

Energy Audit Report



(28.12.2020)



MANGALORE INSTITUTE OF TECHNOLOGY & ENGINEERING

MANGALORE, KARNATAKA – 574225

AUDITOR:

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EXECUTIVE SUMMARY

Mangalore Institute of Technology and Engineering (MITE) was established in the year 2007 by Rajalaxmi Education Trust to fulfil the growing needs of the industry and aspirations of young students. Located amidst lush greenery and serene ambience in Moodbidri, the campus spreads over an area of 74 acres in the sylvan surroundings near Mijar enroute to Karkala. Integrating Modern design, construction technology and eco-friendly techniques, the campus provides right ambience to students for effective learning.

Energy is one of the major inputs for the economic development of any country. The fundamental goal of energy management is to produce goods and provide services with the least cost and least environmental effect. Also it can be said as "the strategy of adjusting and optimizing energy, using system and procedure so as to reduce energy requirements per unit of output while holding constant or reducing total costs of producing the output from these systems". The energy audit is key to a systematic approach for decision making in the area of energy management. It attempts to balance the total energy inputs with its use, and serve to identify all the energy streams in the facility.

Energy resources utilized by all the buildings of Mangalore Institute of Technology & Engineering (MITE located in Moodbidri Mangalore, Karnataka – 574225) include electricity and Diesel for generator. The Energy audit was carried out on 28th December 2020.

The Energy audit was conducted at Mangalore Institute of Technology & Engineering to review the Operation & Maintenance processes in place, to identify the saving potential in energy and to draw out Energy Conservation Measures (ECM) customized for the said facility.

The audit was conducted, and all the utilities and services were inspected from sustained operational point of view.

1 SCOPE OF AUDIT

The objectives of conducting energy audit were to identify, prioritize, and recommend a set of cost-effective energy conservation schemes in various sections of the plant, which would reduce energy consumption and improve working conditions at workplace. Implementation of the recommended energy conservation measures would lead to reduced energy bills, thereby reducing the energy cost and improving the energy efficiency. The audit follows ASHRAE Level – I Walkthrough

The Scope of the Audit was designed to cover and achieve the following:

- Identify the saving potential by reviewing existing data and infrastructure
- To identify ECM's without investment by optimizing operation and good maintenance practice
- To identify ECM's with minimum investments and quick ROI

2 FACILITY OVERVIEW

Location	Moodbidri Mangalore, Karnataka
Plot Area	74 Acres
Build-up Area	7,74,834 Sq.ft
Headcount	350 Staffs & 2850 Students

3 ENERGY SOURCE

There are two sources of energy supply, viz, Electricity and Diesel to operate Mangalore Institute of Technology and Engineering (MITE). MITE has Overall building level energy meter to track the energy usage of the building. MITE has 3 Diesel Generators of 125kVA, 250kVA and 380kVA and 2 transformers of 500kVA and 400kVA to meet its electricity requirement.

3.1 DIESEL GENERATOR DETAILS:

No	Equipment Name	Make	Fuel Used	Capacity in (kVA)
1	Diesel Generator - 1	Cummins	Diesel	125
2	Diesel Generator - 2			250
3	Diesel Generator - 3			380
Total Installed Diesel Generator Availability				755

3.2 TRANSFORMER DETAILS:

No	Equipment Name	Capacity in (kVA)
1	Transformer-1 @ 0.9 PF	500
2	Transformer-2 @ 0.9 PF	400
Total Installed Electrical Power Availability		900

3.3 BUILDING-WISE LOAD INDEX (EXCLUDING HVAC)

Building Name	Load (kW)
Academic Block	123.8
PG Block	71.7
Mechanical Lab	6.2
Geotech Lab	3.3
Food Court	5.6
Girls Hostel 1 & 2	17.6
Girls Hostel 3	13.3
Boys Hostel 1	6.0
Boys Hostel 2	64.0
Boys Hostel 3	61.5
Boys Hostel 4	14.3
Total	387.4

