ENERGY AUDIT OF KALINGA UNIVERSITY RAIPUR

FY 2021-22

BY
AKHILDEEP
MANAGEMENT &
ENERGY CONSULTANT
Pvt. Ltd. Raipur

INDEX

EXECUTIVE SUMMERY

SN	Decription of work/ under progress	Old qty availabl e (Qty)	Replace by (Qty.)	Saving in kHW	Rat e/ KW H	Total savings (Rs)	Inverst ment (Rs)	PB
1	Replacement of 750 watt old conventional fan unit by 50 watt energy ef icient	1883	1883	1080	10	20,33,640	56,49,000	33 Month
2	Replacement of old window/ split AC by EESL make star inverter type air conditioner	20	20	1771	10	3,50,650/	6,33,600	22 Month
3	Replacement of old water coolers with ef icient water cooler (30% saving)	10	10	900	10	90000	200000	26 Month s
4	Conventional transformer with energy ef icient transformer	-	-	-	-	-	30% Saving	36 Month s

KEY OBSERVATIONS

(1) The Audit report has been prepared based on the data available at Kalinga Unviersity Raipur.

(2) The Power factor of Electrical system is being maintained pretty well as per standard.

(3) The Lighting ixtures used in the whole premises of Kalinga University are Energy ef icient.

(4) 300 KW solar Power Plant is being maintained nicely this system is further to be provided with battery backup so that solar power can be used in nights also.

(5) The existing ceiling fans should be gradually replaced by Energy ef icient BLDC fans in Phased manner according to the availability of Budget preferably on exchange basis.

(6) The street Light are being switched on & off manually. It is recommended to install a photo electric timer for automatic switch on & off.

(7) The Old air conditioner are to be replaced with star rated ef icient inverter type air conditioner in Phased manner.

ANNUAL ELECTRICITY BILL ANALYSIS

Conducted as Health Check-up &
in the Interest of Improved Efficiency
taking Present Power Factor is of Lag type.

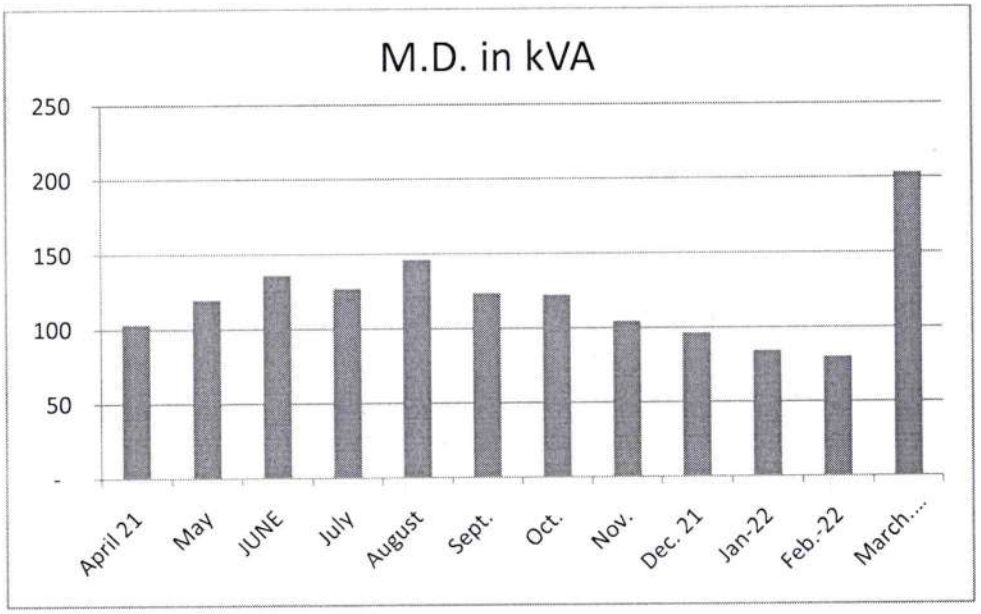
The H.T. Consumer I.D. No. 1021740

KALINGA University, Nava Raipur C.G.

Tariff Category **HT – 3** 11 kV, with SOLAR; Gen. Purpose

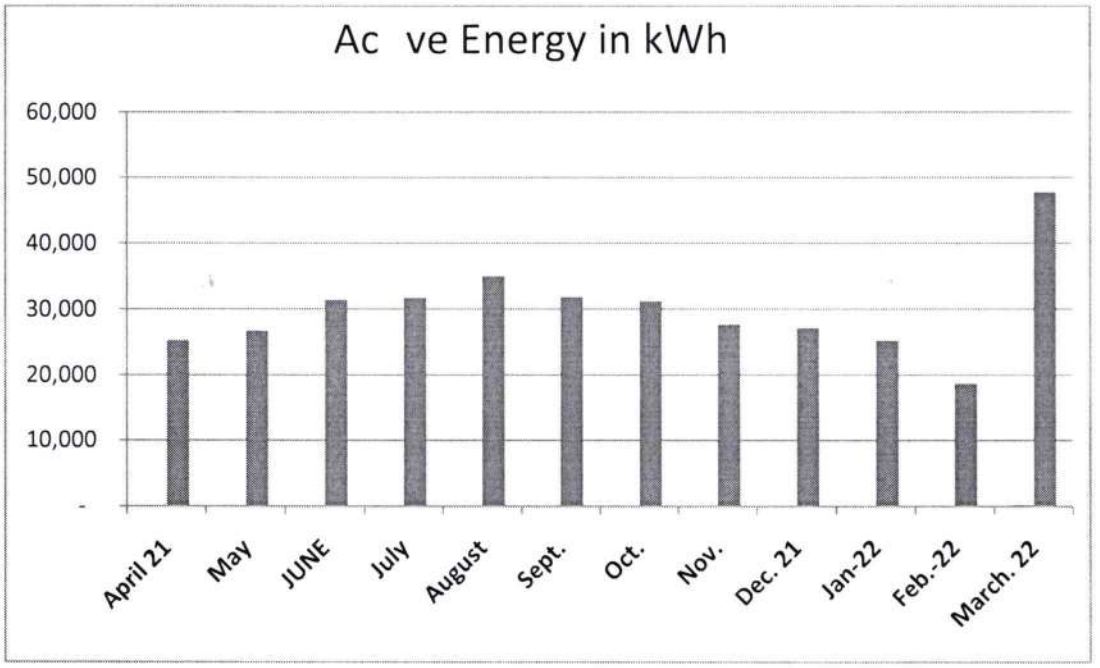
Max. Demand in kVA

Month	Max. Demand in kVA
April 21	103
May	120
JUNE	137
July	127
August	146
Sept.	124
Oct.	123
Nov.	105
Dec. 21	97
Jan-22	84
Feb.-22	80
March. 22	203



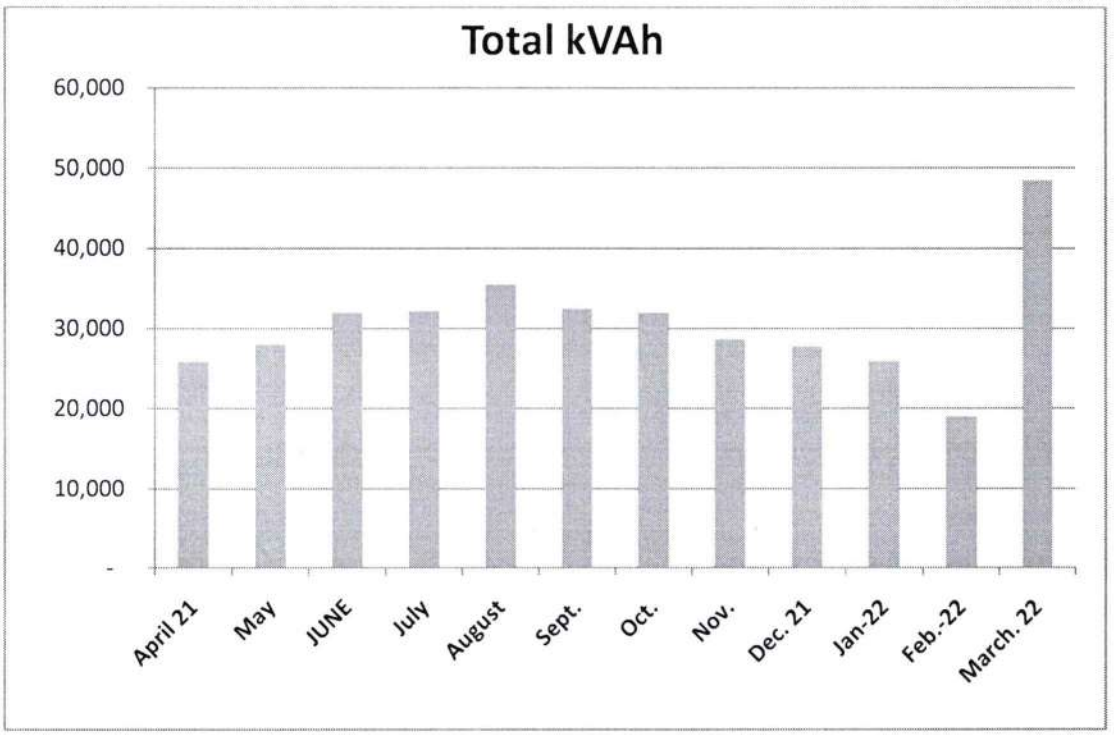
Monthly Active Energy Quantity in kWh.

Month	kWh
April 21	25,263
May	26,750
JUNE	31,419
July	31,754
August	35,060
Sept.	31,868
Oct.	31,251
Nov.	27,734
Dec. 21	27,141
Jan-22	25,227
Feb.-22	18,705
March. 22	47,781



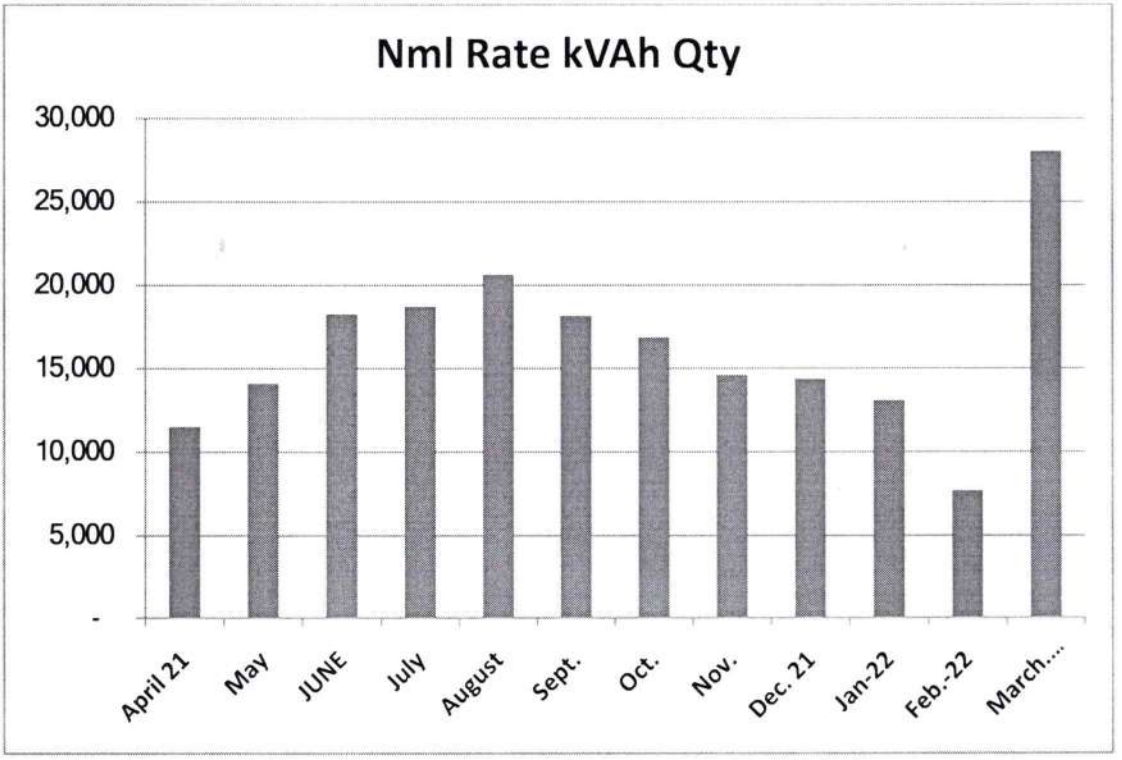
Monthly Active Energy Quantity in kVAh.

