMS</b>	<b>Module mounting structure</b>
<b>MPPT</b>	<b>Maximum Power Point Tracker</b>
<b>NAAC</b>	<b>The National Assessment and Accreditation Council</b>
<b>SEC</b>	<b>Specific Energy Consumption</b>
<b>SPV</b>	<b>Solar Photovoltaic</b>
<b>STC</b>	<b>Standard Test Condition</b>
<b>TV</b>	<b>Television</b>
<b>V</b>	<b>Volts</b>
<b>W</b>	<b>Watts</b>
<b>W/m<sup>2</sup></b>	<b>watt per square meter</b>

## INTRODUCTION OF UNIVERSITY

Sikkim Manipal University (SMU) formerly known as Sikkim Manipal University of Health, Medical and Technological Sciences came into existence on November 15, 1992 as a result of the agreement signed between the Government of Sikkim and the Manipal Pai Foundation, with the aim of imparting exemplary education and health care services in the state of Sikkim and country wide.



It is the first ever Public Private Partnership in the country for higher Education and Health Care Services. The University has two campuses: Medical campus and the Technology campus. Government of Sikkim provides a grant of Rs. 2.25 Crores per annum for the hospital against which CRH provides free treatment to BPL families and concessional treatment to other residents of the State.



The University was established in 1995 vide Sikkim Manipal University of Health, Medical and Technological Sciences Act (Act No. 9 of 1995). SMU is recognized by the University Grants Commission under Section 2(f) of the UGC Act, 1956 vide letter No F. 9-7/96(CPP-I) dated 9th Dec 1998 and approved by the Government of India. All courses run by the university are approved by the regulatory bodies like Medical Council of India (MCI), Nursing Council of India, Indian Association of Physiotherapy, All India Council for Technical Education (AICTE) and the Distance Education Council.



The Sikkim Manipal University of Health Medical and Technological Sciences (Amendment) Act No. 13 of 2009 was passed by the Sikkim Legislative Assembly on 12 Dec, 2009 and received the assent of The Governor of Sikkim on the 22nd of January 2010. Vide Notification No. 13/LD/P/2010, Dated: 08/04/2010 of Sikkim Government, Sikkim Manipal University of Health Medical and Technological Sciences was changed to Sikkim Manipal



# MISSION | VISION | OBJECTIVES | CORE VALUES

## VISION

Global Leadership in Human Development, Excellence in Education and Healthcare.

## MISSION

Develop professionals of excellent technical calibre in the field of Health Sciences, Engineering, Management and Social Sciences with a humane approach capable of shouldering the responsibility of building the nation and be globally competent.

## OBJECTIVES

- To support, promote and undertake the advancement of academics
- To promote use of ICT and modern education technologies
- To encourage research, creation and dissemination of knowledge
- To facilitate extension and community service
- To empower people of Sikkim and contribute to human development in Northeast
- To create environmental and social responsibilities among students and employees
- To ensure steady growth of the University

## CORE VALUES

### ***Integrity and Honesty***

We conduct ourselves ethically and legally in all situations upholding stakeholder trust.

### ***Committed to Teams, Accountable for Results and Passion to Win***

We are passionate about winning and hold ourselves accountable to organizational goals. We believe in teamwork and foster a performance driven culture across the organization.

### ***Achieving Social Impact***

We fulfil our responsibility to society, continuously contributing to build a better world.

