ENERGY AUDIT REPORT – 2020

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SREE VIDYANIKETHAN
Engineering College (Autonomous)

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

(Affiliated To JNTUA, Ananthapuramu, Approved by AICTE, New Delhi, Accredited by NBA and NAAC 'A')

Sree Sainath Nagar, A. Rangampet, Tirupati, Andhra Pradesh – 517 102

January – December 2020

Energy Audit Committee

1.	**Dr. T. Nageswar Prasad** Professor of EEE and Vice Principal SVEC	**Chairman**
2.	**Dr. N. M. G. Kumar** Professor Department of EEE	**Convener**
3.	**Dr. M. S. Sujatha** Professor and HoD Department of EEE	**Co-Convener**
4.	**Mr. P. Venkatesh** Asst. Professor Department of EEE	**Member**
5.	**Mr. K. Leleedhar Rao** Asst. Professor Department of EEE	**Member**

ENERGY AUDIT

Objective:

To conduct 'Energy Audit' at SVEC to monitor the annual energy consumption at SVEC, identify the root cause for the excess consumption of electrical energy and other forms of energy, and propose energy conservation measures.

The 'Energy Audit' also gives an 'Energy Management Plan' in the SVEC campus and proposes an 'Energy Efficient Policy' for increase in the energy demand in the campus.

Purpose:

In view of increase in demand for electrical energy in the SVEC campus, it was proposed to carryout Audit for the consumption of electricity at the campus and to identify the verticals consuming electrical energy during the period of auditing.

Introduction:

An energy audit is a study of a plant or facility to determine how and where energy is used and to identify methods for energy savings. There is now a universal recognition of the fact that new technologies and much greater use of some that already exist provide the most hopeful prospects for the future. The opportunities lie in the use of existing renewable energy technologies, greater efforts at energy efficiency and the dissemination of these technologies and options.

Steps Carried Out for Energy Audit:

To carry out the proposed energy audit in the campus, the data collection through visual examination on the general condition of the facility equipment & quantification, identification, verification of energy consumption and other parameters by measurements, detailed calculations, analyses and assumptions, validation, potential energy saving opportunities for various verticals like Class Rooms, Laboratories, Workshops, Canteens, Library, Staff Rooms, Parking, etc.

1. Connected Loads and their Capacities (KW or KVA or KVAR Specifications)
2. Star Ratings of Air Conditioners
3. Water Pumping System

4. Alternate Source of Power Generation- by DG
5. Battery Driven Electric Vehicles
6. Switch Yards
7. And Other Appliances

Energy Audit is conducted annually on regular basis to have better energy conservation mechanism in the campus.

The audit committee visited various energy facilities and records available in the campus during the month of January 2021 and interacted with the respective in-charges for data collection and validation with regard to energy consumption. The committee has looked into different aspects of energy consumption issues and came out with the following findings and suggestions for better energy conservation.

Energy Consumed at SVEC Campus and Hostels for the Year 2020

The following are the details regarding the energy consumption at Sree Vidyanikethan Engineering College and SVEC Hostels for the year **January 2020 to December 2020.**

S. No.	Month	Energy Consumption			
		KWH (Units)	KVAH	Demand KVA	Power Factor
1	January 2020	50456	51820	304.72	0.970
2	February 2020	47072	48536	348.32	0.960
3	March 2020	53224	53988	407.16	0.980
4	April 2020	18400	18428	68.16	0.990
5	May 2020	27828	28192	309.88	0.980
6	June 2020	33104	33432	328.92	0.990
7	July 2020	21124	21448	135.68	0.980
8	August 2020	18764	18772	55.68	0.990
9	September 2020	19168	19480	98.41	0.990
10	October 2020	29840	30064	226.28	0.992
11	November 2020	27788	27876	177.28	0.996
12	December 2020	32452	32492	203.72	0.990
Total Energy Consumed for the Year 2020		**379220**	**384528**	**2664.21**	--
Average KVA Demand and Power Factor				**222.02**	**0.984**

Total Energy Consumed at SVEC Campus during the Year 2020

S. No.	Area	KWH (Units)	KVAH	Demand KVA
1	SVEC Campus	379220	384528	2664.21
2	SVEC Hostels	132727	134585	932.477
Total Energy Consumed		511947	519113	--
Average KVA Demand and Power Factor			**300 KVA and 0.984**	

The total power and energy consumed during the period from January 2020 to December 2020 at SVEC Campus and Hostels (Boys and Girls) in terms of MW is **3.6 MW** (approx.) and the lighting load requirement of **1.3 MW** (approx.), the energy consumption of about **379220 units** of energy (Three Lakh Seventy Nine Thousand Two Hundred and Twenty Only) and an average load demand of **300 KVA** monthly and its having 30% of lighting load at present due to pandemic. Due convid19 position, the SVEC Hostels are nearly closed for 6 months. Therefore, the annually lighting energy consumption of about **179181 units** (One Lakh Seventy Nine Thousand One Hundred and Eighty One Only). The maximum KVA demand also attained to the connected load demand. The total demand also reduces to **511947 units** (Five Lakh Eleven Thousand Nine Hundred and Forty Seven Units Only).