Month	Total kVAh
April 21	25,859
May	28,000
JUNE	31,958
July	32,191
August	35,490
Sept.	32,474
Oct.	31,986
Nov.	28,710
Dec. 21	27,786
Jan-22	25,928
Feb.-22	19,032
March. 22	48,508



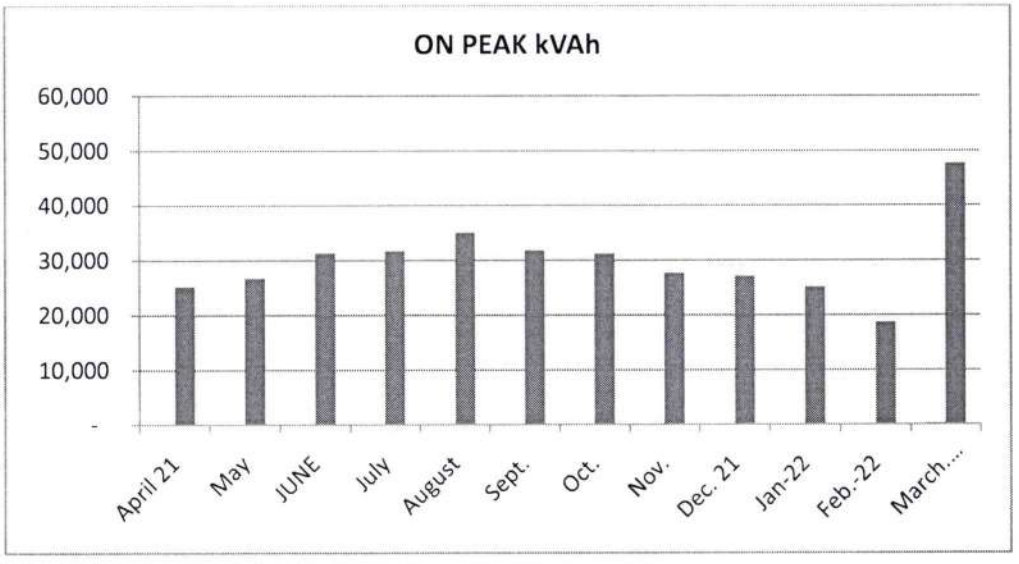
Normal Daytime Rate Qty. of kVAh.

Month	Nml Rate kVAh Qty
April 21	11,544
May	14,100
JUNE	18,289
July	18,722
August	20,621
Sept.	18,173
Oct.	16,865
Nov.	14,611
Dec. 21	14,382
Jan-22	13,100
Feb.-22	7,707
March. 22	28,048
Total	**1,96,161**
Maximum	28,048
minimum	7,707
Ann. Avg.	16,346.8



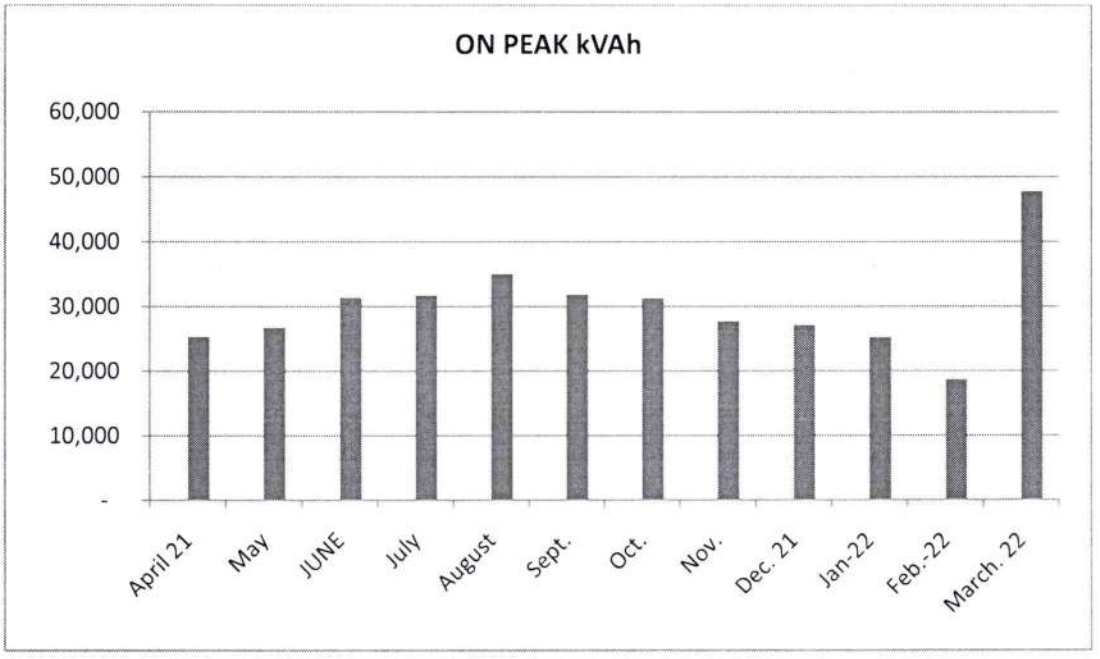
ON PEAK time (Evening 6pm to 11 pm) Rate Qty. of kVAh.

Month	ON PEAK kVAh
April 21	6,669
May	6,500
JUNE	6,398
July	6,255
August	7,169
Sept.	7,053
Oct.	7,475
Nov.	6,728
Dec. 21	6,441
Jan-22	6,393
Feb.-22	6,189
March. 22	10,023



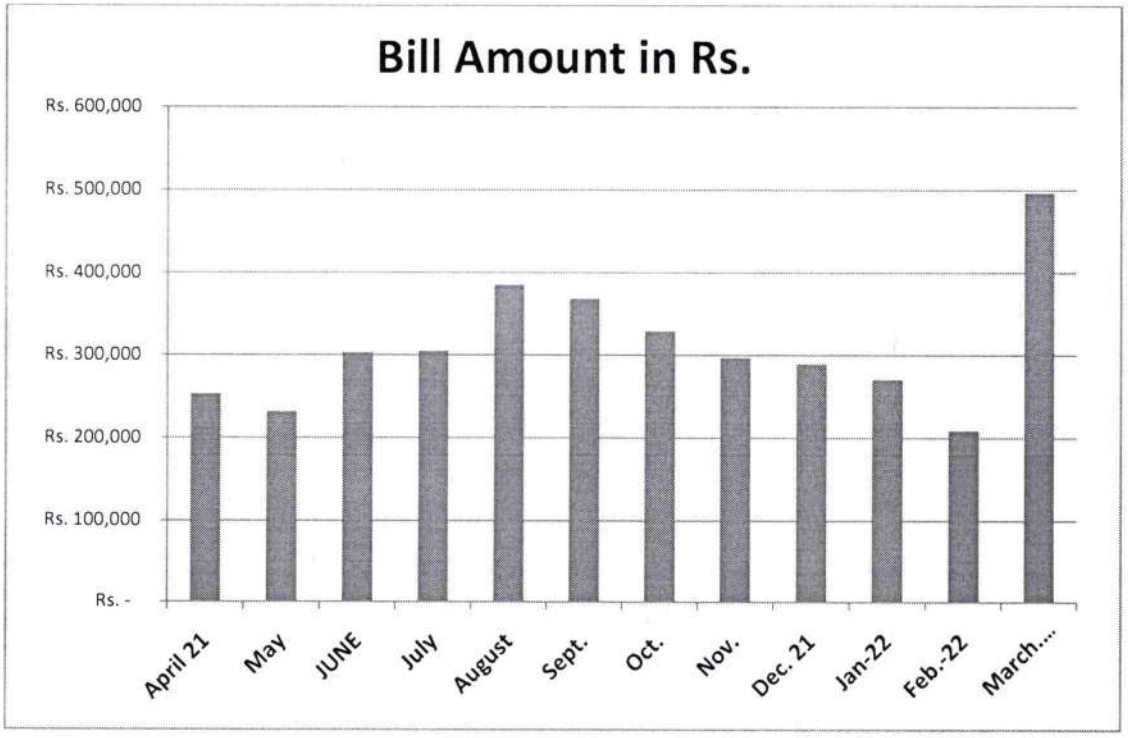
off peak (11 pm to 5 am; MIDNIGHT) time Rate Qty. of kVAh.

Month	off peak kVAh
April 21	7,646
May	7,400
JUNE	7,271
July	7,214
August	7,700
Sept.	7,248
Oct.	7,646
Nov.	7,371
Dec. 21	6,963
Jan-22	6,435
Feb.-22	5,136
March. 22	10,437



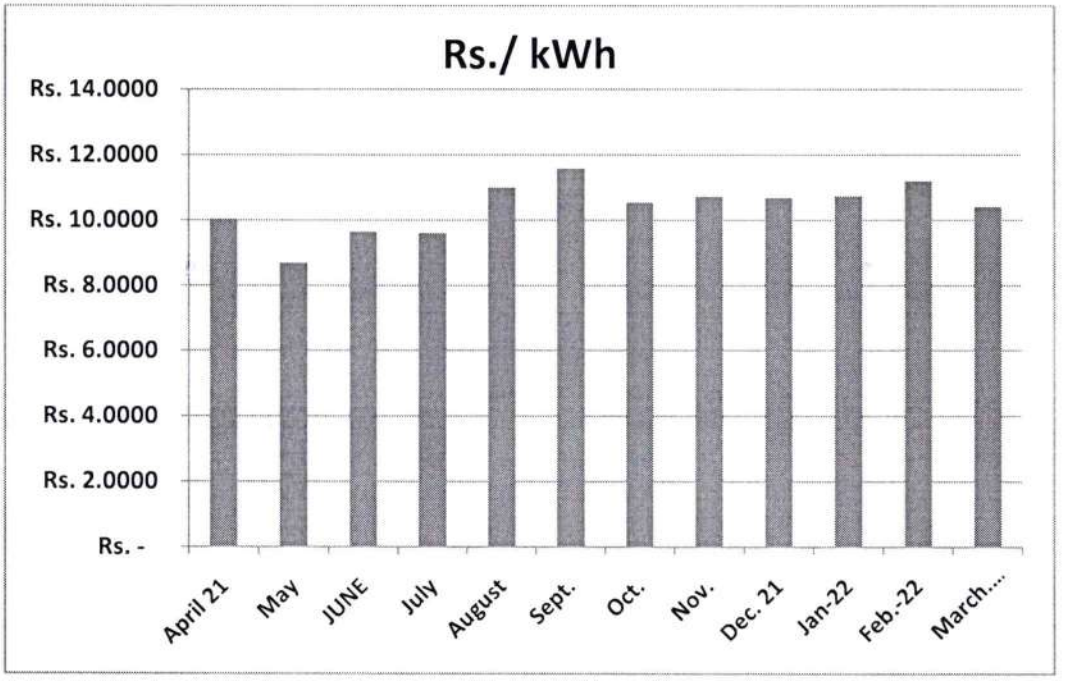
Monthy Bill Amount in Rs.

Month	Bill Amount in Rs.
April **21**	Rs. 2,53,570
May	Rs. 2,32,650
JUNE	Rs. 3,03,244
July	Rs. 3,05,107
August	Rs. 3,85,881
Sept.	Rs. 3,69,061
Oct.	Rs. 3,29,360
Nov.	Rs. 2,97,178
Dec. 21	Rs. 2,89,617
Jan-**22**	Rs. 2,70,935
Feb.-22	Rs. 2,09,373
Bill of Feb. 22 is on assumed qty.	
March. 22	Rs. 4,97,044
Annual Total	**Rs. 37,43,020**
Maximum	Rs. 4,97,044
minimum	Rs. 2,09,373
Ann. Avg.	**Rs. 3,11,918**



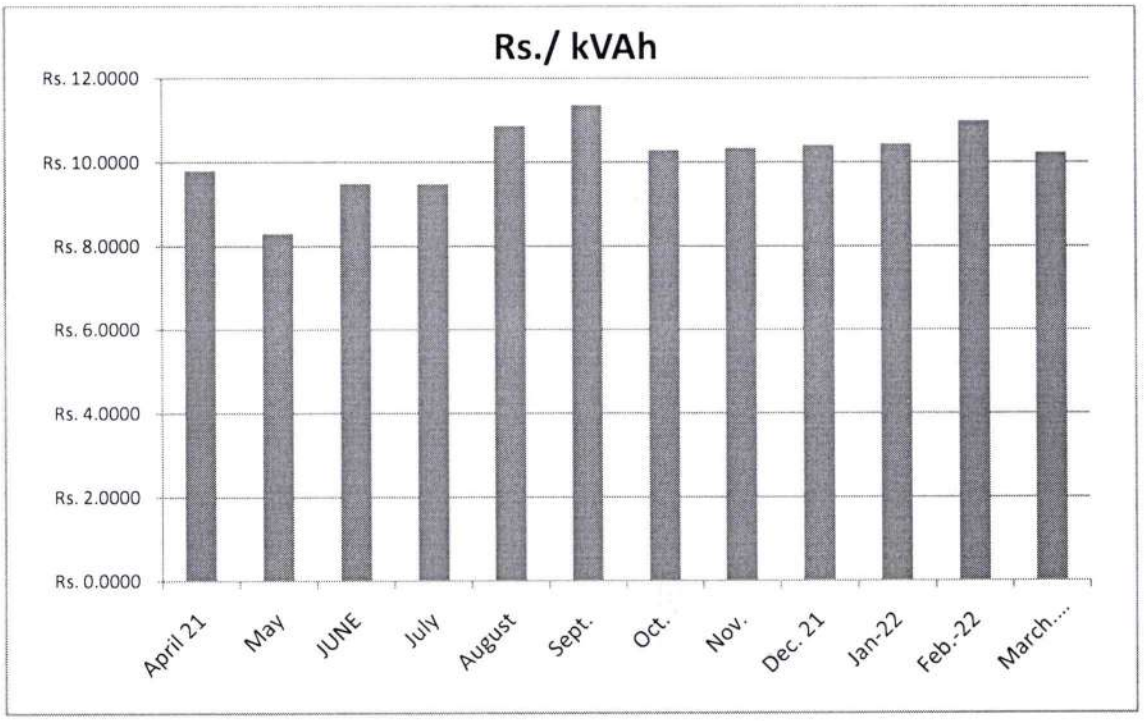
Avg. Rate of Active Energy in Rs. per kWh.