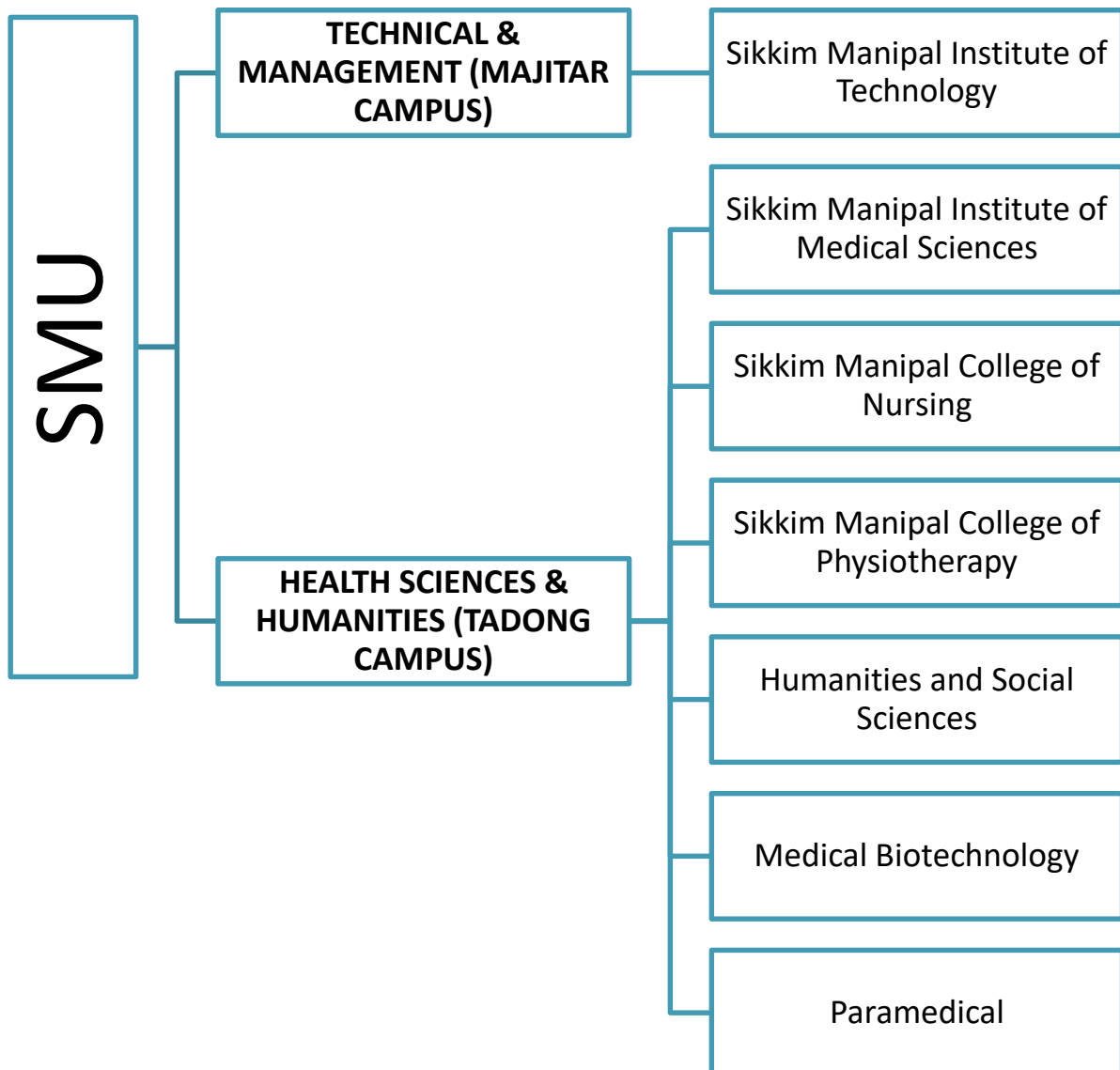
### ***Respect and Fairness***

We trust every individual and treat them with dignity, respect and fairness. We practice open and honest communication at all times.

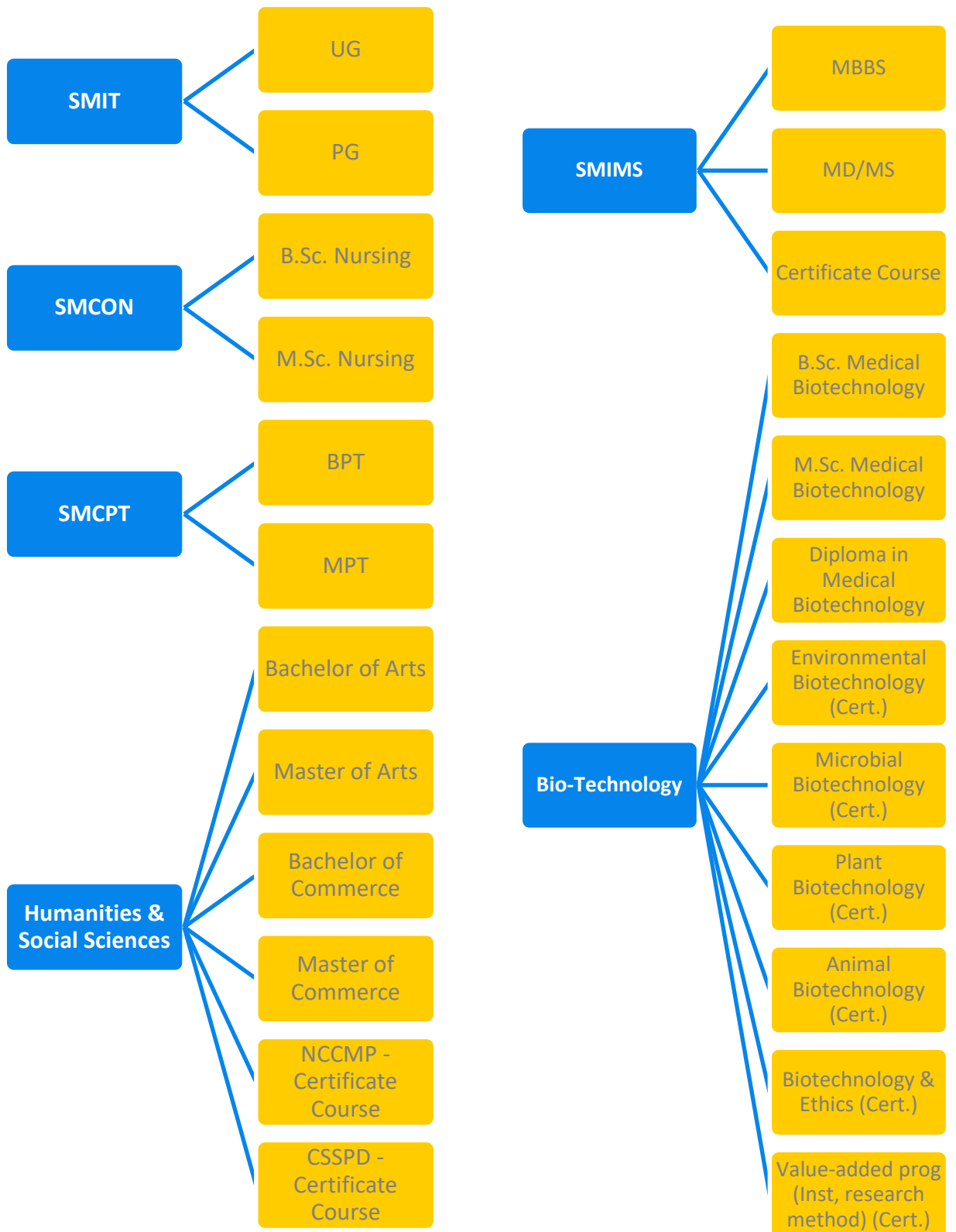
### ***Excellence through Quality, Innovation and Leadership***