3.4 BUILDING-WISE AIR CONDITIONING LOAD INDEX

Floor Level	TR	Quantity	Total TR	Demand Load kW
Academic block	5.5	61	335.5	322.1
	2.5	2	2.5	2.6
	1	15	3	3.2
	1.5	1	1.5	1.6
	1.5	7	10.5	11.1
	11	2	22	23.2
	2.4	2	4.8	5.1
	2.2	4	8.8	9.3
Mechanical Block	5.5	8	44	42.2
	1.5	1	1.5	1.6
	8.5	2	17	18.0
	1	2	2	2.1
PG Block Food Court	5.5	24	132	126.7
	1	16	2	2.1
	8.5	5	42.5	44.9
	16.5	2	33	34.8
Girls Hostel 1	1	3	1	1.1
Girls Hostel 2	1	2	2	2.1
Girls Hostel 3	1	1	1	1.1
Boys Hostel 2	1	1	1	1.1
Boys Hostel 3	1	1	1	1.1
Gym	2.2	2	4.4	4.6
Total				662

4 ENERGY CONSUMPTION TREND

Monthly Electricity and Diesel Consumption (2018, 2019,2020,)

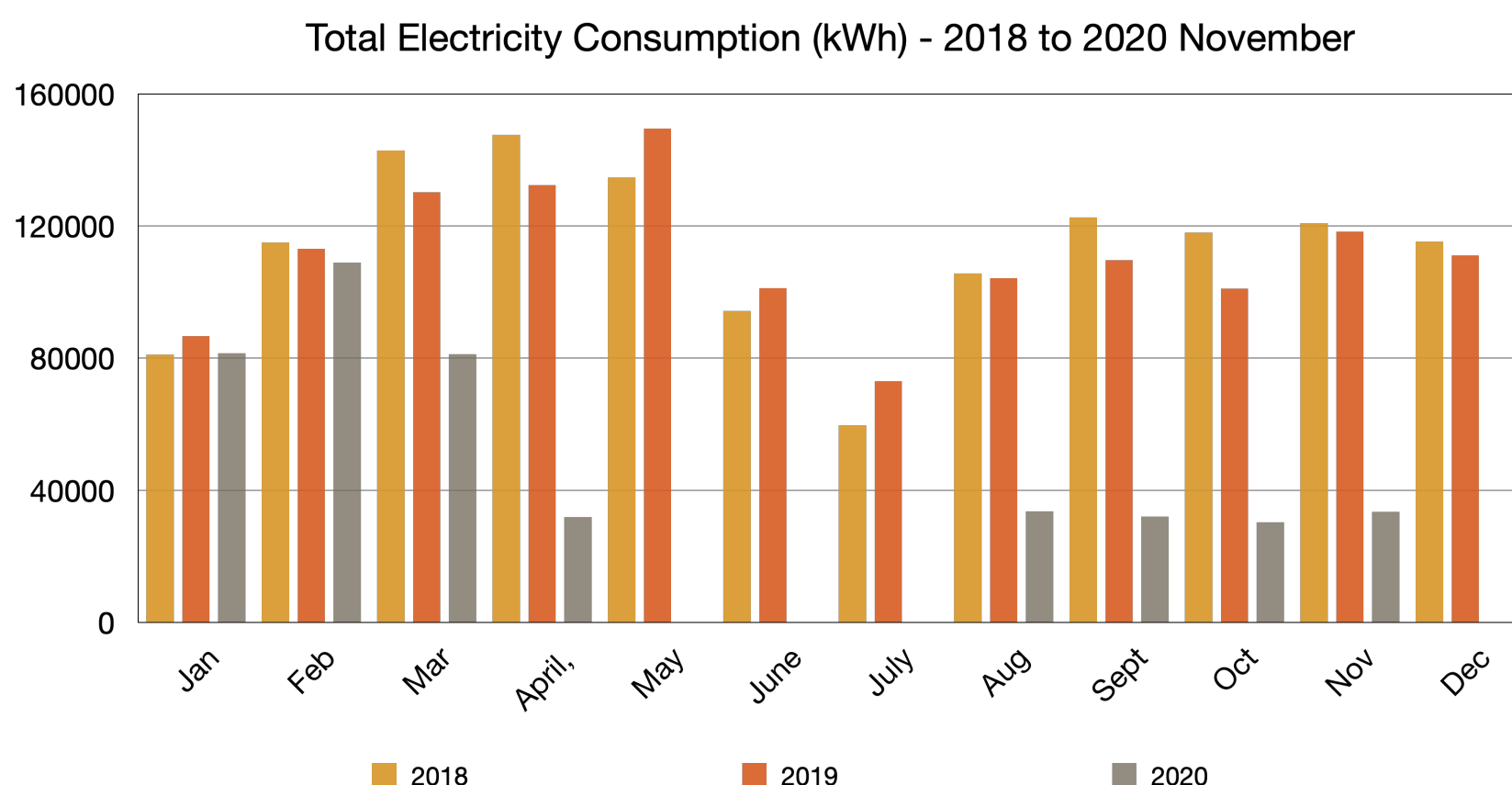
Monthly Electricity bills and diesel bills (2019 – 2020) were used to calculate the total energy consumption of the MITE facility.