Month	Rs./ kWh
April 21	Rs. 10.0372
May	Rs. 8.6972
JUNE	Rs. 9.6516
July	Rs. 9.6086
August	Rs. 11.0065
Sept.	Rs. 11.5811
Oct.	Rs. 10.5392
Nov.	Rs. 10.7155
Dec. 21	Rs. 10.6708
Jan-22	Rs. 10.7399
Feb.-22	Rs. 11.1934
March. 22	Rs. 10.4025
Maximum	Rs. 11.5811
minimum	Rs. 8.6972
Ann. Avg.	Rs. 10.3987



Avg. Rate of Apparent Energy in Rs. per / kVAh

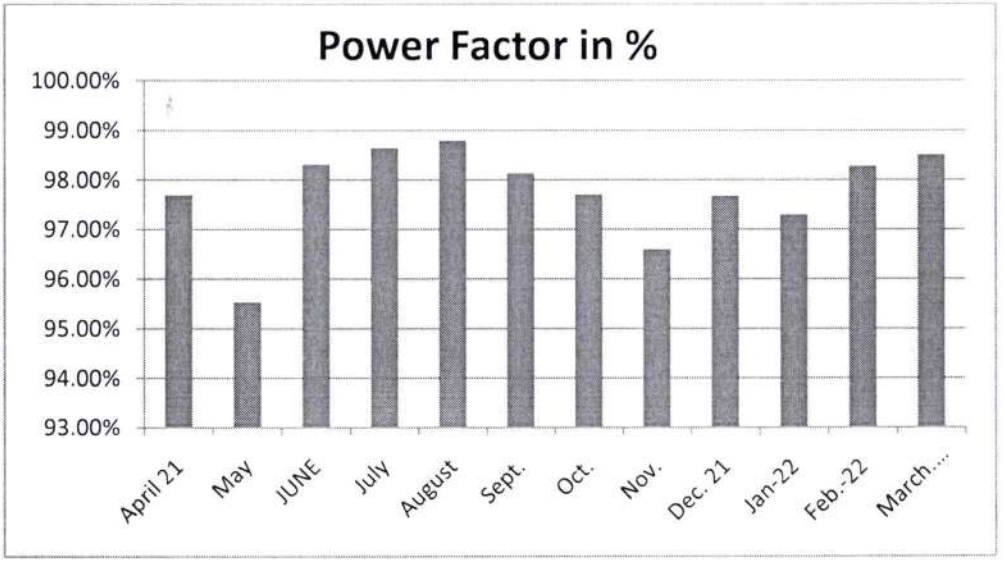
Month	Rs./ kVAh
April 21	Rs. 9.8059
May	Rs. 8.3089
JUNE	Rs. 9.4890
July	Rs. 9.4780
August	Rs. 10.8730
Sept.	Rs. 11.3650
Oct.	Rs. 10.2970
Nov.	Rs. 10.3510
Dec. 21	Rs. 10.4231
Jan-22	Rs. 10.4495
Feb.-22	Rs. 11.0011
March. 22	Rs. 10.2466
Maximum	Rs. 11.3650
minimum	Rs. 8.3089
Ann. Avg.	Rs. 10.1734



POWER FACTOR in %.

Month	Power Factor in %
April 21	97.70%
May	95.54%
JUNE	98.31%
July	98.64%
August	98.79%
Sept.	98.13%
Oct.	97.70%
Nov.	96.60%
Dec. 21	97.68%
Jan-22	97.30%
Feb.-22	98.28%
March. 22	98.50%
Total/ Annual	**97.83%**
Maximum	98.79%
minimum	95.54%

We find that the MONTHLY Average POWER FACTOR is very Good, and there in no need to add capacitors in the circuit.



- The period of the bills is of COVID time, hence may not be taken as a normal time.

- I find that average monthly power factor is pretty good. We congratulate the team. There is no need to add capacitors; because Annual Power Factor of **97.83%** is very Good.

- There may be future plans of adding machinery, so again there is no need to reduce Contract Demand from 300 kVA; because in March 22; the Maximum Demand (M.D.) is 203 kVA.

- Though if we consider this as an non-covid time; then we may consider to have C.D. as 200 kVA, then for 10 months the power demand quantity is better; again as the size of Total campus is pretty large; there may be near future expansion plans, which is again a dynamic situation; then reducing C.D. by 100 kVA to new value of 200 kVA may save about Rs. 3.50 lakhs annually. This has a rare & a very minor risk of Power over-use financial penalty, along with pro-rata penalty on (energy, VCA, Duty etc).if there is a 15 minute meter time over-use, the bill with penal amount will be larger. But, this should be a part of Detailed Energy Audit.

- There are 3 Boys Hostels and 1 Girls Hostel, and all these 4 Hostels are having quite a useful Solar Panels; and the **L.T. Electricity Bills** are quite *insignificant*, because these hostels have lots of Solar Panels.

- The H.T. Bill for the Kalinga University, for the month of ***February 22*** is missing, we have used assumed quantity of Energy DATA.

GLOSARY OF WORDS

MD	-	Medium Demand
BD	-	Billing Demand
CD	-	Contract Demand
COP	-	Coef icient of performance
DG	-	Diesel Generator
ECG	-	Energy Conservation Measures
FTL	-	Fluorescent Tube Light
LT	-	Low Tension
HT	-	High Tensions
kV	-	Kilo volt
kVA	-	Kilo volt Ampere
kVAH	-	Kilo volt Ampere Hour
kWh	-	Kilo Watt Hour
LED	-	Light Emitting Diode
SEC	-	Speci ic Energy consumption
SLD	-	Single line diagram
TR	-	Tons of Refrigeration

ENERGY AUDIT MEASURES

Immediate measures

(1) Minimize ex iltration of conditioned air and in iltration of unconditioned air through leaky windows & doors by incorporating effective mean of weather stripping. Auto door closers to be provided in Air conditioned rooms.

(2) The temperature & human comfort with best energy saving should be set between 24° to 25° C.

(3) Periodic cleaning of lighting ixtures specially at open spaces to maintain utilization factor & illumination level.

(4) It is suggested NOT to pump the water supply during peak hours to save the cast of energy. It is because the utility service (CSPDCL) charges higher tariff during peak hours

(5) The temperature of water cooler should be>20°C for energy saving. Also from 10PM to 8AM, the water coolers should be switched of specially in winter & rainy season.

(6) The lighting ixtures itted on high mast are to be relocated in such a way that the lighting in better utilized.

Medium Term Measures

(1) Installation of occupancy sensors in of ice room and retiring room at to switch OFF & ON the ligh/fan depending on occupancy.

(2) The energy meter / Sub meter should be installed at every feeder to create awareness & control use of energy.

(3) Soft starters should be installed for pump houses.

Long Term Measures

(1) Provide dedicated lighting transformer for light circuit instead of feeding through power transformer. This will enable the dimming circuit to activate whenever needed.

(2) Gradual replacement of conventional water coolers which are ghost consumers units with energy ef icient water coolers. Energy ef icient water coolers save 30% energy consumption.

(3) Gradual replacement in phased manner the conventional transfer unit with energy ef icient transformer.

(4) The ceiling fans may further be replaced by replaced by more ef icient 1200 mm sweep 35w BLDC (Brush less Direct Current) motor. It works an AC supply and converts AC to DC. It operates through remote in different speed.

Energy Audit Team

The following team was involved in the auditing of Kalinga University in April. 2022 for carrying out measurement, collection of data and ield study.

S.N.	Name	Quali ication	Experience	Contact
1.	Mr. A.K. Verma	Accredited Energy Auditor (AEA-0194), Director of Akhildeep Management & Energy Consultant Pvt. Ltd. Raipur	38 yrs.	9009347799
2.	Mr. Jitendra Rathod	Certi ied Energy Auditor (EA-2189)	38 yrs.	9893759981
3.	Mr. Deepak Jain	Certi ied Energy Auditor (EA-11607)	17 yrs.	7987701760

ABOUT M/S AKHILDEEP MANAGEMENT & ENERGY CONSULTANT PVT LTD

Akhildeep Management & Energy Consultant specialise in solving energy efficiency challenges' in today's highly demanding environments. We help companies to improve their energy ef iciency by reviewing and modernizing process and introducing automation to system and devices. We have more than 20 satis ied customers in Energy Auditing and Consulting almost from all industry sectors across India. Based on our expertise and industry standards, we customize and scale our solutions for the needs of any company or community.

Akhildeep Management & Energy Consultant was establish in 2014 with a vision to serve the industry and deliver best solutions for Energy Conservation and Management of International standards. We possess suf icient Infrastructure and a Team of Management and Technical professional having vast diversi ied industrial experience of Consultancy & Training in Manufacturing and Service Industry. Some of them are lead auditors from Bureau of Energy Ef iciency (B.E.E.) Government of India.

We have empanelment, arrangements and tie – ups with various National & International Energy Agencies & Certi ication Bodies / Registrars.

Equipments List From 01-04-2021 to 31-03-2022			
S.No.	**Equipment Name**	**Power**	**Quantity**
1	Cealing Fan		142
2	Tubelight	(20watt)	759
3	2"×2" Led Light	(36watt)	22pcs
4	Coolers		47pcs
5	Led Light 9"×8"		383pcs
6	Intercom		55pcs
7	Washing Machine	7KG	8pcs
		8.5KG	(1pcs)
8	AC	1.5ton	(28pcs)
		1.8ton	(11pcs)
		1ton	(04pcs)
		2.2ton	(10pcs)
		2ton	(02pcs)
		4ton	(2pcs)
9	Led Round White	15wa	(131pcs)
		12wa	(138pcs)
		18wa	(188pcs)
		20wa	(10pcs)
		30wa	(46pcs)
10	Led 3 in 1 Colour Light	12wa	(20pcs)
11	Led Street Light	20wa	(01pcs)
		36wa	(30pcs)
		100wa	(10pcs)
12	Led Bulb		46pcs
13	UPS	5KVA	(04pcs)
		50KVA	(02pcs)
		25KVA	(01pcs)
		10KVA	(01pcs)
14	Computer System UPS		40pcs
15	Water Motor Pump	5HP	(02pcs) (Mono Block)
		3HP	(02pcs) (Mono Block)
		2HP	(01pcs) (Mono Block)

		5HP	(03pcs) (Open wall)
16	Solar Street Light		24Pcs

Electrical Equipment List 2021-22

S.NO.	Equipment Name	Power	Qty 2020-21	Remarks
1	Ceiling Fan	65W	1883	
2	Tube Light	20W	2621	
3	2"×2" LED Light	36W	232	
4	9"×8" LED Light	9W	560	
5	LED Round White	12W	1131	
		15W		
		18W		
		20W		
		30W		
6	LED Street Light	20W	41	
		36W		
		100W		
7	Air conditioner	1.5T	170	
		1.8T		
		2.2T		
		4.0T		
8	UPS	5KVA	8	
		10KVA		
		25KVA		
		50KVA		
9	Water Motor Pump Mono block	2HP	5	

		3HP		
		5HP		
10	Solar Street Light	-	24	

SUBSTATION TRANSFORMER DETAILS KALINGA UNIVERSITY RAIPUR

S.NO.	Rated Speci ication	TR1
1	KVA	300
2	HV VOLTAGE	11000
3	LV VOLTAGE	433
4	AMP HV	15.75
5	AMP LV	416.37
6	MAKE	Power Star
7	DATE OF INSTALLATION	2015
8	VECT GROUP	Dyn11

TABLE SHOWING STANDARD NO LOAD/LOAD LOSSES IN TRANSFORMER

Rating	No load Loss (W)	Load Loss (W)
100	320	1950
160	455	2800
250	640	4450
500	900	6450
600	1260	9300
1000	1800	13300
1600	2600	19800
2000	3200	21000
3150	4600	28000
5000	6500	31000
6300	7700	45000
10000	11000	63000
12500	13000	77000
20000	18000	107000
31500	25000	150000
40000	30000	180000

Transformer load analysis :

Transformer losses consist of two parts:

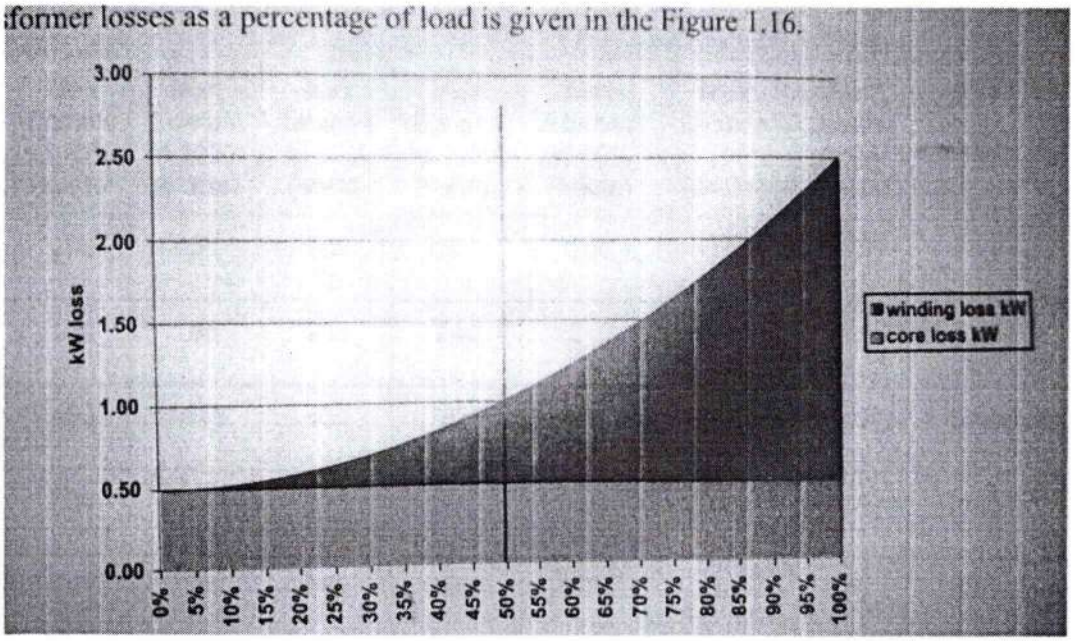
1. No-load loss (also called core loss) is the power consumed to sustain the magnetic field in the transformer's street core. Core loss occurs whenever the transformer is energized; core loss does not vary with load. Core losses are caused by two factors: hysteresis and eddy current losses. Hysteresis loss is that energy lost by reversing the magnetic ield in the core as the magnetizing AC rise and falls and reverses direction. Eddy current loss is a result of induced currents circulating in the core.
2. Load loss (also called copper loss) is associated with full-load current low in the primary and secondary windings of a transformer due to the ohmic resistance of the windings. Copper loss varies with the square of the load current. (P=I2R). Transformer losses as a percentage of load is given in the igure.
3. For a given transformer, the manufacturer can supply values for no-load loss, Pno-load, and loss, P LOAD. The total transformer loss, P TOTAL, at any load level can then be calculated from:
4. P TOTAL = P NO-LOAD = (% LOAD/100)^2 X P LOAD
5. Where transformer's loading is known, the actual transformers loss at given load can be computed as:

ENERGY EFFICIENT TRANSFORMER (STAR RATED)

Most energy loss in dry-type transformer occurs through heat or vibration from the core. The new high-ef iciency transformer minimize these loss. The conventional transformer is made up of a silicon alloyed iron (grian oriented) core. The iron loss of any transformer depends on the type of core used in the transformer. However the latest technology is to use amorphous material – a metallic glass alloy for the core. The expected reduction is core loss over conventional (Si Fe core) transformers is roughed around 70% which is quite signi icant. By using an amorphous core – with unique physical and magnetic properties – these new types of transformers have increased ef iciency even at low loads – 98.5% ef iciency at 35% load.

Electrical distribution transformers made with amorphous metal cores provide excellent opportunity to converse energy right form the installation. Though these transformers are a little costlier than conventional iron core transformers, the overall bene it towards energy savings will compensate for the higher initial investment.

former losses as a percentage of load is given in the Figure 1.16.



TOTAL TRANSFORMER LOSSES AT 50% AND 100% LOADING

	1 star		2 star		3star		4 star		5 star	
Rating kVA	Max Losses at 50% (watts)	Max Losses at 100% (watts)	Max Losses at 50% (watts)	Max Losses at 100% (watts)	Max Losses at 50% (watts)	Max Losses at 100% (watts)	Max Losses at 50% (watts)	Max Losses at 100% (watts)	Max Losses at 50% (watts)	Max Losses at 100% (watts)
16	200	555	165	520	150	480	135	440	120	400
25	190	785	235	740	210	695	190	653	175	595
63	490	1415	430	1335	380	1250	340	1140	300	1050
100	700	2020	610	1910	520	1800	475	1650	435	1500
160	1000	2800	880	2550	770	2200	670	1950	570	1700
200	1130	3300	1010	300	890	2700	780	2300	670	2100

Advantages of 20 w LED Tube

Comparison Between Conventional louresent tube & 20 w LED Tube

S.No.	Conventional 40 w l Tube	20 w LED Tube Energy
1	It Contains Mercury hence unsafe for environment	20 w LED tubes are mercury free environment friendly
2	FI tube are expensive to dim	It has full dimming facilities
3	It was multi directional lighting which means some light is lost and illuminates unnecessary place also	It has direction a light which means illumination is at required place
4	It does not work well with occupancy sensor and other controls and burns faster	It works well with occupancy sensor & other controls
5	It's efficiency is less	LED tube are 30% more ef icient
6	It is lickering issues hence quality of illuminations inferior	It does not licks but gives contract high
7	Average life is 30,000 burning hours	Average life is 50,000 burning hours

Ceiling fan speci ication

(1)	Types of motor	Induction
(2)	Blade Material	Steel metal (MS)
(3)	Rated RPM	330
(4)	Actual RPM	332
(5)	Power Consumption	50 W
(6)	CMM (Air Delivery)	210 cubic meter per min.
(7)	Body Weight	750 grams
(8)	Sweep	1200 MM
(9)	Winding Material Gauge	Copper wire 32 SWG
(10)	Bearing Type	Open Bearing
(11)	Rated voltage	230 v
(12)	Blade Thickness	0.60MM
(13)	Air cutting noise	Moderate
(14)	Humming Noise	Moderate

BLDC FAN

BLDC fans are (Brushless Direct Current) Motor. IT works an normal 220 Volt Single Phase AC supply. It contains a converting direct from AC to DC Because of Brushless DC, It is more ef icient than recent 50 watt energy fans. It has following features.

(1) Power consumption as full speed – 28 watt
(2) Reduces power consumption by 65% than commercial fans.
(3) Runs smoothly or wide voltage range of 110v – 285v.
(4) Runs 3 times longer an inverter than ordinary fans.
(5) Zero heating of motor result in increase fan life.
(6) Better output performances or RPM or air delivery speed.
(7) Smart remote controller.
(8) It has sleep mode & timer mode.

Comparison between conventional ceiling fan &

EESL make energy ef icient fan

S.No.	Parameters	Conventional fan	EESL fan
1	Wattage	75W	50W
2	Units Consumed per day per hour 12 hrs usage	0.9 kWh	0.6 kWh
3	Unit consumed per month per fan	27Kw	18Kw
4	Unit consumed per year per fan	324	216

Money saved per year per fan@ 10 per kwh	Rs/-1080
Total no. Of fans replaced	1883 fan
Total saving in Energy	Rs/- 20,33,640/-
Money saved	
Investment made for purchase of fan @ of Rs/- 1500 per fan	Rs/- 56,49,000/-
Payback period	33 MONTHS

COMPARISON OF DIFFRENT STAR RATED AIR CONDITIONERS

S.No.	Type	0.75T	1T	1.5T	2T
1	1 Star non inverter type	627	843	1246	1648
2	2 Star non inverter type	596	800	1184	1626
3	3 Star non inverter type	542	747	1104	1448
4	4 Star inverter type	464	645	945	1293
5	5 Star inverter type	450	554	840	1113

Comparison Between Invertor BEE split AC & Non Inverter conventional AC

S.No.	INVERTER AC 1.5T 5 STAR	CONVENTIONAL NON INVERTER
1	These are variable speed/variable air circulation and there of quite different from regular Air condition	These are ixed speed & ix tonnage AC
2	Inverter AC can adjust Their speed depending upon heat load of room	These AC can not do so
3	It saves 30 to 40% power and Highly energy ef icient	It consumes power and is much less ef icient
4	No voltage luctuation	It has luctuation
5	It gives constant cooling of the room by adjusting the speed/air circulation	It can not do so

Energy/Cost saving with replacement by energy ef icient 5 star inverter AC

Energy saving per AC per year	1771kWh
Saving in Rs. for 20 AC per year	35420 kWh
Saving in Rupees @ Rs. 10	Rs 3,50,650
Total investment @ Rs 32000 for 2AC	Rs/-6,33,600/-
Payback period	22 Months

SUBMERSIBLE PUMP

This is a device coupled with a completely air tight sealed motor to the pump in entire assembly is submersed within the liquid to be pushed. These pump are mainly use to prevent cavitations of the pump. t. he advantage of submersible pumps are:

(1) This pump does not need priming
(2) This pumps are very ef icient
(3) The pressure of water drives the water into pump hence conserves lot of energy
(4) This pump can handle solids as well as liquid
(5) This pump are quite in water
(6) The pumps in power house are 1.5kW/2HP and are running with full load. Since these pumps are only 1.5 kW hence no much saving potential can be derived.

SN	LOCATION	CAPACITY	QTY.	RUNNING	TYPE OF PUMP
1	Kalinga University Premisis	2 HP	1	YES	Mono block
		3 HP	2	YES	Mono block
		5 HP	1	YES	Mono block
		5 HP	3	YES	Open well

It is recommended to use the soft starters in place of DOL starters due to following reasons.

- Smooth starting.
- More starting torque
- Less mechanical stress
- Improved power factor
- Lower maximum demand
- Less mechanical maintenance

UNINTERRUPTIBLE POWER SUPPLY

An uninterruptible Power Supply (UPS) is a device that has an alternate source of energy, typically a battery backup that can provide power when the primary power source is temporarily disabled. The switchover item must be small enough to not cause a disruption in the operation of the loads.

The components of a UPS are converter (AC to DC), battery, inverter (DC to AC), Monitor and control hardware/software.

There are two types UPS architectures namely line interactive (Off Line) and ON Line. Simple OFF Line UPS system, connect the load directly to the input AC line voltage deviates beyond preset limits by means of an auto-transformer based Automatic Voltage Regulator. In case of signi icant utility voltge deeps or outage these system transfer the UPS to battery operation.

Due to its direct connection to input AC power, OFF lines types, including Line interactive systems off higher ef iciency when compared to an Online UPS. But, unstable grid environment, with frequent power interruptions nor outages, might cause these system to suffer frequent transfer to battery operation. Thus, exporting the critical load to possible failures due to unsmooth or unsuccessful transfer, or to battery failure, because of numerous battery discharges, which decrease drastically battery life time.

An online UPS system, frequently called Double conversion system, irst converts th AC input voltage to stabilized DC, which is then converted back to AC, to feed continuously the critical load, with pure stabilized sinusoidal output, coming either from the input line via AC/DC converter, or from batteries in case of power failure.

Energy ef iciency of a UPS is the difference between the amount of energy that goes into a UPS verses the amount of useful energy that comes out of the UPS and actually powers loads. In all UPS systems, some energy is lost as heat when is passes through the internal components of the UPS (including transformers, recti iers, and inverters).

SOFT STARTER

When starting, AC Induction motor develops more torque than is required at full speed. This stress is transferred to the mechanical transmission system resulting in excessive wear and premature failure of chains, belts, gears, mechanical seals, ets, Additionally, rapid acceleration also has a massive impact on electricity supply charges with high inrush currents drawing = 600% of the normal run current.

The use of Star Delta only provides a partial solution to the problem. Should the motors slow down during the transition period, the high peaks can be repeated and can even exceed direct on line current.

Soft starter provides a reliable and economical solution to these problems by delivering a controlled release of power to the motor, thereby providing smooth, step less acceleration and deceleration. Motor life will be extended as damage to windings and bearings is reduced.

Soft start & soft stop is built into 3 phase units, providing controlled starting and stopping with a selection of ramp times and current limit settings to suit all applications.

Advantage of soft starter

- Les mechanical stress
- Improved power factor
- Lower maximum demand

GENERATOR (250 KVA * 2) Available for Emergency Supply

Generator Size (kW)	1/4 Load (gal/hr)	1/2 Load (gal/hr)	3/4 Load (gal/hr)	Full Load (gal/hr)
20	0.6	0.9	1.3	1.6
30	1.3	1.8	2.4	2.9
40	1.6	2.3	3.2	4.0
60	1.8	2.9	3.8	4.8
75	2.4	3.4	4.6	6.1
100	2.6	4.1	5.8	7.4
125	3.1	5.0	7.1	9.1
135	3.3	5.4	7.6	9.8
150	3.6	5.9	8.4	10.9
175	4.1	6.8	9.7	12.7
200	4.7	7.7	11.0	14.4
230	5.3	8.8	12.5	16.6
250	5.7	9.5	13.6	18.0
300	6.8	11.3	16.1	21.5
350	7.9	13.1	18.7	25.1
400	8.9	14.9	21.3	28.6
500	11.0	18.5	26.4	35.7
600	13.2	22.0	31.5	42.8
750	16.3	27.4	39.3	53.4
1000	21.6	36.4	52.1	71.1

Solar Energy system

As The cost of solar energy

Reduced in recent year with major improvement in technical ef iciencies, the solar is seen viable source of alternate energy, solar panels are widely use in south India as the solar intensity is very high.

How solar panel work (step by step)

(1) The silicon photo-voltaic cells absorb the energy of sun an convert it to D.C. Electricity.

(2) The solar inverter converts DC electricity from solar modules to AC Electricity which is used by most home applications.

(3) AC Electricity lows through home powering electrical devices.

(4) Excess Electricity produced by solar panels to fed to electric grid through net metering.

Advantage of sloar energy

(1) Solar power is pollution free and causes no green house gases to be emitted after installation.

(2) Reduced dependence aon foreign oil and fossil fuels.

(3) Renewable clean power that is available everyday Even cloudy day produce some power.

(4) Virtually no maintenance for solar panel and their useful life is 30 years.

(5) Excess power can be sold back to power company.

(6) Ability to live grid fee if enough power is generated.

(7) Can be installed anywhere in ield to the building on roof or a ground.

(8) Safer than traditional electric current.

(9) Tax incentives are granted by Govt.