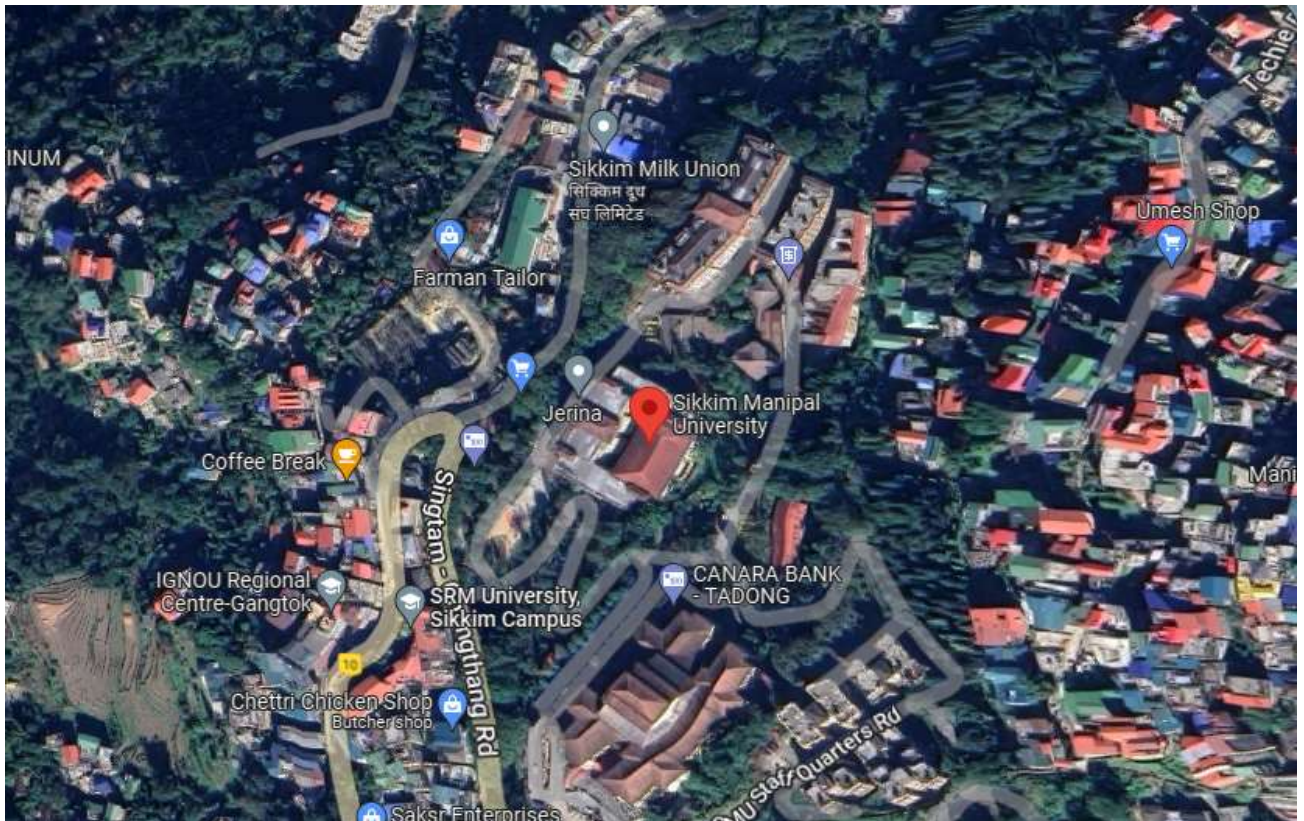
We are committed to delivering superior programs and academic services through

continuous innovation and leadership at all levels. Below are the details of institutions:



Presently, SMU offers various courses featuring a wide selection of undergraduate, postgraduate and PhD courses. Below are the details of SMU faculties namely:





**Geo Location** Geo Coordinates from Google maps: 27.3177334, 88.5960472



## Audit Participants

On behalf of University

Name	Designation
<b><i>Lt Gen (Dr) Rajan S Grewal</i></b>	<i>Vice Chancellor, SMU</i>
<b><i>Prof. (Dr) KS Sherpa</i></b>	<i>Registrar, SMU</i>
<b><i>Dr Murlidhar V Pai</i></b>	<i>Dean, SMIMS</i>
<b><i>Prof. (Dr) G L Sharma</i></b>	<i>Director SMIT</i>
<b><i>Col V S Yadav (Rtd.)</i></b>	<i>Head General Services, SMU</i>
<b><i>Col Manoj Kumar(Retd)</i></b>	<i>Head Engineering - Infrastructure and Facilities, SMU</i>
<b><i>Col D B Chhetri (Rtd.)</i></b>	<i>Head Administration, SMIT</i>
<b><i>Mr. Sebom Mukherjee</i></b>	<i>Dy. Manager (Housekeeping), SMIT</i>

On behalf of EHS Alliance Services

Name	Position	Qualifications
<b><i>Mr. Vijay Singh</i></b>	<i>Lead-Auditor</i>	<i>M.Sc. M. Tech (Environment Science &amp; Engineering), Energy Auditor, Post Diploma in Industrial Safety Management</i>
<b><i>Dr. Uday Pratap</i></b>	<i>Co-Auditor</i>	<i>Ph.D. , PDIS, QCI – WASH, Lead Auditor ISO 14001:2015</i>



## EXECUTIVE SUMMARY

The purpose of this Energy Audit was to seek opportunities to improve the energy efficiency of the SMU. Reducing the energy consumption despite improving the human comfort, health and safety were of primary concern.

Beyond just identifying the energy consumption pattern, this audit sought to detect and categorize the most energy efficient appliances. Additionally, some daily practices relating common appliances have been shared which may help reducing the energy consumption. Data collection for energy audit of the University was carried out by the EHS Alliance Team. The Energy Audit Report accounts for the energy consumption patterns of the University on actual survey and detailed analysis during the audit.

The work comprehends the area wise consumption traced using suitable equipment. The analysis was carried out by our team with the support of the staff members from SMU. The report provides a list of possible actions to preserve and efficiently access the available source, resources and their saving potential was also identified. We look forward towards optimization that the authorities, students and staff members would follow the recommendations in the best possible way. The report is based on certain generalizations including the approximations wherever necessary. The views conveyed may not reveal the general opinion. They merely represent the opinion of the team guided by the interviews of clients. We are happy to submit this Energy audit report to the SMU.