Roof Top Solar Power Generated at SVEC Campus for the Year 2020

The following are the details of Roof Top Solar Power Generation at Sree Vidyanikethan Engineering College form **January 2020 to December 2020.** A 500 KWp Roof Top Solar Plant was installed in SVEC Campus and commissioned in the month of January 2018 in collaboration with Orb Energy Private Limited, Bengaluru, Karnataka, India and it is functioning effectively. The energy monitoring meter was installed during the month of January 2018 in association with APSPDCL, Tirupati. The solar plant is generating an average of **1900** units daily and monthly of **228000** units (approx.). The solar energy generated from plant is directly synchronized to grid and an excess of electrical energy is exported to grid. The average amount of exported energy to grid is **19546 units** (KWH) monthly and an average amount of **293 KVA** (approx.) shown in table below.

S. No.	Month	Energy Exported			
		KWH (Units)	KVAH	Demand KVA	Power Factor
1	January 2020	14328	15204	315.07	0.940
2	February 2020	9568	10108	274.04	0.940
3	March 2020	20320	21880	324.52	0.920
4	April 2020	34119	49016	304.68	0.690
5	May 2020	31032	33472	295.56	0.920
6	June 2020	13572	15764	280.32	0.850
7	July 2020	20856	23969	288.88	0.870
8	August 2020	28476	33672	299.76	0.840
9	September 2020	20660	23796	270.52	0.860
10	October 2020	13820	16057	285.28	0.890
11	November 2020	14220	15089	295.40	0.920
12	December 2020	13580	14604	262.32	0.920
Total Exported Energy for the Year 2020		234551	272631	3496.35	-
Average KVA Demand and Power Factor				291.3625	0.88

Observations:

1. The SVEC Campus and Hostels are closed from 22nd March 2020 to September 2020 due to covid19. The institution was opened in the month of October 2020 for all the academic activities. Due to this, there is a large change in the power consumption.
2. The observations found the annual power demand is about **3.6 MW** till the month of December 2020 and by regular analytical exercise, it was estimated that the total energy consumed is **511947 units** during the year of 2020 and an average of monthly energy consumption is **42662 units** with an average **demand of 300 KVA** towards smooth function of academic activities.
3. It has been found that a there are three DG sets capacity of **250 KVA and 120 KVA and 320 KVA** is present in the campus as back up source to meet the required demand during the failure of grid power.
4. The roof top solar plant is generating an average of **1900** units daily and monthly of **228000** units (approx.). The solar energy generated from plant is directly synchronized to grid and an excess of electrical energy is exported to grid. The average amount of exported energy to grid is

234551 units (KWH) during the covid19 and an average amount of of KVA is **293** (approx.) shown in above table.

RECOMMENDATIONS

- To conserve the energy in the campus, it is proposed and recommended on a regular basis, the lighting appliances must be replaced by 10% of LEDs and 10% to 15% energy efficient fans in the campus on every financial year.
- To meet a future electricity demand, it is recommended to erect and commission one more roof top 500 kWp Solar PV plant on Roof in the new construction building (Manchu towers, facility center and new boys hostel).
- Suggested to maintain the power factor and power quality of the solar plant at the grid terminals.
- During the energy audit and by observation, two to three solar panels are fragmented. Hence it is required to replace those panels with the same rating.
- Suggested to maintain the solar panels by cleaning their surfaces on regular basis (at least once in two months) with qualified person with proper safety equipment.
- Also, suggested to install the small size of 1kW to 2KW wind plants around the compound wall of the SVEC Campus, V Block and near M Block) with commercial vendors.
- Also, suggested to construct a water chilled plant for Centralized AC system for Central Library makes reduced energy consumption.

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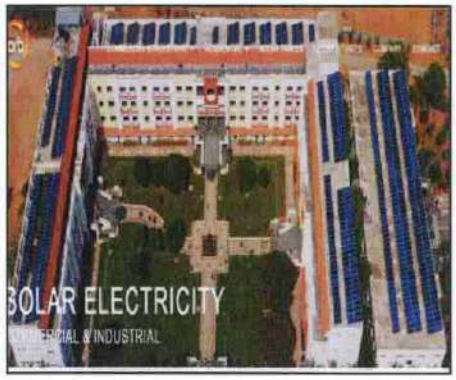

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Steps Carried Out for Energy Audit:

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1. Connected Loads and their Capacities (KW or KVA or KVAR Specifications)
2. Star Ratings of Air Conditioners
3. Computing Facilities in the Campus
4. Water Pumping System
5. Alternate Source of Power Generation- by DG
6. Battery Driven Electric Vehicles
7. Switch Yards, and
8. Other Appliances (Laptops, Projectors and Water Filtering Systems etc.).

Energy Audit is conducted annually on regular basis to have better energy conservation mechanism in the campus.

The audit committee visited various energy facilities and records available in the campus during the month of January 2020 and interacted with the respective in-charges for data collection and validation with regard to energy consumption. The committee has looked into different aspects of energy consumption issues and came out with the following findings and suggestions for better energy conservation.