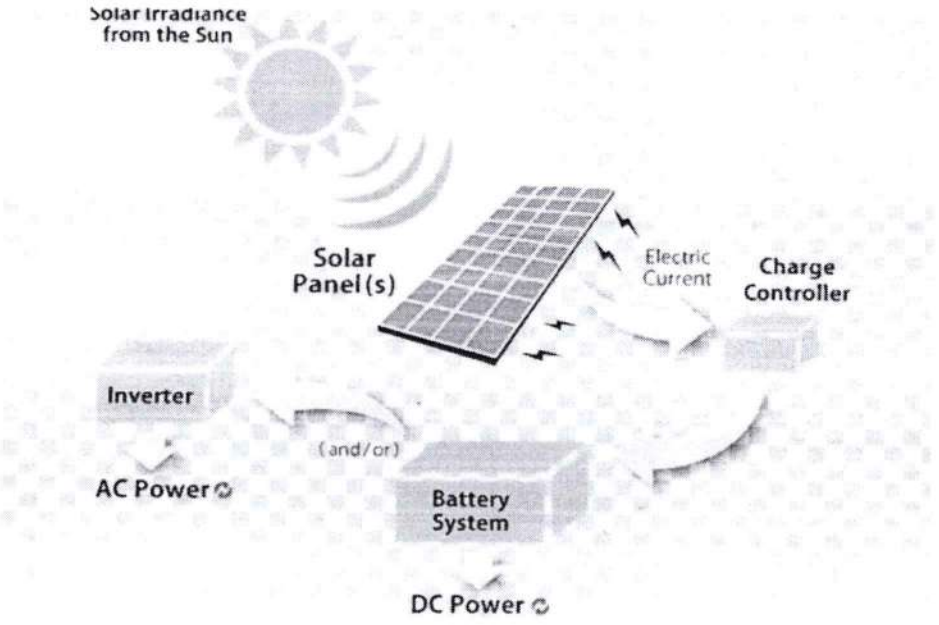
(10) Using solar power reduces the electricity bills from utilities.

Disadvantage

(1) High initial cost.

(2) No solar power at night so there is a need of battery bank.

(3) Lower product in winter & cloudy days.

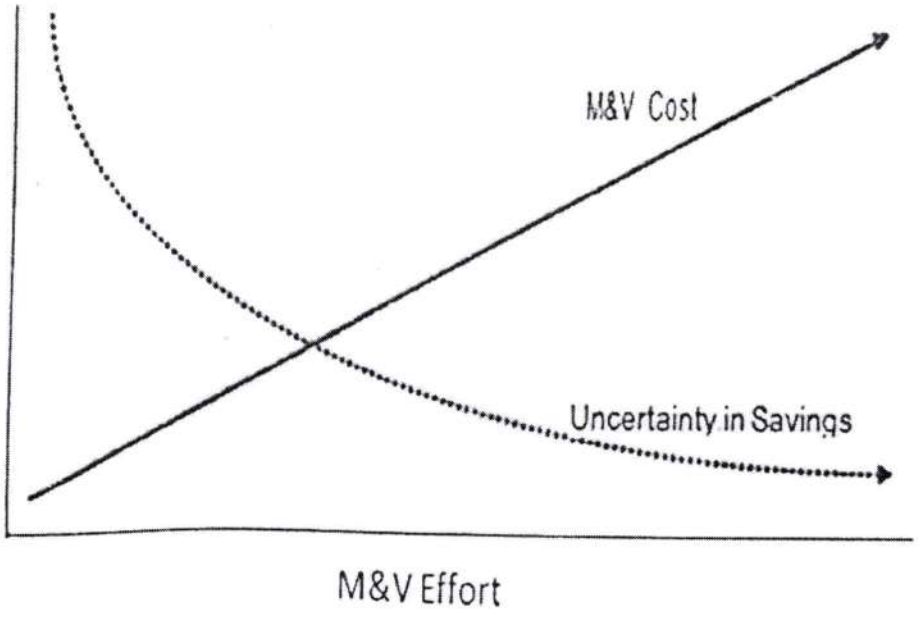


ENERGY METERING SYSTEM

It is possible to establish The existing energy consumption of an organization through energy audit however this only produces a picture of past energy consumption in order to keep control of subsequent energy consumption it is necessary to initiate a monitoring program through installation of energy meters in every feeder. To achieve an improvement in energy performance a targeting program in which targets are sets must accompany the monitoring process.

Energy monitoring and targeting (M&T) is primarily a management technique that uses a energy information as a basis to eliminate waste reduce and control current level of energy in existing operation system. It is base of the principle "You can't manage what you don't measure"_is essentially combines the principals of energy use of statistics.

By using M & T the utilities such as fuel steam compressed air water and electricity are managed as controllable resources. It can only monitoring and targeting can save 5 to 15% of energy.



GENERAL TIPS FOR ENERGY CONSERVATION

➢ ELECTRICITY

- Schedule your operation to maintain a high load factor.
- Minimize maximum demand bt tripping loads through a demand controller
- Use stand by electric generation equipment for on-peak high load periods.
- Set transformer taps to optimum settings.
- Shut off unnecessary computers, printers, and copiers at night.

➢ MOTORS

- Properly size to the load for optimum ef iciency.
- (High ef iciency motors offer of 4-5% higher ef iciency than standard motors)
- Provide proper ventilation.
- For every 10°C increase in motor operating temperature over recommended peak, the motor life is estimated to be halved.
- Check for under-voltage conditions.
- Balance the tree-phase power supplies.
- An imbalanced voltage can reduce 3-5% in motor input power.
- Demand ef iciency restoration after motor rewinding.

➢ **DRIVES**

- Use variable-speed drives for large variable loads.
- Use high-ef iciency gear sets.
- Use precision alignment.
- Check belt tension regularly.
- Eliminate variable – pitch pulleys.
- Use lat belts as alternative to v-bells.
- Use synthetic lubricants for large gearboxes.
- Eliminate eddy current couplings.
- Shut then off when not needed.

➢ **FANS**

- Use smooth, well-rounded air inlet cones for fan air intakes.
- Avoid poor low distribution at the fan inlet.
- Minimize fan inlet and outlet obstructions.
- Clean screens, ilters, and fan blades regularly.
- Use aero il-shaped fan blades.
- Minimize fan speeds.
- Use low-slip or lat belts.
- Check belt tension regularly.
- Eliminate variable pitch pulleys.
- Use Variable speed drives for large variable fan loads.

- Use energy-ef icient motors for continuous or near-continuous operation.
- Eliminate leaks in ductwork.
- Minimize bends in ductwork.
- Turn fans off when not needed.

➢ BLOWERS

- Use smooth, well-rounded air inlet ducts or cones for air intakes.
- Minimize blower inlet and outlet obstructions.
- Clean screens and ilters regularly.
- Minimize blower speed.
- Use low-slip or no-slip belts.
- Check belt tension regularly.
- Eliminate variable speed drives for large variable blower loads.
- Use variable speed dries for large variable blower loads.
- Use energy-ef icient motors for continuous or near-continuous operation.
- Eliminate ductwork leaks.
- Turn blowers off when they are not needed.

➢ PUMPS

- Operate pumping near best ef iciency point.
- Modify pumping to minimize throttling.
- Adapt to wide load variation with variable speed drives or sequenced control of smaller units.
- Stop running both pumps-add an auto-start for an on-line spare or add a booster pump in the problem area.
- Use booster pumps for small loads requiring higher pressure.
- Increase luid temperature differentials to reduce pumping rates.
- Repair seals and packing to minimize water waste.
- Balance the system to minimize lows and reduce pump power requirements.
- Use siphon effect to advantage : don't waste pumping head with a free-fall (gravity) return.

➢ CHILLERS

- Increase the chilled water temperature ser point if possible.
- Use the lowest temperature condenser water available that the chiller can handle.
- Reducing condensing temperature by 5.5°C, result in a 20 – 25% decrease in compressor power consumption.
- Increase the evaporator temperature.
- 5.5°C increase in evaporator temperature reduces compressor power consumption bt 20 – 25%.
- Clean heat exchangers when foulded.
- 1 mm scale build-up on condenser tubes can increase energy consumption by 40%.
- Optimize condenser water low rate refrigerated water low rate.
- Use water-cooled rather than air-cooled chiller condenser.
- Use energy-ef icient motors for continuous or near-continuous operation.
- Specify appropriate fouling factors for condensers.
- Do not overcharge oil.
- Install a control system to coordinate multiple chillers.
- Study part-load characteristics and cycling costs to determine the most-ef icient mode for operating multiple chillers.
- Run the chillers with the lowest operating costs to serve base load.
- Avoid over-sizing-match the connected load.
- Establish a chiller ef iciently-maintenance program a part of your continuous energy management program.

➢ **HVAC (Heating / Ventilation / Air conditioning)**

- Tune up the HVAC control system.
- Consider installing a building automation system (BAS) or energy management system (EMS) or restoring an out-of-service one.
- Balance the system to minimize lows and reduce blower/fan/pump power requirements.
- Eliminate or reduce reheat whenever possible.
- Use appropriate HVAC thermostat setback.
- Use building thermal lag to minimize HVAC equipment operating time.
- In winter during unoccupied periods, allow temperatures to fails as low as possible without freezing water lines or damaging stored materials.
- In summer during unoccupied periods, allow temperatures to rise as high as possible without damaging stored materials.
- Improved control and utilization of outside air.
- Use air-to-air heat exchangers to reduce energy requirements for heating and cooling of outside air.
- Reduce HVAC system operating hours (e.g. – night, weekend.)
- Optimize ventilation.

- Ventilate only when necessary. To allow some areas to be shut down when unoccupied, install dedicated HVAC systems on continuous loads (e.g. – computer rooms.)
- Provide dedicate outside air supply to kitchens, cleaning rooms, combustions equipment, etc. To avoid excessive exhausting of conditional air.
- Use evaporative cooling in dry climates.
- Clean HVAC unit coils periodically and comb mashed ins.
- Upgrade ilter banks to reduce pressure drop and thus lower fan power requirements.
- Check HVAC ilters on a schedule (al least monthly) and clean/ change if appropriate.
- Check pneumatic controls air compressor for proper operation, cycling, and maintenance.
- Isolated air conditioned loading dock areas and cool storage areas using high-speed doors or clear PVC strip curtains.
- Install ceiling fans to minimize thermal scari ication in high-bay areas.
- Relocate air diffusers to optimum heights in areas with high ceilings.
- Consider reducing ceiling heights.
- Eliminate obstructions in front of radiators, baseboard heaters, etc.

- Check re lectors on infrared heat for cleanliness and proper beam direction.
- Use professionally-designed industrial ventilation hoods for dust and vapor control.
- Use local infrared heat for personnel rather then heating the entire area.
- Use spot cooling and heating (e.g. - - use ceiling fans for personal rather than cooling the entire area).
- Purchase only high-ef iciency models for HVAC units.
- Put HVAC window units on timer control.
- Don't oversize cooling units. (oversize units will "short cycle" when results in poor humidity control).
- Install multi-fuelling capability and run with the cheapest fuel available at the time.
- Consider dedicated make-up air for exhaust hoods. (Why exhaust the air conditioning or heat if you don't need to?).
- Minimize HVAC fan speeds.
- Consider desiccant drying of outside air to reduce cooling requirements in humid climates.
- Seat leaky HVAC ductwork.
- Seal all leaks around coils.

- Repair loose or damaged lexible connections (including those under air handling units).
- Eliminate simultaneous heating and cooling during seasonal transition periods.
- Zone HVAC air and water system to minimize energy use.
- Inspect, clean, lubricate, and adjust damper blades and linkages.
- Establish an HVAC ef iciency-maintenance program. Start with an energy audit and follow-up, then make an HVAC ef iciency-maintenance program a part of your continuous energy management program.
- Online condenser cleaning system should be installed at chiller. This will keep the condenser tubes clean and will maintain the approach within range.

➢ **LIGHTING**

- Reduce excessive illumination levels to standard levels using switching, de-lamping. Etc. (know the electrical before doing de-lamping).
- Aggressively control lighting with clock timers, delay timers, photocells, and/pr occupancy sensors.

- Install ef icient alternative to incandescent lighting, mercury vapor lighting, etc. Ef iciency (lumens/watt) or various technologies range from best to worst approximately as follows: low pressure sodium, high pressure sodium, metal halide, luorescent, mercury vapor, incandescent.
- Select ballasts and lamps carefully with high power factor and long-term ef iciency in mind.
- Upgrade obsolete luorescent system to compact luorescents and electronics ballasts.
- Consider lowering the ixtures to enable using less of them.
- Consider they lighting, skylights, etc.
- Consider painting the walls a lighter colour and using less lighting ixtures or lower wattages.
- Use task lighting and reduce background illumination.
- Re-evaluate exterior lighting strategy, type, and control, Control it aggressively.
- Changer exit signs from incandescent to LED.

➢ DG SETS

- Optimize loading.
- Use waste heat to generate steam/hot water/power an absorption chiller or preheat process or utility feeds.
- Use jacket and head cooling water for process needs.
- Clean air ilters regularly.
- Insulate exhaust pipes to reduce DG set room temperature.
- Use cheaper heavy fuel oil for capacities than 1MW.

➢ BUILDINGS

- Seal exterior cracks/opening/gaps with caulk, weather stripping, etc. Consider new thermal doors, thermal windows, roo ing insulation, etc.
- Install wind breaks near exterior doors.
- Replace single-pane glass with insulating glass.
- Consider covering some window and skylight areas with insulated wall panels inside the building.
- If visibility is not required but light is required, consider, replacing exterior windows with insulated glass block.
- Consider tinted glass, re lective glass, coating, awnings, over change, draperies, blinds, and shades for sunlit exterior windows.
- Use landscaping to advantage.