## ENERGY AUDIT ANALYSIS

### 1. ENERGY CONSUMPTION

To understand the Energy Consumption trends and for analyzing the average monthly consumption we have collected electricity energy bills from Jan 2022 to Dec 2022

The details of “**Meter Connection**” at “**SMU**” are as follows-

Name - Sikkim Manipal University

CA No. - 121005A00DT30001

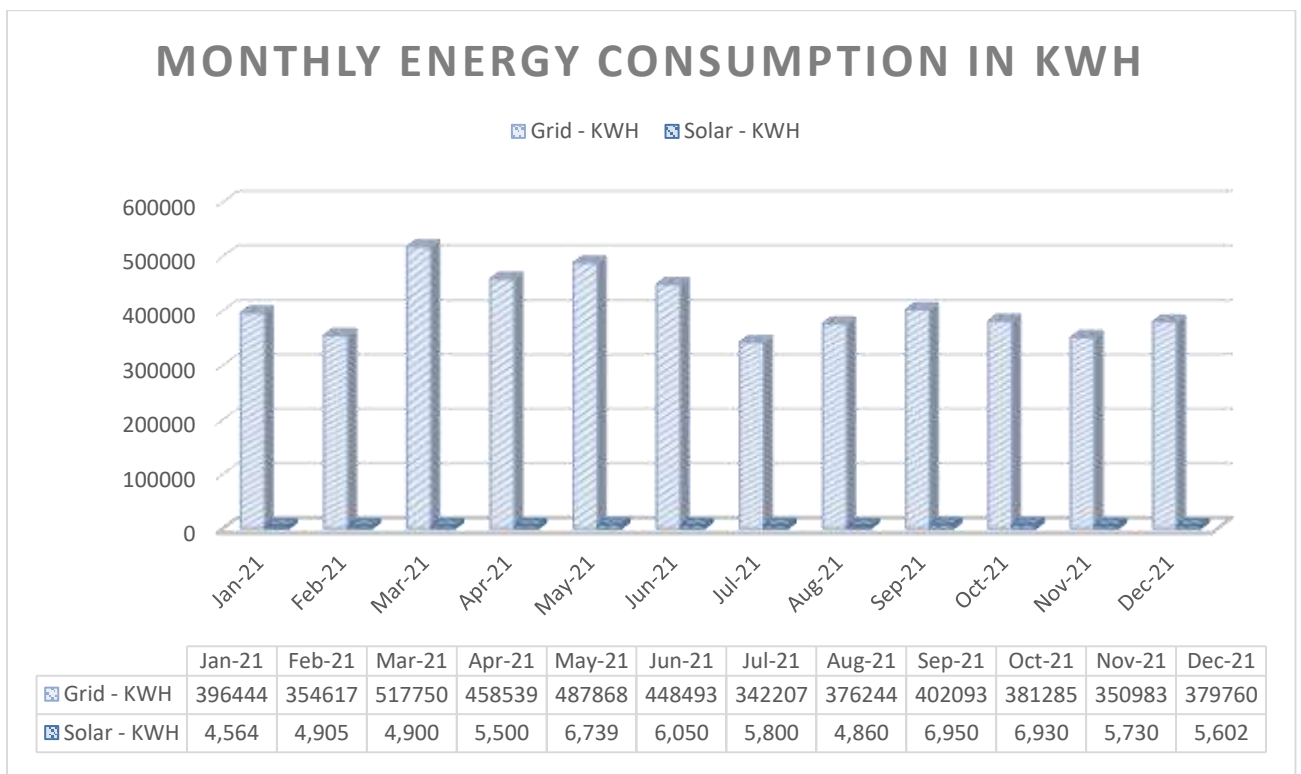
Name - Sikkim Manipal Institute of Technology

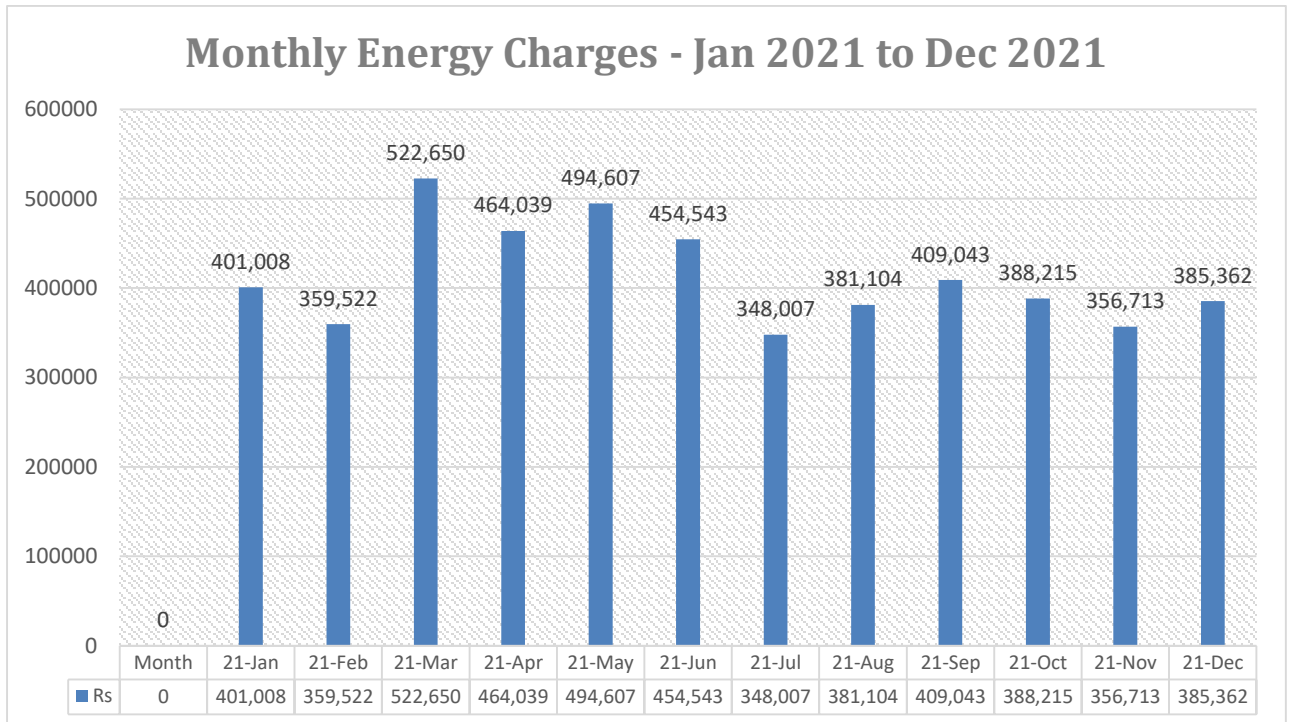
CA No. - 000000038999

## 1.1 Summary of Monthly Electricity Consumption and Total Bill Amount

To understand the Energy consumption trend and for developing the baseline parameter we have collected monthly energy bill for the 12 months i.e. from Jan 2021 to Dec 2021