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The following are the details regarding the energy consumption at Sree Vidyanikethan engineering college and SVEC Hostels for the year **January 2019 to December 2019.**

S. No.	Month	Energy Consumption			
		KWH (Units)	KVAH	Demand KVA	Power Factor
1	January 2019	35000	36580	376.47	0.956
2	February 2019	55028	57448	502.48	0.950
3	March 2019	79996	82340	481.21	0.970
4	April 2019	83272	85888	580.36	0.960
5	May 2019	75812	78552	545.44	0.960
6	June 2019	84972	89304	459.36	0.950
7	July 2019	104416	106672	537.32	0.970
8	August 2019	78932	80832	505.92	0.970
9	September 2019	88684	91504	520.04	0.960
10	October 2019	76164	77908	514.8	0.977
11	November 2019	60836	62284	482.4	0.976
12	December 2019	50612	51544	318.06	0.980
Total Energy Consumed till Date of the Year 2019		**873724**	**900856**	**5823.9**	--
Average KVA demand and Power Factor				**485.3217**	**0.965**

Total Electrical Energy consumed at SVEC Campus during the Year 2019

S. No.	Area	KWH (Units)	KVAH	Demand KVA
1	SVEC Campus	873724	900856	5823.9
2	SVEC Hostels	637820	657625	4076.1
Total Energy Consumed		**15,11,544**	**15,58,481**	--
Average KVA Demand and Power Factor			**825KVA and 0.965**	

The total power and energy consumed during the period from January 2019 to December 2019 at SVEC campus and Hostels (Boys and Girls) in terms of MW is **9.55MW** (approx.) and the lighting load requirement of **3.82 MW** (approx.), the energy consumption of about **1511544 units** of energy (Fifteen Lakh Eleven Thousand Five Hundred and Forty Four Only) and an average load demand of **825 KVA** monthly and its having 42% of lighting load at present. Hence, the lighting energy consumption annually is about **634849 units**. (Six Lakh Thirty Four Thousand Eight Forty Nine Only).

Roof Top Solar Power generated at SVEC Campus for the Year 2019

The following are the details of Roof Top Solar Power Generation at Sree Vidyanikethan Engineering College form **January 2019 to December 2019.** A 500.3 kWp at SVEC Campus and it is commissioned in the month of January 2018 in collaboration with Orb Energy Private Limited, Bengaluru, Karnataka, India and it is functioning effectively. The energy monitoring meter was installed during the month of January 2018 in association with APSPDCL, Tirupati for energy profile monitoring. The solar plant is generating an average of **1900** units daily and monthly of **228000** units (approx.). The solar energy generated from plant is directly synchronized to grid and an excess of electrical energy is exported to grid. The amount of exported energy to grid is **91808 units** for a period of one year and average amount of **259 KVA** (approx.) shown in table below.

S. No.	Month	Energy Exported			
		KWH (Units)	KVAH	Demand KVA	Power Factor
1	January 2019	18580	20404	340.72	0.910
2	February 2019	6732	7324	302.84	0.910
3	March 2019	7700	8660	250.2	0.880
4	April 2019	11904	13380	279.54	0.880
5	May 2019	4080	5228	221.18	0.780
6	June 2019	2908	3480	154.48	0.830
7	July 2019	3136	3732	213.34	0.830
8	August 2019	6392	7456	277.80	0.850
9	September 2019	5912	6792	240.29	0.870
10	October 2019	10288	11168	314.00	0.920
11	November 2019	7364	8092	258.09	0.910
12	December 2019	6812	7770	258.44	0.870
Total Exported Energy for the Year 2019		**91,808**	**1,03,486**	**259.24**	**0.87**

Observations:

1. It is observed that the number of units consumed during the year 2019 is increased and KVA demand is reduced due roof top solar power plant.

2. Identified that the KVA demand of SVEC Boys Hostels and SVEC Campus in increased by 10% in every month.

3. It has been found that the annual energy demand is **1511544 units** during the year of 2019 and by regular analytical exercise it was estimated that the average monthly consumption is **125962 units** with an average **demand of 825 KVA** towards smooth function of academic activities.

4. It has been found that there are three DG sets of capacities **250 KVA, 120 KVA and 320 KVA** are present in the campus as back up source of energy to meet the required demand during the failure of grid power.

5. The solar plant is generating an average of 1900 units daily and monthly of 228000 units (approx.). The solar energy generated from plant is directly synchronized to grid and an excess of electrical energy is exported to grid. The amount of exported energy to grid is **91808 units** for a period of one

year, an average amount of **260 KVA (approx.)** shown in the above table.

Recommendations:

- To conserve the energy in the campus, it is proposed and recommended on a regular basis, the lighting appliances must be replaced by 20% of LEDs and 10% to 15% energy efficient fans in the campus every year.
- To meet a part of electricity demand, it is recommended to erect one more roof top 500 kWp Roof Top Solar PV Power Plant in the new building.
- Suggested to maintain the power factor of the solar plant at the grid terminals.
- Suggested to maintain the solar panels by cleaning their surfaces on regular basis **(at least once in two months)** with qualified person with proper safety equipment.

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