- Add vestibules or revolving doors to primary exterior personal doors.
- Consider automatic doors, air curtains, strip door, etc. At high-traf ic passages between conditioned and non-conditioned spaces. Use self-closing doors if possible.
- Use immediate doors on stairways and vertical passages to minimize building stack effect.
- Use dock seals at shipping and receiving doors.
- Bring cleaning personal in during the working day or as soon after as possible to minimize lighting and HVAC costs.

➢ **WATER & WASTERWATER**

- Recycle water, particularly for uses with less-critical quality requirements.
- Recycle water especially if sewer costs are based on water consumption.
- Balance closed systems to minimize lows and reduce pump power requirements.
- Eliminate once-through cooling with water.
- Use the at least expensive type of water that will satisfy the requirement.

- Fix water leaks.
- Text for underground water leaks. (It's easy to do over a holiday shutdown).
- Check water over low pipes for proper operating level.
- Automate blow down to minimize it.
- Provide proper tools for wash down – especially self-closing nozzles.
- Install ef icient irrigation.
- Reduce lows at water sampling stations.
- Eliminate continuous over low at water tanks.
- Promptly repair leaking toilets and faucets.
- Use water restrictors on faucets, shower, etc.
- Use self-closing types faucets in restrooms.
- Use the lowest possible hot water temperature.
- Do not use a heating system hot water boiler to provide service hot water during the cooling season - - install a smaller, mor-ef icient system for the cooling season service hot water.
- If water must be heated electrically, consider accumulation in a large insulated storage tanks to minimize heating at on-peak electric rates.
- Use multiple, distributed, small water heaters to minimize thermal losses in large piping system.
- Use freeze protection valves rather than manual of lines.

- Consider leased and mobile water treatment system, especially for deionized water.
- Seal sumps to prevent seepage inward from necessitating extra sump pump operation.
- Install pre-treatment to reduce TOC and BOD surchargers.
- Verify the water meter reading. (you'd be amazed how long a meter reading can be estimated after the meter breaks or the meter pit ills with water.)
- Verify the sewer lows if the sewer bills on them.

➢ MISCELLANEOUS

- Mater ant unmetered utilities. Know what is normal ef icient use. Track down causes of deviations.
- Shut down spare, idling, or unneeded equipment.
- Make sure that all of the utilities to redundant areas are turned off - - including utilities like compressed air and cooling water.
- Install automatic control to ef iciently coordinate multiple air compressors, chillers, cooling tower cells, boilers, etc.
- Renegotiate utilities contracts to re lect current loads and variations.
- Consider buying utilities contracts to re lect current loads and variations.
- Leased space often has low-bid inef icient equipment. Consider upgrades of your lease will continue for several more years.
- Adjust luid temperature within acceptable limits to minimize underestimate heat transfer in no long pipelines.
- Minimize use of low bypasses and minimize bypass low rate.
- Provide restriction ori ices in purges (nitrogen, steam, etc.).
- Eliminate unnecessary low measurement ori ices.
- Consider alternatives to high-pressure drops across valves.
- Turn off winter heat tracing that is on in summer.

Minutes of the Quarterly Meeting of the National Council on Medical Devices and Diagnostics on 4th August via Hybrid Mode

Mr Vineet Gupta, Chairman extended a warm welcome to all council members and facilitated introductions. Chairman is very keen on issues related to business continuity. Furthermore, he directed the secretariat to develop a mechanism for effectively tracking policy initiatives.

Mr Dinesh Arora, Co-chair, welcome the members of the council and highlighted the importance of smaller groups directing their attention towards the council's agenda.

Discussions and Action Points:

- Council agenda will focus on the continuity of Business rules to come out which should be implementable with the ease of doing business.

- The Department of Pharmaceuticals is actively engaged in developing the PLI scheme and enhancing India's brand image. We have requested the Department of Pharmaceuticals to initiate technical advocacy in this domain, which presents a promising area for our concentrated efforts.

- Draft on Regulatory Pathway for Refurbishment to be shared with the members of the council for inputs and comments - OEM & Non OEM that also to be brought under regulatory control. Because this mainly focused on safety and efficacy of the patient

- Technical & Financial support to be provided for Indian Manufacturer to get CE & FDA approval.

- Exemption from Legal Metrology, QCO & CRO - ASSOCHAM to submit the representation to NITI Aayog addressing to Mr. Suman Bery, NITI Aayog & CC to Dr Vinod Paul. Following this, a comprehensive discussion involving all stakeholders can be organized.

ASSOCHAM
Ideate • Innovate • Impact

ASSO/NAAC/EEA-122/2022

NAAC Environmental Parameters Review Report (EPRR)
Kalinga University, Raipur, Chhattisgarh

This is to certify that

ASSOCHAM
has carried out the following for

Kalinga University, Raipur

1. Energy Audit
2. Environmental Audit
3. Water Audit

The ensuing reports have been prepared as per the NAAC guidelines for Criteria 7 (7.1.2 to 7.1.6). The reports have been prepared as per primary visits and documents obtained from the client.

For ASSOCHAM

ASSOCHAM NEW DELHI

A. K. Verma
Accredited Energy Auditor
AEA-0194
Director, Akhildeep Management and Energy Consultant Pvt. Ltd.

Rinaki Dasgupta
Environmental Auditor
ASSOCHAM

July 2021-22

ASSOCHAM
Ideate · Innovate · Impact

NAAC Environmental Parameters Review Report (EPRR)

Kalinga University, Raipur, Chhattisgarh

Kalinga University

Raipur, Chhattisgarh

Energy Audit | Environmental Audit | Water Audit

2021-22

THE ASSOCIATED CHAMBERS OF COMMERCE AND INDUSTRY OF INDIA

Regn. No. EA-11607

Certificate No. 6232

National Productivity Council

(National Certifying Agency)

PROVISIONAL CERTIFICATE

This is to certify that Mr. / Ms. ....Deepak Kumar Jain.....

son / daughter of Mr......S. Kumar Jain.....

has passed the National Certification Examination for Energy Auditors held in October - 2011, conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India.

He / She is qualified as **Certified Energy Manager** *as well as* **Certified Energy Auditor.**

He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the fulfillment of qualifications for the Accredited Energy Auditor and issue of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.

This certificate is valid till the issuance of an official certificate by the Bureau of Energy Efficiency.

Place : Chennai, India

Date : *1st February, 2012*

P. Dhanalingam

Controller of Examination

NAAC Environmental Parameters Review Report (EPRR)
Kalinga University, Kotni, Raipur, Chhattisgarh
2021-22

1.0 Background

The NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL (NAAC) conducts assessment and accreditation of Higher Educational Institutions (HEI) such as colleges, universities, or other recognised institutions to derive an understanding of the 'Quality Status' of the institution. NAAC evaluates the institutions for its conformance to the standards of quality in terms of its performance related to the educational processes and outcomes, curriculum coverage, teaching-learning processes, faculty, research, infrastructure, learning resources, organisation, governance, financial wellbeing and student services.

Kalinga University, Raipur has retained ASSOCHAM Councils on Environment and Climate Change for conducting a NAAC review with focus on Criteria VII pertaining to Environmental parameters. The ensuing report covers the various points and provides an overview of the various initiatives as part of NAAC requirements for the year 2021-22.

2.0 About ASSOCHAM

The Associated Chambers of Commerce & Industry of India (ASSOCHAM) is the country's oldest apex chamber, initiated its endeavour of value creation for the industry in 1920. It brings in actionable insights to strengthen the Indian ecosystem, leveraging its network of more than 4,50,000 members. With a strong presence in states, and key cities globally, ASSOCHAM also has more than 400 associations, federations, and regional chambers in its fold.

ASSOCHAM with its principles of SEED: sustainability, empowerment, entrepreneurship, and digitisation serve as a bridge between the industry and government on policy and regulatory, ease of business and cross cutting sectoral issues.

The GEM green building certification is an indigenous systematic evidence-based rating system for built environment including commercial and residential complexes. It is designed on the principles of NBC, ECBC and selected CPWD guidelines. It is recognized in several states for availing incentives and subsidies for FAR and other existing benefits. GEM is at par with all other green certification programme.

The councils for Environment & Climate Change and Water were formed keeping in mind the importance and a greater need to engage members on the core principles of sustainable development, circular economy, and SDGs.

The councils have been involved in engaging stakeholders and members for policy interventions, addressing their business concerns for better productivity and profitability. The councils have a vision for being the leading strategic, knowledge and solutions platform for members and stakeholders for achieving 5Ps.

3.0 About Kalinga University

Kalinga University is located at Naya Raipur, Chhattisgarh that spreads over 35 acres of lush green campus enveloped with serene beauty. As a proactive University concerned with the conservation of the environment, we generate awareness and promote environmental care at both individual and community level. We aim to create a pervasive atmosphere on environmental issues by engaging faculty, students and the general public.

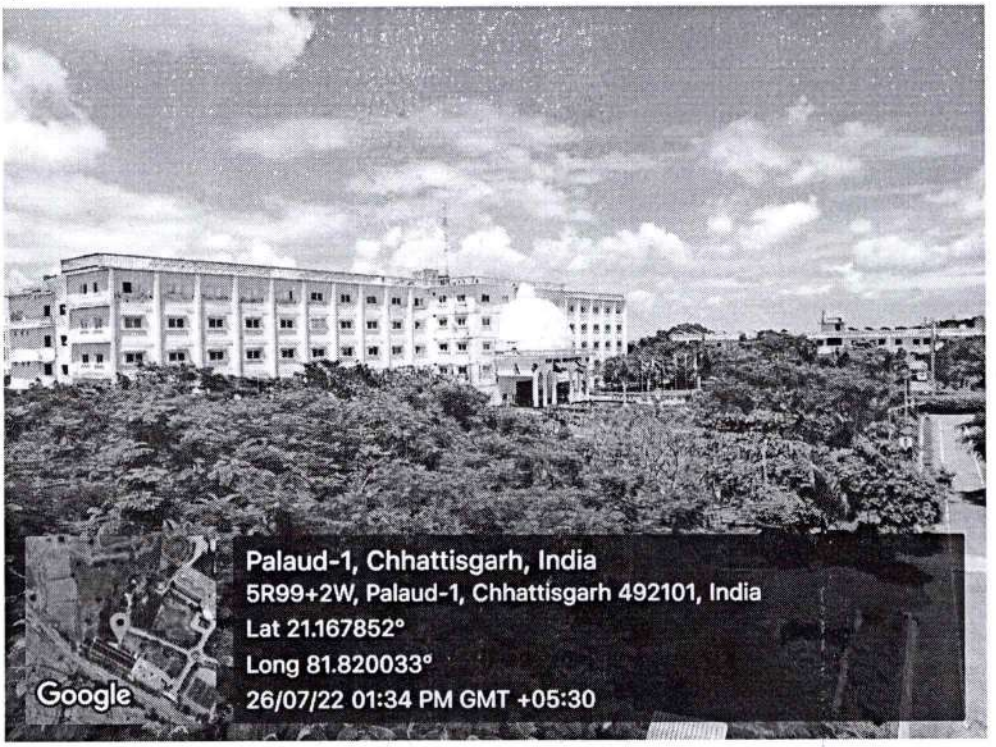


Photo 1: Kalinga University

The Kalinga university is situated in village Kotni, 35 km from Raipur city.

Kalinga University, Raipur is a NAAC accredited University with Grade B+ and the Only Private University in Chhattisgarh ranked in Top 101-150 Universities in NIRF Ranking 2022 and has emerged as a centre of excellence of higher education in Central India. Strategically located in the Smart City of New Raipur, this University has started carving a niche for itself in the education domain and is rising as a shining star on the horizon of quality education.

Establishment - Established in 2013, this university has been able to win the confidence of over 8000 students. Meritorious students from all over the country and 23+ foreign countries have chosen this University for their education and career.

Schools of Excellence - A centre for Doctoral research programmes in various fields. Currently the University is serving the student community through various UG and PG programs namely Engineering, Law, Pharmacy, Arts & Humanities, Science, Commerce & Management, Biotechnology, Information Technology, Library Science, Fashion Design & Interior Design.

Academics and Faculty - All schools are headed by senior professors having excellent academic credentials and experience of teaching, publications and research. They are ably supported by the well qualified faculty members who come from top educational institutions and the industry. Students also get an opportunity to learn from a distinguished panel of experts drawn from various industries, who regularly come for guest lectures.

Infrastructure – Kalinga boasts of World Class Infrastructure and student facilities with student centric approach. Highest attention is paid to hands on learning approach and students are encouraged to come up with innovative ideas for projects and practical's. The University has more than 75 laboratories and workshops, all well equipped with the latest, state of the art apparatus and tools. Special emphasis is given to the development of communication skills through the language lab. More than 1200 computers are available for the use of the students.

The library has a collection of over 79,000+ books and also offers Digital content through membership of DELNET, National Digital Library and NPTEL. Various magazines and journals are available for the use of the faculty and students.

Infrastructure consists of Student Hostel facilities, Green Acres, Canteen, Food Mess, Gymnasium, Fully Wi-Fi Campus, ATM, Mini Market, Student hangout Areas, Sports Complex, Re-creation Halls with Indoor Games and Music and recreation activities.