Month	Grid Power	Solar	Total
Jan-21	396444	4,564	401,008
Feb-21	354617	4,905	359,522
Mar-21	517750	4,900	522,650
Apr-21	458539	5,500	464,039
May-21	487868	6,739	494,607
Jun-21	448493	6,050	454,543
Jul-21	342207	5,800	348,007
Aug-21	376244	4,860	381,104
Sep-21	402093	6,950	409,043
Oct-21	381285	6,930	388,215
Nov-21	350983	5,730	356,713
Dec-21	379760	5,602	385,362
<b>SUM</b>	<b>4,896,283</b>	<b>68,530</b>	<b>4,964,813</b>

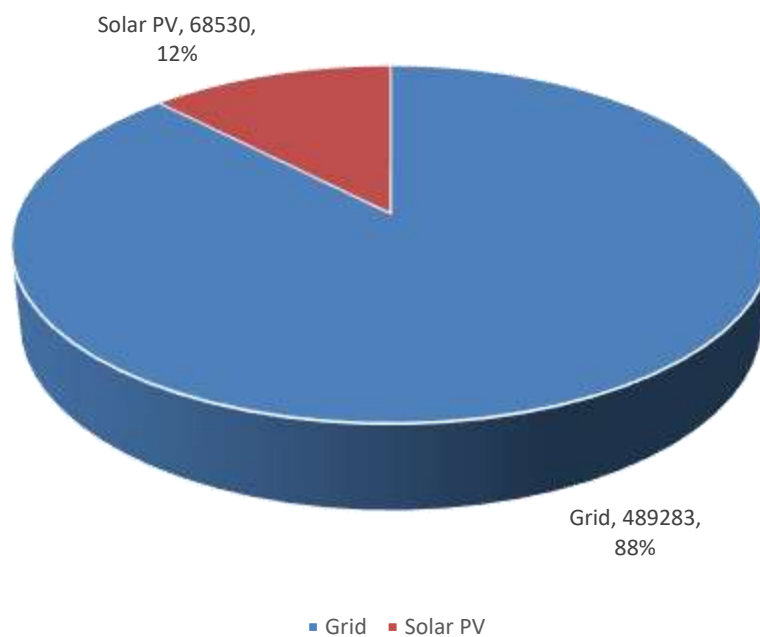




### Electricity generation from Solar PV

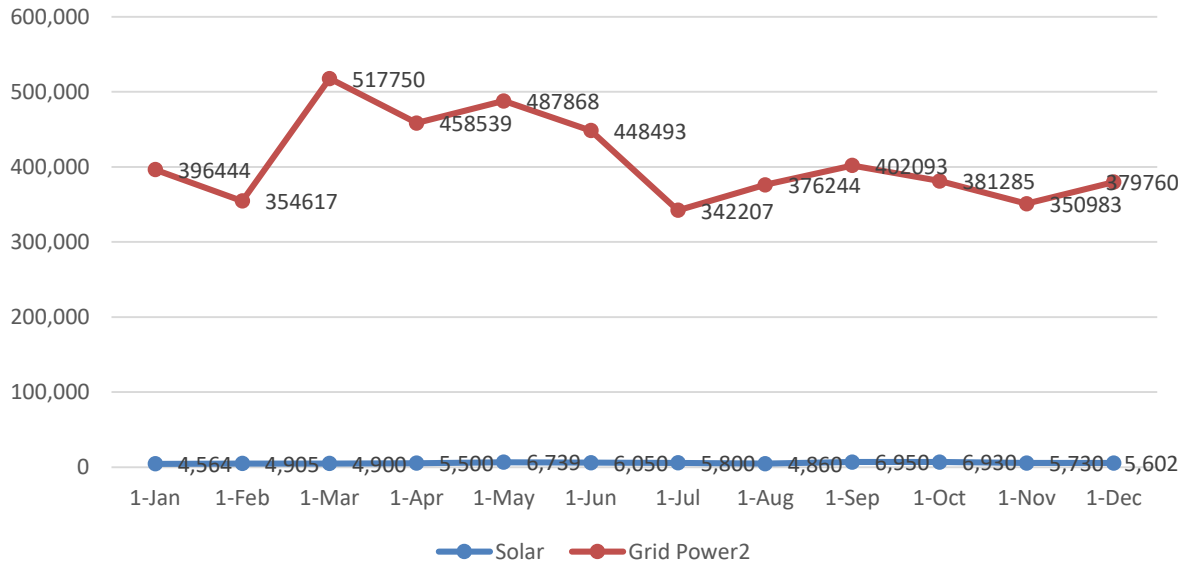
JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
4,564	4,905	4,900	5,500	6,739	6,050	5,800	4,860	6,950	6,930	5,730	5,602