Month	Year	Electricity Consumption (kWh)	Diesel Consumption
January	2018	81080	595
February	2018	114960	3745
March	2018	142800	1995
April	2018	147600	1925
May	2018	134720	3430
June	2018	94240	2260
July	2018	59600	945
August	2018	105640	3395
September	2018	122560	3675
October	2018	117960	2520
November	2018	120920	2485
December	2018	115265	2275
January	2019	86720	1400
February	2019	113120	2730
March	2019	130240	3640
April	2019	132400	4025
May	2019	149520	1855
June	2019	101120	1715
July	2019	73080	910
August	2019	104160	4305
September	2019	109680	3465
October	2019	101040	4710
November	2019	118240	3675
December	2019	111040	1750
January	2020	81480	560
February	2020	108920	3920
March	2020	81200	1820
April	2020	31920	490
May	2020	0	1050
June	2020	0	665

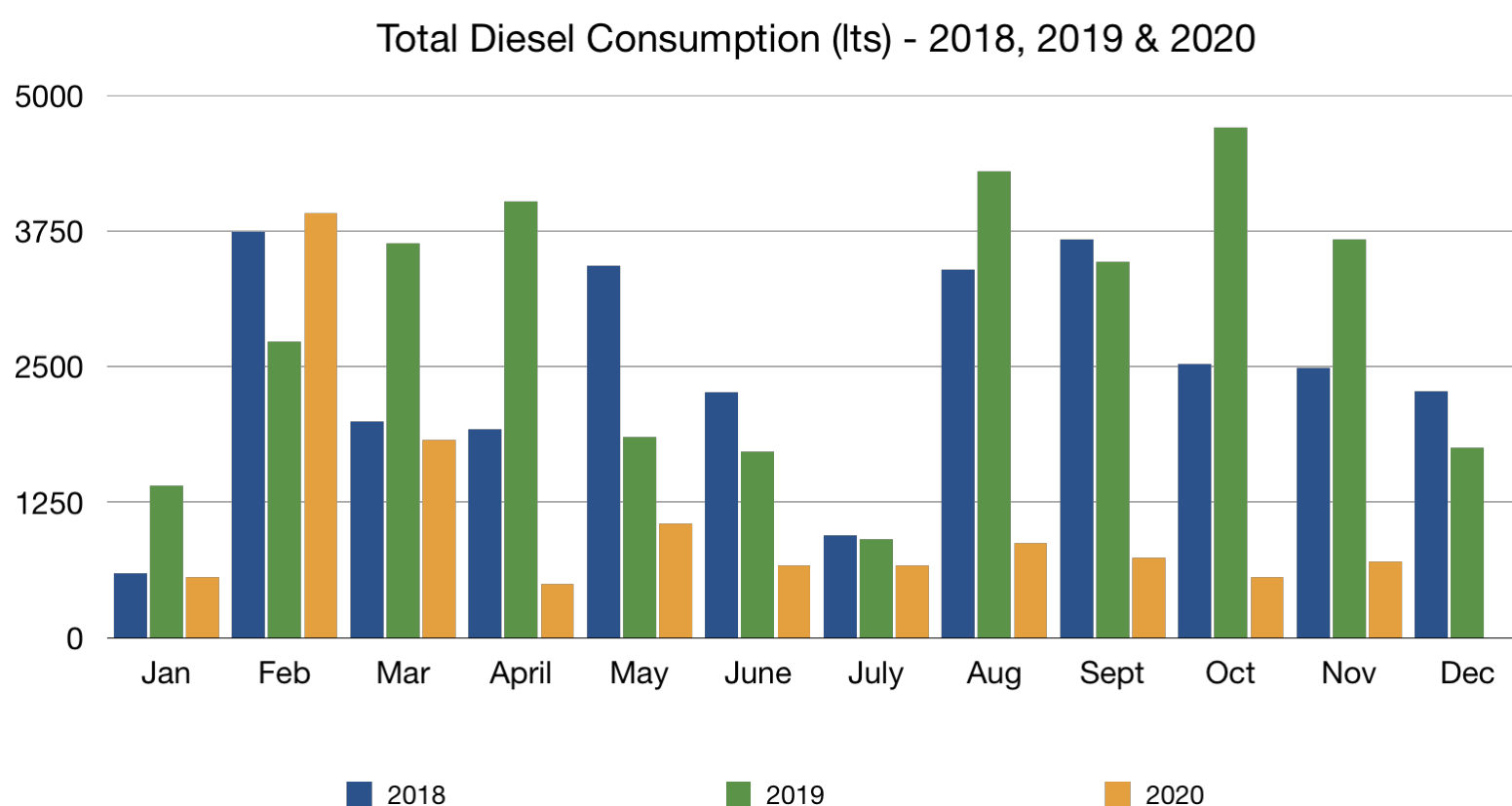
July	2020	0	665
August	2020	33640	875
September	2020	32000	735
October	2020	30280	560
November	2020	33520	700