Industry Orientation and Leadership - Industry interaction is an integral part of the curriculum and Industrial visits, internships on live projects and mentoring by the industry leaders are regular features. The University has developed excellent connections with the top Industries of the region by taking memberships of leading industrial associations like ASSOCHAM, Confederation of Indian Industries, PHD Chamber of Commerce and Industry, Federation of Indian Chamber of Commerce and Industry, Indian Importers Chamber of Commerce and Industry. The University has an active chapter of Young Indians in which students get an opportunity to interact extensively with the industry leaders and attend various corporate seminars and events.

Life Changing Experience - Kalinga is a Life Changing experience where the stress is on over all development of students. NCC, NSS and Various other clubs and societies offer opportunities to students to showcase their talent and learn under the guidance of experts. Music, dance and martial arts trainers are available for the students. Coaches of different games and sports like Cricket, Football, Basketball, Volleyball and athletics are also available for sharpening the talent of the students.

Highlights of Kalinga University

1	Research oriented, student centric university attracting students from all parts of India and over 22 foreign countries.
2	8th Private University in the country approved under Section 12B by UGC.
3	The best Private University in Central India Award by ASSOCHAM in 2020.
4	44th Rank in top Universities in the country as per survey done by outlook-icare in 2019.
5	30th Rank in top universities in the country established after the year 2000 as per survey done by India Today in 2018.
6	Management Department Ranked as 7th Best in the country as per survey by Competition Success Review in 2018.
7	Engineering Department Ranked as 3rd Best in the country as per survey by Competition Success Review in 2019.
8	State of the art Library with over 80,000 books and E access to various journals and databases including DELNET, NPTEL, NDL, J-Gate (Social Science), J-Gate (Science and Technology), INSPEC Database of Elsevier & Web of Science.
9	Free of cost Coaching classes for Competitive exams and IT skills in Collaboration with Bosch, NIIT, and BT for all students.
10	Free of Cost Hobby classes for Self defence and Martial arts , Instrumental and Vocal Music for hostel students.
11	Central Instrumentation Facility with world class Scientific apparatus and research databases.
12	Innovation and Incubation Cell to support startups and entrepreneurship of students.
13	Accredited by NAAC with B+ grade.
14	Listed in Rank Band 150-200 in University category in NIRF Ranking 2021.
15	"Free of cost" Value Added courses available for all students.
16	Unique policy of acquiring "Extra Credits" for Various Co-curricular & academic activities.
17	Mentoring of all students by dedicated faculty members.

18	Extra classes for slow learners.
19	Regular field visits, guest lectures, case studies, role plays, mock sessions etc.
20	Soft skills classes for all students.
21	Activities, internship & placement opportunities for all students.

4.0 Background

Environmental issues are important for wellbeing of people and surroundings. They are increasingly impacting several walks of life and institutions. Proper addressing of environment concerns ensures that the bottom line and future prospects of companies and institutions.

They can present both opportunities and risk and can have important implications for strategy, competitiveness, risk management, stakeholder relations and business resilience.

The ICAI in its publication states that an understanding of how environmental issues impact stakeholders and understanding stakeholder's expectations about environmental issues can contribute valuable insights for the identification of strategic opportunities and corporate risks. Positive stakeholder relations build trust, increasingly essential for competitiveness and resilience.

Environment audit is one such tool which provides the owners and stakeholders a 360-degree view of the present status of physical environment in any location. It includes various components such as air management, water conservation, wastewater management, solid waste management, landscaping, and plantation aspects.

The aim is to assess how well environmental organisation, management and equipment are performing with the aim of contributing to safeguard the environment by facilitating management control of environmental practices and assessing compliance with organisational policies, which would include meeting regulatory requirement.

5.0 Audit Phases

The various phases of audit are

1. Pre-audit
2. Audit
3. Post-audit

The pre-audit consists of

1. Objectives
2. Scope

3. Audit Criteria
4. Audit team
5. Audit plan
6. Facility
7. Review

The audit phases consist of

1. Opening meeting
2. Physical visit and inspection
3. Records and documents review
4. Interviews
5. Initial review of findings
6. Closing

The post-audit phase consists of

1. Final evaluations
2. Preliminary report
3. Management approval
4. Final report

Audit Follow up and actions taken.

The ensuing report is based on the above guidelines.

5.1 Part A: Pre-audit

1. Objectives
   The objective is to undertake an environmental assessment and report the findings through an audit report as per NAAC criteria 7.0.

2. Scope
   The scope of the audit is the physical boundaries of Kalinga University situated at village: Kotni, Raipur in the state of Chhattisgarh.

3. Audit Criteria
   The audit criteria for the purpose of this environmental audit is the guidelines of environment audit by ICAI.

4. Audit Team
   The audit team is responsible for the physical inspection and documentation of the audit. The team consists of Chairman along with Member Secretary with members from all departments of university.

5. Audit Plan
   The audit plan consists of opening meetings, physical inspection, interviews, document collection and verification, reporting and documentation.

5.2 Part B: Audit

The audit phases consist of

1. Opening meeting
   An opening meeting was held on 26th July, 2022 with the registrar and other team members from the environment committee.

2. Physical visit and inspection
   The audit team conducted physical visit to different departments inside the campus along with members from the environment committee of the university under the guidance of member secretary.

3. Records and documents review
   The audit team inspected several documents during the audit. Some of these are
   a. Water register
   b. List of trees
   c. Waste logs
   d. Solar power bills
   e. STP documents
   f. MoUs with multiple agencies on waste.

4. Interviews
   The interviews were conducted with administration, accounts, academics and randomly selected students and members of staff for their views on the environment. The team also interviewed the member secretary of the environment committee to obtain an overview of the environmental practices and actions of the university.

5. Initial review of findings
   The findings were recorded, reviewed and shared with the management through the environment committee of Kalinga university.

6. Closing
   A closing meeting was held with the member secretary and select members of the environment committee.

5.3 Part C: Post Audit

The post-audit phase consists of

1. Final evaluations
   The final evaluations were initiated post receipt of the preliminary findings of the audit from the management.

2. Preliminary report
   The preliminary report was shared with the management for their review and approval.

3. Management approval
   The management accorded acceptance of the preliminary report.

4. Final report
   The final report was prepared post obtaining the remarks and observations from the Kalinga management and environment committee.

6.0 Audit Observations and Findings

Solar Power

Kalinga University has set up Solar Panels generating 300 KV (200 KV + 100 KV) of electricity, which is directly linked to the grid. Apart from the above, the university has 24 solar street lightings.

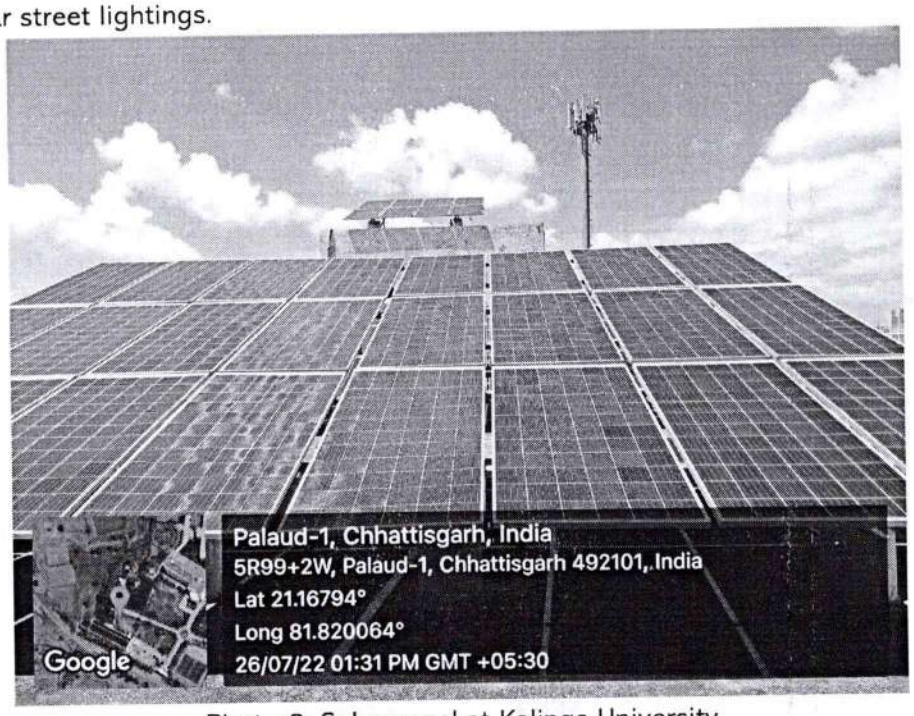


Photo 2: Solar panel at Kalinga University

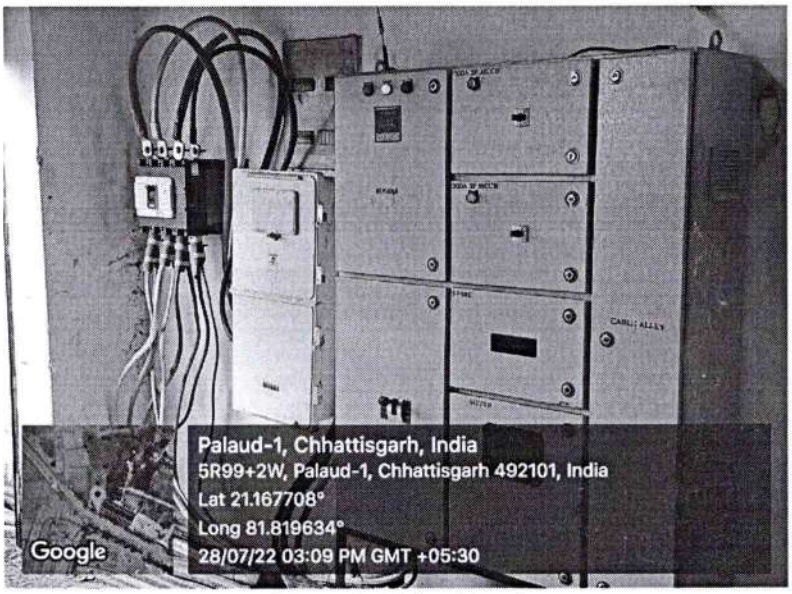


Photo 3: Solar Panel

Air

The ambient air samples were collected from two locations inside the campus. These were analyzed as per NAAQS parameters. The results are provided in Annexure-10.

The university also ensures that there is no open burning of solid waste.

DG sets

There are three generators in use – 1 x 125, 2 x 45 KVA. They are as per CPCB guidelines.

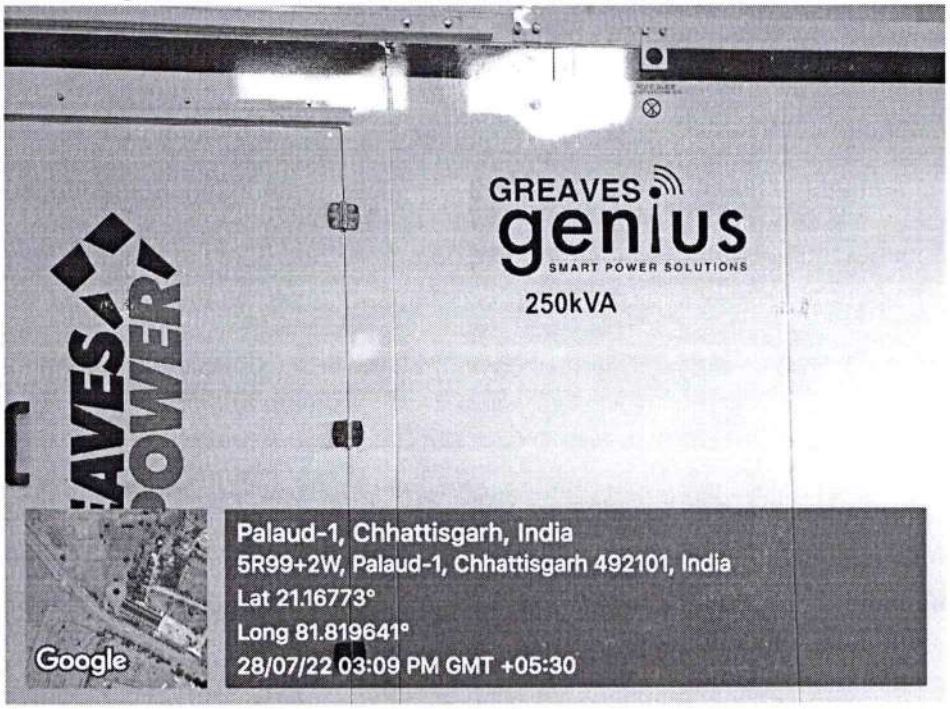


Photo 4: DG sets

Water

The university has installed groundwater extraction systems inside the campus to meet water demand. The groundwater is pumped to overhead tanks and passed through RO. Filtered water is supplied for drinking purposes. Raw water is utilized for laundry, washing and bathing purposes. Cooking water supplied is of drinking quality.

The tank capacity at various locations is provided in Table 1

Table 1: water storage quantity in Campus

S.No	Block	Quantity
1.	Main Building	40,000 ltr
2.	Academic Block	20,000 ltr
3.	Indus Hostel	50,000 ltr
4.	Bhramputra Hostel	40,000 ltr
5.	Everest Hostel	20,000 ltr

The water requirement as per NBC 2016 is provided in Table. This quantity is at a higher estimate. The water consumption is around 75% of the estimated quantity. The staffing pattern for the university is 600, out of which 200 are administrative, 400 teaching and 200 working staff. There are two restaurants with seating capacity of 10 indoors and 30 outdoors. The campus also houses canteens. There are 3500 non-resident students who ply from their place of residence to the campus by bus and personal transport. The annual holiday for students has been estimated to be around 75 days spread over two to three months along with leave with respect to medical and personal reasons.