### Electricity Distribution in KWH





Electricity Grid and Solar PV Consumption Pattern

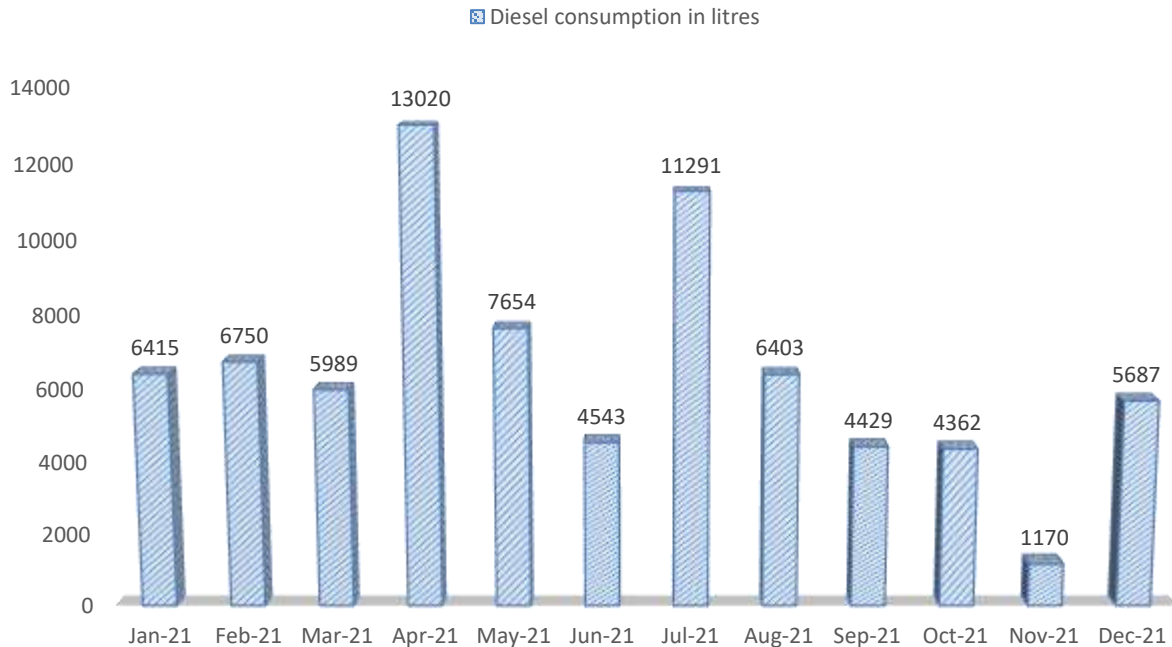


## 2. DIESEL CONSUMPTION

Below is the diesel consumption details in litres from Jan 2021 to Dec 2021

Period	Diesel consumption (in litres)
Jan-21	6415
Feb-21	6750
Mar-21	5989
Apr-21	13020
May-21	7654
Jun-21	4543
Jul-21	11291
Aug-21	6403
Sep-21	4429
Oct-21	4362
Nov-21	1170
Dec-21	5687
Total	77713

## DIESEL CONSUMPTION (LITRES) APRIL. 2021 TO MARCH. 2022



### 3. ANALYSIS OF DG SETS

In the University, there are 9 Diesel Generator (DG) sets for its electrical power needs in case of Grid power failure. Total installed DG sets capacity is 4475 kVA.

Description	Unit	DG Station -1	DG Station -2	DG Station -3	DG Station -4	DG Station -5	DG Station -6	DG Station -7	DG Station -8	DG Station -9
<b>Design details:KG1-12SWS212KVA</b>										
Rated capacity	KVA	625	600	500	500	250	500	500	500	500
Hz	HZ	50	50	50	50	50	50	50	50	50
Sl No.		5AG 012 27	JHB00 690	H5G00 491	SKM00 598	3T8652 CW	FTJ0074 6	FTJ00752	SKM0048 6	SKM0105 2
Make		Caterpillar								
Volts	Volts	415	415	415	415	415	415	415	415	415
PF		0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Phase		3	3	3	3	3	3	3	3	3

RPM		1500	1500	1500	1500	1500	1500	1500	1500	1500
Amps	Amps	870	835	696	696	348	688	688	688	688
Mfg.		2000	2011	2016	2019	2000	2013	2013	2019	2021

DG Set Operation details		
Operating hours during testing	Hours	0.50
% Loading	%	64.28
Energy Generation	kWh	37.92
Load	KVA	94.45
Fuel consumption during testing	Litre	10
Specific energy generation	kWh/litre	3.47



**Observation and Suggestions:-** As per the trial taken during the energy audit the percentage loading of DG set is 64.28% which is ok and specific energy consumption of DG Sets 3.47 KWH/Litre which is satisfactory because as per manufacturer recommendation, best practices for SEC in DG sets range from 3.0 to 3.5 kWh/litre and above.

## 4. AC SYSTEM

*Energy Efficiency Ratio (EER):* Performance of smaller chillers and rooftop units is frequently measured in EER rather than kW/ton. EER is calculated by dividing a chiller's cooling

Capacity (in Btu/h) by its power input (in watts) at full-load conditions. The higher the EER, the More efficient the unit. The cooling effect produced is quantified as tons of refrigeration (TR). The above TR is also called as air-conditioning tonnage.



There are Split ACs installed in SMU in various areas of various capacity which detail is given below:

SI No.	Location/Identification	Type(Window/Split)
		1 TR (Qty.)
		1.5 TR(Qty.)
		2 TR (Qty.)
		3 TR (Qty.)
		4 TR (Qty.)
		5.5 TR (Qty.)
		7.5 TR (Qty.)
		8.5 TR (Qty.)
		11 TR (Qty.)
		4 TR COLD ROOM (Qty.)

1	Academic Building	Split	8	17	73	5						
2	Academic Building	Ductable						2	6	1	2	
3	Academic Building F-Block	AHU						13		12		
4	MSC Building	Split			8							
5	Hostel-1	Split		1								
6	Hostel-2	Split		10								
7	Hostel-3	Split		5								
9	Staff Housing New R	Split		3								
13	Guest House	Split		15								
14	Boys Mess	AHU						4	12			
16	Sport Complex	AHU						3	40			
22	MBBS College	SPLIT/CA SSEETE/D UCTABLE	11	9	8		9		1		2	2
27	CENTRAL REFERAL HOSPITAL	SPLIT/CA SSEETE/D UCTABLE	23	20	21	2	6	2	14			2
	TOTAL		42	80	110	7	15	24	73	13	4	4
1	Academic Building	Split	8	17	73	5						
2	Academic Building	Ductable						2	6	1	2	
3	Academic Building F-Block	AHU						13		12		
4	MSC Building	Split			8							
5	Hostel-1	Split		1								
6	Hostel-2	Split		10								
7	Hostel-3	Split		5								
9	Staff Housing New R	Split		3								
13	Guest House	Split		15								
14	Boys Mess	AHU						4	12			
16	Sport Complex	AHU						3	40			
22	MBBS College	Split/ casseete/ ductable	11	9	8		9		1		2	2
27	CENTRAL REFERAL HOSPITAL	Split/ casseete/ ductable	23	20	21	2	6	2	14			2
	TOTAL		42	80	110	7	15	24	73	13	4	4

**Remarks:** - We have checked Energy Efficiency Ratio of AC's and EER of AC's is fairly OK. But in future you should purchase 5-Star rated inverter based split AC's because power consumption of Inverter based BEE 5-Star rated AC's is less than non-star rated AC's.

## 5. FAN ANALYSIS

In the SMU, 5270 Ceiling Fans, 40 pedestal fans and 305 bracket fans are installed. The observation and suggestion are given below.