4.1 ELECTRICITY CONSUMPTION TREND

The below graph represents the total electricity consumption trends for the year 2018, 2019 & 2020 (until December) of MITE.



4.2 DIESEL CONSUMPTION TREND



5 ENERGY PERFORMANCE INDEX ANALYSIS (2018, 2019,2020)

Electricity from Mangalore Electricity supply (EB) and Diesel Generator is considered below to calculate EPI.

ENERGY TYPE	2018	2019	2020	UNIT
Electricity (EB & DG)	13,93,901	13,73,085	4,85,946	kWh
Energy Performance Index (Total kWh ÷ Gross Floor Area)	19.4	19.1	6.8	kWh/Sq.m

Gross Buildup Area (Sq.m)

71984

6 HISTORICAL COMPARISON OF ENERGY PERFORMANCE & COST INDEX

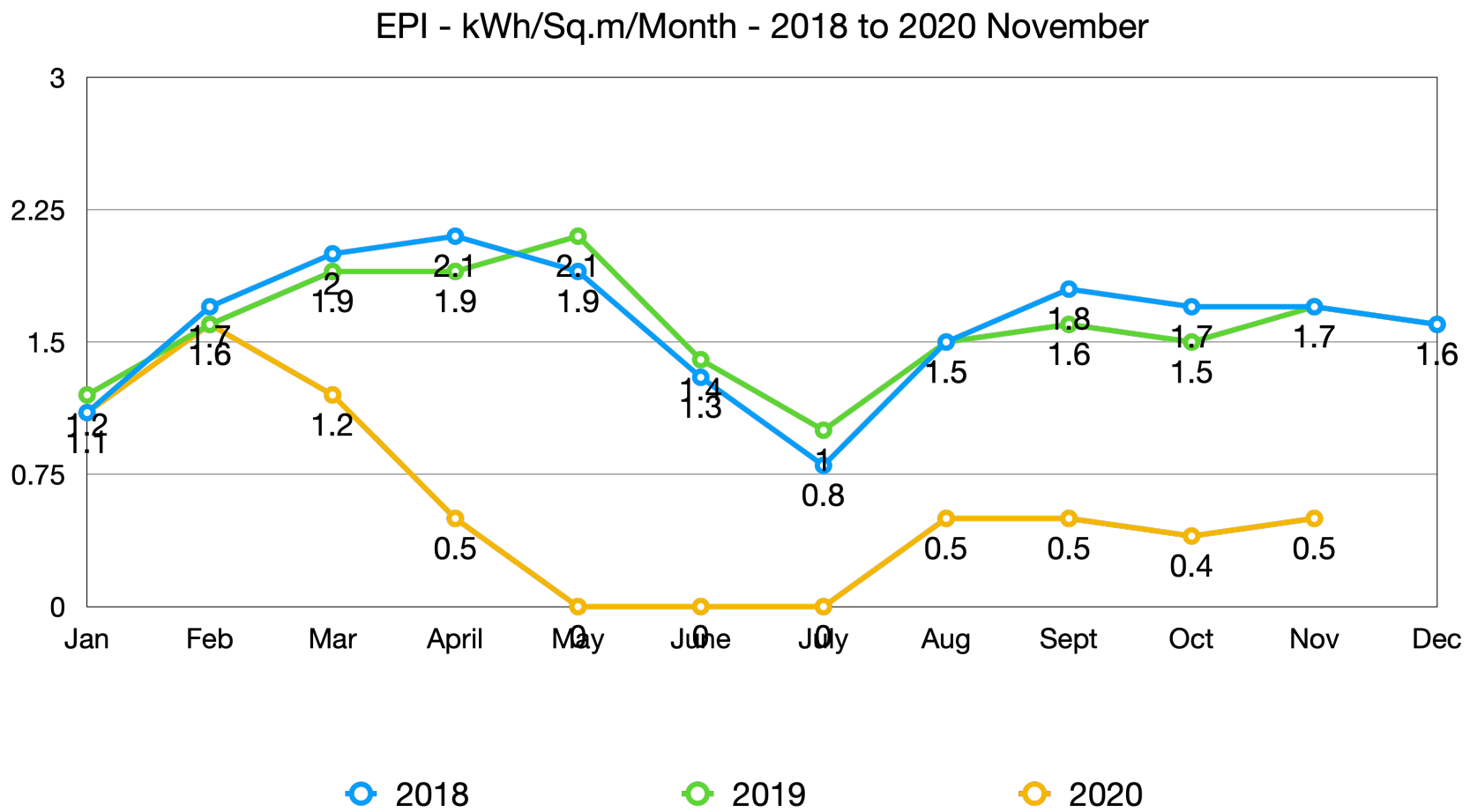
Comparison of Energy Performance & Cost Index

Metric	MITE 2018	MITE 2019	MITE 2020
EPI (kWh/Sq.m/Yr)	19.4	19.1	6.8
Energy Use (kWh)	13,93,901	13,73,085	4,85,946

6.1 ENERGY TARGET INDEX

Metric	Current EPI	Average EPI	Target EPI	Saving
EPI (kWh/Sq.m/Yr)2018	19.4	15.1	13.6	10% Savings
EPI (kWh/Sq.m/Yr)2019	19.1			
EPI (kWh/Sq.m/Yr)2020	6.9			

6.2 EPI TREND



7 GENERAL RECOMMENDATIONS

1. Employment of more solar panels or other renewable energy sources for electricity generation.
2. Boys hostel panel 2 is looped with breaker incomer terminal of Boys Hostel panel 1 Likely Boys hostel panel 4 is looped from boys hostel panel 3. These power cables to be feeded from separate feeder/busbar.
3. Establish a purchase policy for environmental friendly materials.
4. Unplug overhead projectors, computers, and smart boards when not in use. This simple way to conserve energy can help save large amount of power and money in the long run.

8 ENERGY CONSERVATION MEASURES

1. Replace the old tube lights with LED lights.
2. Installation of solar street lights inside the campus.
3. Installation of sensor based electrification items like fans lights can save electricity.

#	Energy Conservation Measure	Estimated Annual Energy Savings in kWh	Estimated Annual Cost Savings in INR	Estimated Total Implementation Cost INR	Simple Payback Years
1	Replace old fans with BLDC Fans	26608	106432	160000	1.5
2	Employment of more solar panels	47024	188096	85000	0.5
2	Installation of Occupancy Sensor	266072	2128576	200000	0.1
3	Replace the existing 36W lights with 18W or 20W fixtures	37619	150477	10551	0.1
4	Installation of solar panels to street lights inside the campus	18810	26124	20899	0.8

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