Sl No.	Location/Identification	Ceiling Fan-60W	Pedestal Fan	Bracket Fan
1	Staff Housing -A	64		
2	Staff Housing -B	72		
3	Staff Housing -C	40		
4	Staff Housing -D	88		
5	Staff Housing -E	48		
6	MBBS College	316	8	43
7	SMCPT	3		1
8	PG HOSTEL	316	8	43
9	NURSING HOSTEL	19		1
10	MBBS HOSTEL	275		
11	BIOTECHNOLOGY			1
12	CENTRAL REFERAL HOSPITAL	408	2	201
13	ANIMAL HOUSE			2
14	Academic Building	900	10	10
15	Academic Building F-Block	700	10	3
16	MSC Building	30		
17	Hostel-1	492		
18	Hostel-2	490		
19	Hostel-3	135		
20	Hostel-4	260		
21	Staff Housing New R	144		
22	Staff Housing New L	60		
23	Staff Housing Old R	144		
24	Staff Housing Old L	60		
25	Guest House	34	2	
26	Boys Mess	80		
27	Girls Mess	40		
28	Sport Complex	52		
	<b>TOTAL</b>	<b>5270</b>	<b>40</b>	<b>305</b>

### Observation and Suggestions:-

In the University, majority of ceiling fans are of 60 W but BEE 5 Star Rated 30W Ceiling Fans are present in the market. Considering the electricity charges in Sikkim, we would not recommend to replace the existing 60W fans with 30W fans immediately, but as and when fans get old and damaged, the university should opt for purchasing BEE 5 star

rated ceiling fans

### *ECRM-1-Energy saving by replacing 60 W fans with energy efficient 30W ceiling fans*

<b>Total no of Ceiling Fans (60 W)</b>	=	<b>5270</b>	<b>Nos.</b>
<b>Total no of pedestal Fans (90 W)</b>	=	40	Nos.
<b>Total no of bracket fans (45 W)</b>		305	
<b>Total wattage of BEE 5 Star rated Fans (30W)</b>	=	333525	Watt
<b>Total saving in Wattage after replacement</b>	=	168450	Watt
<b>Operating hours per day</b>	=	8	Hours
<b>Operating days per annum</b>	=	253	Days
<b>Energy charges per unit in Rs.</b>	=	27002184	INR
<b>Saving in Rs./annum</b>	=	2971642	INR
<b>Investment INR</b>	=	1684500	INR
<b>Payback period:-</b>	=	9.08	Years

**Note:-** Energy saving will increase or decrease if operating hours of machine /equipment will be increase or decrease and payback period will also increase or decrease if cost of investment(Cost of machine/equipment/accessories of machine) will increase or decrease because cost of investment is taken on tentative basis.

## **6. ANALYSIS OF LIGHTING SYSTEM**

### 6.1 Brief description of existing system

For assessing energy efficiency of lighting system, Inventory of the Lighting System has been noted / collected, with the aid of a lux meter, measurement and documentation of the lux levels at various locations at working level has been done.

### 6.2 Inventory of Lighting

Location/Identification	200W-LED High Mast	190W-LED High Mast	60W LED	60W LED Outdoor	10W LED	18W LED Tube Light	25 W LED	45W-Park Light	12 W LED Round	36W LED	72W LED	32W LED	39W LED	150W LED	18W LED Flood	36W LED Flood
-------------------------	--------------------	--------------------	---------	-----------------	---------	--------------------	----------	----------------	----------------	---------	---------	---------	---------	----------	---------------	---------------

Academic Building						200		20	150	60						
Academic Building F-Block									150	120						
MSC Building									30							
Hostel-1						410										
Hostel-2						400										
Hostel-3						120										
Hostel-4						250										
Staff Housing New R						80										
Staff Housing New L																
Staff Housing Old R																
Staff Housing Old L																
Guest House					20	24			80							
Boys Mess					33	118				35						
Girls Mess																
Sport Complex					70				30	90						
Street Light																
Street Light	2	17	14	24	21			21								
Staff Housing -A						122					122					
Staff Housing -B						100					100					
Staff Housing -C						130					110					
Staff Housing -D						164					164					
Staff Housing -E						122					106					
MBBS College						549					12	389	40	28	65	23
SMCPT						17					30	48		1	1	
PG HOSTEL						743					265	35				
NURSING HOSTEL						415					92	25				
MBBS HOSTEL						371					603	49				
BIOTECHNOLOGY						13										
CENTRAL REFERAL HOSPITAL						2306					42	315	155	274	234	93
INCINARATOR						10					4					
ANIMAL HOUSE						2						3	13		3	
<b>TOTAL</b>	<b>2</b>	<b>16</b>	<b>14</b>	<b>24</b>	<b>144</b>	<b>6666</b>	<b>21</b>	<b>20</b>	<b>440</b>	<b>305</b>	<b>1650</b>	<b>864</b>	<b>208</b>	<b>303</b>	<b>303</b>	<b>116</b>



Location/Identification	17W LED	20W LED	100W-RGP Light	160W-RGP 4 Feet Light	20W LED-FOB Aly Side	36WX2 Normal Tube	36W Normal Tube	28X2 CFL Tube	28W CFL Tube	9W Bulb LED	2X11W PL	11W PL	18W PL	75W Street light
Academic Building						600	50		90	50				
Academic Building F-Block						154		500		100				
MSC Building						40								
Hostel-1							700			1000				
Hostel-2							680			980				
Hostel-3							270			270				
Hostel-4									520			520	520	
Staff Housing New R						9			360					
Staff Housing New L							120			120	10			
Staff Housing Old R						10	360							
Staff Housing Old L						8	120			120				
Guest House														
Boys Mess														
Girls Mess						30								
Sport Complex									80					
Street Light														35
Street Light					80			12						
Staff Housing -A					72									
Staff Housing -B					40									
Staff Housing -C					110									
Staff Housing -D														
Staff Housing -E														
MBBS College	10	81	34											
SMCPT														
PG HOSTEL														
NURSING HOSTEL														
MBBS HOSTEL				603										
BIOTECHNOLOGY														
CENTRAL REFERAL HOSPITAL	26	10	9		44									
INCINARATOR														

<b>ANIMAL HOUSE</b>														
<b>TOTAL</b>	<b>36</b>	<b>91</b>	<b>43</b>	<b>603</b>	<b>346</b>	<b>851</b>	<b>2300</b>	<b>512</b>	<b>1050</b>	<b>2640</b>	<b>10</b>	<b>520</b>	<b>520</b>	<b>35</b>

Location/Identification	90W LED Light	125W LED HIGHBAY LIGHT	150 W Sodium Vapar	250 W MH Lamp	400W MH Lamp
Academic Building				18	8
Academic Building F-Block					
MSC Building					
Hostel-1					16
Hostel-2					16
Hostel-3					4
Hostel-4					4
Staff Housing New R					3
Staff Housing New L					2
Staff Housing Old R					2
Staff Housing Old L					2
Guest House					
Boys Mess					
Girls Mess			6		
Sport Complex					60
Street Light			30		
Street Light	12	6			5
Staff Housing -A					
Staff Housing -B					
Staff Housing -C					
Staff Housing -D					
Staff Housing -E					
MBBS College					
SMCPT					
PG HOSTEL					
NURSING HOSTEL					
MBBS HOSTEL					
BIOTECHNOLOGY					
CENTRAL REFERAL HOSPITAL					
INCINARATOR					
ANIMAL HOUSE					
<b>TOTAL</b>	<b>12</b>	<b>6</b>	<b>36</b>	<b>18</b>	<b>122</b>

### 6.3 Lux Measurement

Description	Lux	Remark
<b>Class Rooms</b>	120 to 235	Acceptable
<b>Offices</b>	130 to 240	Acceptable
<b>Corridors</b>	35 to 90	Acceptable
<b>Washrooms</b>	45 to 76	Acceptable
<b>Outdoor</b>	36 to 95	Acceptable
<b>Computer Lab</b>	150 to 289	Acceptable
<b>Parking area</b>	45 to 94	Acceptable
<b>Canteen</b>	69 to 185	Acceptable

### Observation

SMU has implemented LED based lighting solution in the campus. LEDs save energy, the life span is much greater and emit virtually no heat. The University has installed solar lights for street lights in the campus. SMU is doing their bit for the energy conservation.

Table below shows the performance characteristics comparison of all luminaries.

Type of Lamp	Lumens/Watt		Colour Rendering Index	Typical Application	Typical Life
	Range	Avg.			
<b>Incandescent</b>	8-18	14	Excellent (100)	Homes, restaurants, general lighting, emergency lighting	1000
<b>Fluorescent lamps</b>	46-60	50	Good w.r.t coating (67-77)	Offices, shops, hospitals, homes	5000
<b>Compact fluorescent Lamps (CFL)</b>	40-70	60	Very Good (85)	Hotels, shops, homes, offices	8000-10000
<b>High pressure mercury (HPMV)</b>	44-57	50	Fair (45)	General lighting in factories, garages,	5000

				car parking, flood lighting	
<b>Halogen lamps</b>	18-24	22	Excellent (100)	Display, flood lightening, stadium exhibition grounds, construction areas	2000 - 4000
<b>High pressure sodium (HPSV) SON</b>	67-121	90	Fair (22)	General lighting in ware houses, factories, street lighting	6000 - 12000
<b>Low pressure sodium (LPSV) SOX</b>	101-175	150	Poor (10)	Roadways, tunnels, canals, street lighting	6000 - 12000
<b>Metal halide lamps</b>	75-125	100	Good (70)	Industrial bays, spot lighting, flood lighting, retail stores	8000
<b>LED Lamps</b>	30-50	40	Good (70)	Reading lights, desk lamps, night lights, spotlights, security lights, signage lights, etc.	40000 - 100000

## 7. OTHER POWER CONSUMPTION

SI No.	Location/Identification	50W Exhaust Fan	60W Exhaust Fan	22W Exhaust Fan	35W Exhaust Fan	82W Exhaust Fan	160W Exhaust fan	Water Cooler-200W	180W-Desert Cooler	180W-Circulating Fan	180W-Circulating Fan	2KW Geyser	2.2 KW EX-System	2.2 KW EX-System	7.5 KW EX-System	1.5 KW EX-System	18KW STERLIZER
1	Academic Building		36				12	6									
2	Academic Building F-Block		6						4	16							
3	MSC Building		2	6			4	2									
4	Hostel-1					8		7				2					
5	Hostel-2							8				4					
6	Hostel-3							6									
7	Hostel-4							8				4					
8	Staff Housing New R			36								36					
9	Staff Housing New L			30								30					

10	Staff Housing Old R			36								36					
11	Staff Housing Old L			30								30					
12	Guest House			12													
13	Boys Mess			4			6	4				4	4	2	4	4	
14	Girls Mess			4				2									
15	Sport Complex							2		12				6			
16	Staff Housing -A		16									32					
17	Staff Housing -B		16									36					
18	Staff Housing -C		20									40					
19	Staff Housing -D		20									44					
20	Staff Housing -E		22									32					
21	MBBS College											4					2
22	SMCPT		35														
23	PG HOSTEL		145									145					
24	NURSING HOSTEL		0									92					
25	MBBS HOSTEL		0									201					
26	BIOTECHNOLOGY																
27	CENTRAL REFERAL HOSPITAL	69	116									116					
28	INCINARATOR		2				1										
29	ANIMAL HOUSE		4									1					
	<b>TOTAL</b>	<b>69</b>	<b>440</b>	<b>158</b>	<b>0</b>	<b>8</b>	<b>23</b>	<b>45</b>	<b>4</b>	<b>28</b>	<b>0</b>	<b>889</b>	<b>4</b>	<b>8</b>	<b>4</b>	<b>4</b>	<b>2</b>

## Observation

There should be regular maintenance schedule of equipment like geyser, water coolers, pumps, etc. in order to increase the efficiency of the appliances.

## 8. CAPACITOR DETAILS

Sl. No.	Campus	Location/ Identification	Capacity in KVAR
1	SMU	SUBSTATION	125
2	SMIT	Main LT Panel1 Room	100
3	SMIT	Main LT Panel2 Room	100
4	SMIT	Main LT Panel2 Room	200

\*\*\*\*\* END OF THE REPORT \*\*\*\*\*