Table 2: Water demand as per NBC for Kalinga University

S.No	Establishment	Number	Persons	NBC standard	Quantity
1.	Hostels	4	1200	135	1,62,000
2.	Offices	45	200	45	27,000
3.	Restaurant	2	10 (indoors) 30 (outdoors)	70	1,400 4,200
4.	Non-resident students		3500	45	1,57,500
5.	Total requirement				3,52,100
6.	Say				350 KLD

The supply is also obtained from tankers of 4 KL capacity. This water is utilized for drinking purposes. The approximate distribution of water is provided in table 3.

Table 3: Number of tankers utilized by Hostels

S.No	Establishment	Number of tankers
1.	Brahmaputra	210
2.	Girl's hostel	18

3.	Gole chowk	18
4.	Tree/Garden	76
5.	Sports Ground	22
6.	Makhana	13
	Total	325

The total tankers received in a month are an average of 640-650 KL. It translates to around 80-90 tankers per day. This would then indicate volume of 80-90 KLD. This indicates that the tankers cater to 25%-30% of the total water demand.

The main storage inside the campus is at gole chowk of 35 KL. The underground tank at Brahmaputra hostel is of 15 KL capacity.
The wastewater generated is therefore, 350 KL x 80% = 280 KL
The groundwater sampling reveals the following results.
Sampling was also undertaken from the artificial pond created by the university authorities. The pond is 200 KL capacity.
The analytical result from the pond is provided in table.
The university also employs water conservation measures such as rainwater harvesting.
The rainwater harvesting estimation is provided in Table.

RAINWATER HARVESTING PIT CALCULATIONS
KALINGA UNIVERSITY, RAIPUR
PARAMETERS / DATAS / CALCULATIONS:

1.0	Areas	
	Total Area in Acre	33.98
a)	Site Area in m^2	137512.74
b)	Terrace / Roof Area (approx.)	65,000.00 Sq.m
c)	Paved / Pavement / Road/Sub Soil Drainage	136423.65 Sq.m
d)	Green Area / Loose Area	20626.91 Sq.m
2.0	Co-efficient and factors adopted	
a)	Harvesting efficiency factors for terrace and roof tops	0.9
b)	Harvesting efficiency factors for roads and paved surface/SSD	0.7
c)	Harvesting efficiency factor for Green/ soft soil	0.2
3.0	Rain Fall	
a)	Annual average rainfall considered *(as per CGWB – CENTRAL GROUND WATER BOARD Ministry of Water Resources, Government of India,*	1401.00 mm
4.0	Co-efficient for calculations of capacity for collection wells for Harvesting	
a)	Rain Fall intensity *(assumed as per rainydays)*	35 mm/hr
b)	Retention time for capacity of recharge tank	30 min
c)	Net runoff for which holding is required for infiltration	17.5 mm

5.0	Calculation for Rainwater Harvesting System	
a)	Total Annual run up available	
	Terrace / Roof Area (approx.)	27381.70 Cu.Mtr
	Paved / Pavement / Road/Sub Soil Drainage	133790.67 Cu.Mtr
	Green Area / Loose Area	5779.66 Cu.Mtr
	TOTAL	166952.03 Cu.Mtr
	CALCULATIONS:	
1.0	Roof / Terrace	
i)	Average runoff co-efficient for terrace	0.9
ii)	Terrace / Roof Area	21716.00 Sq.m
iii)	Rain fall intensity	35 mm/hr
iv)	Infiltration well capacity design period	30 min
v)	Net runoff for which holding is required for infiltration	17.5 mm
vi)	Required approx. theoretical volume of infiltration wells (Total Area x Coefficient x Net Runoff)	342.03 Cu.Mtr
2.0	Road / Paved / Pavement Area	
i)	Average runoff co-efficient for terrace	0.7
ii)	Road / Paved / Pavement Area	136423.65 Sq.m
iii)	Rain fall intensity	35 mm/hr
iv)	Infiltration well capacity design period	30 min
v)	Net runoff for which holding is required for infiltration	17.5 mm
vi)	Required approx. theoretical volume of infiltration wells (Total Area x Coefficient x Net Runoff)	1671.19 Cu.Mtr
3.0	Green / Loose Area	
i)	Average runoff co-efficient for terrace	0.2
ii)	Green / Loose Area	20626.91 Sq.m
iii)	Rain fall intensity	35 mm/hr
iv)	Infiltration well capacity design period	30 min
v)	Net runoff for which holding is required for infiltration	17.5 mm
vi)	Required approx. theoretical volume of infiltration wells (Total Area x Coefficient x Net Runoff)	72.19 Cu.Mtr
	Total Volume of Infiltration	2085.41 Cu.Mtr

Capacity of Single Desilting Chamber:

L	W	D		
5.0 M	5.0 M	2.0 M		50.00 Cu.Mtr
			Say	50.00 Cu.Mtr

Capacity of Single Circular Pit:

Dia	Effect. Depth

3.0 M	3.0 M		21.20 Cu.Mtr
		Say	21.20 Cu.Mtr
Total volume of 1 set of Desilting Chamber + Pit			71.20 Cu.Mtr
Thus, number of Pits required		=	31.4 Nos.
		Say	31 Nos.

Water Treatment

There are seven ROs installed inside the campus. Geotagged photos are provided. Three points per building are provided for purified water supply to residents.

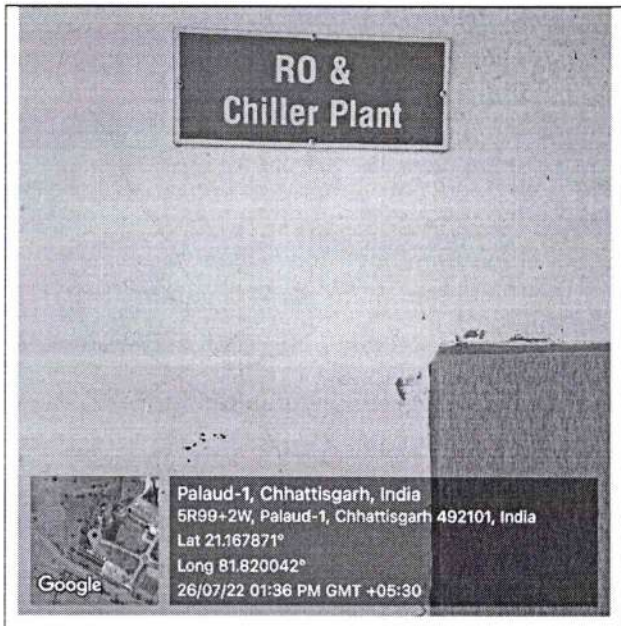


Figure 5: RO systems

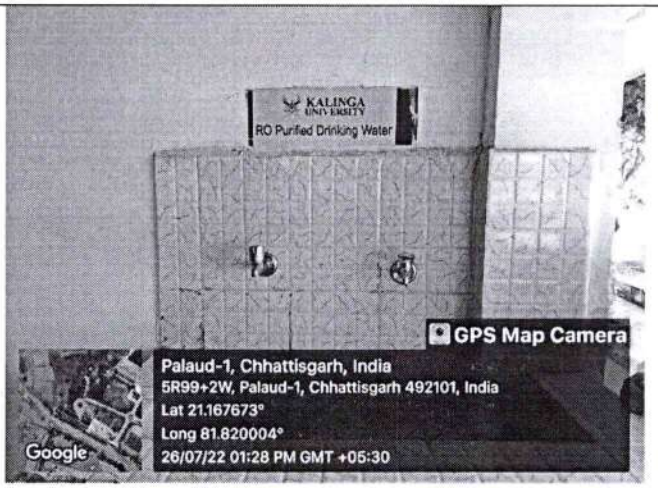


Figure 6: RO distribution system within campus.

Wastewater

The wastewater is generated from campus from the following areas:

1. Canteen
2. Restaurants
3. Hostels
4. Offices
5. Generator room

There are five STPs installed in the campus at various locations. The details are provided in table 4

Table 4: STP and their location with capacity and operational time.

S.No	STP capacity (KL)	Location	Operation status
1	40	Pacific Hostel	Operation hours 8-10 hrs
2	30	Brahmaputra Hostel	Operation hours 8-10 hrs
3	30	Indus Hostel	Operation hours 8-10 hrs
4	40	Canteen	Operation hours 8-10 hrs
5	40	Administrative Block	Operation hours 8-10 hrs

The STPs are maintained by the university staff. These STPs were installed during 2020.

Treatment Capacity:

The wastewater treatment plant is designed to treat 30,000 Liters/Day to 1 Lakh Liters/Day Sewage generated from Unit.

The treated effluent will be used for gardening, horticulture, and flush water in toilets.

As per the site visit yesterday, we found that there are 6 buildings-

1. Admin Building
2. Pharmacy Building
3. Old Boys Hostel
4. Girls Hostel
5. International Boys Hostel
6. New Boys hostel.

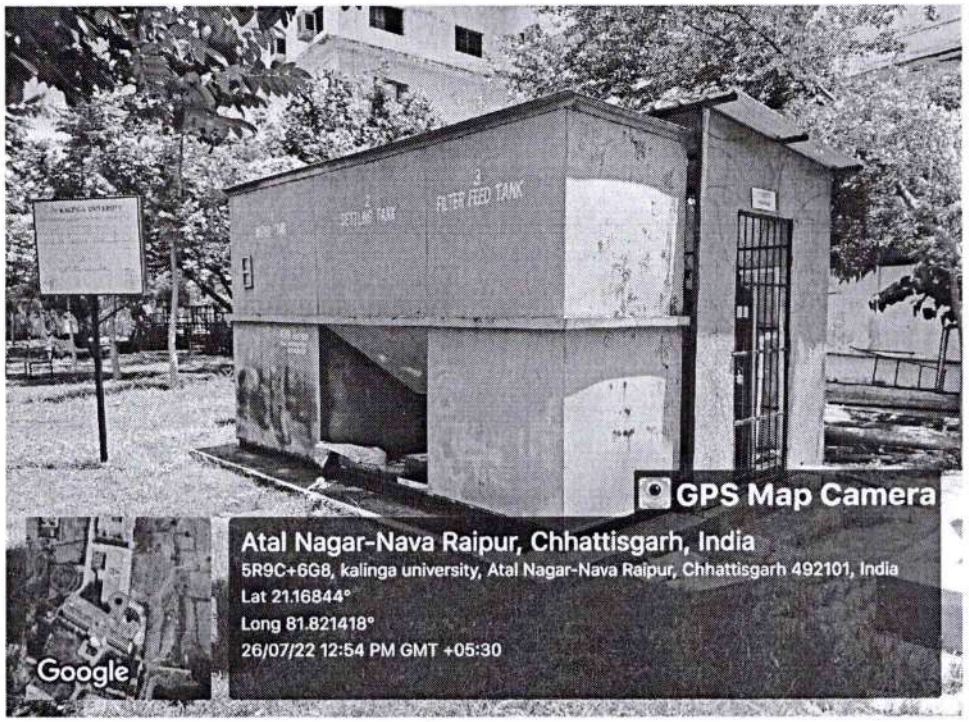
Admin Building and Pharmacy Building Sewage treatment plant can be common as there are no distances between them. There will be separate Sewage treatment plants for other four buildings. As per the people strength we have designed plants of different capacities for different buildings.

For Admin building and under construction pharmacy building we recommend plant of 100 KLD.

DESIGN BASIS

Treatment Capacity:

The wastewater treatment plant is designed to treat 30,000 Liters/Day to 1 Lakh Liters/Day Sewage generated from unit.



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For Admin building and under construction pharmacy building a plant of 100 KLD was recommended

.

The technical specifications of 100 KLD Plant is provided in Annexure.

The results of the influent and effluent are provided in table.

Solid Waste

The university campus has the capacity to house the following population:

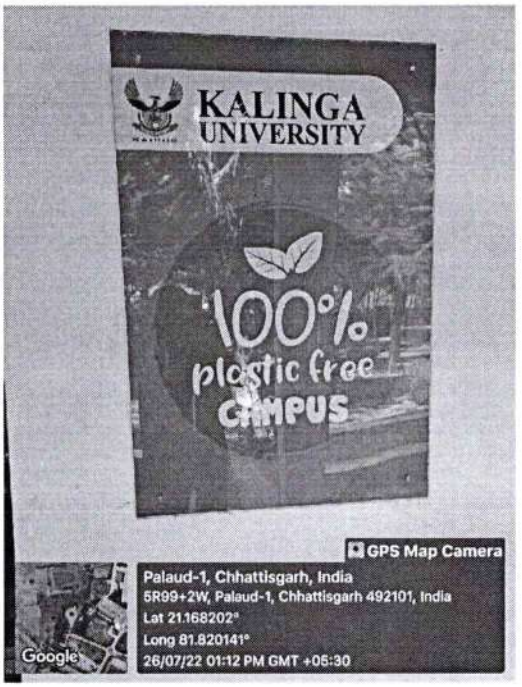
1. Students – 1200 (residents)
2. Teaching staff - 600
3. Non-teaching staff – 400
4. Students – 2800 (day engagement)

The solid waste generated from the campus in 2021-22 has been estimated based on the following (Assuming 0.3 kg/per capita daily solid waste generation):

The solid waste is collected through bins (blue and green). Blue bins are for dry waste, while the green bins are for wet wastes.

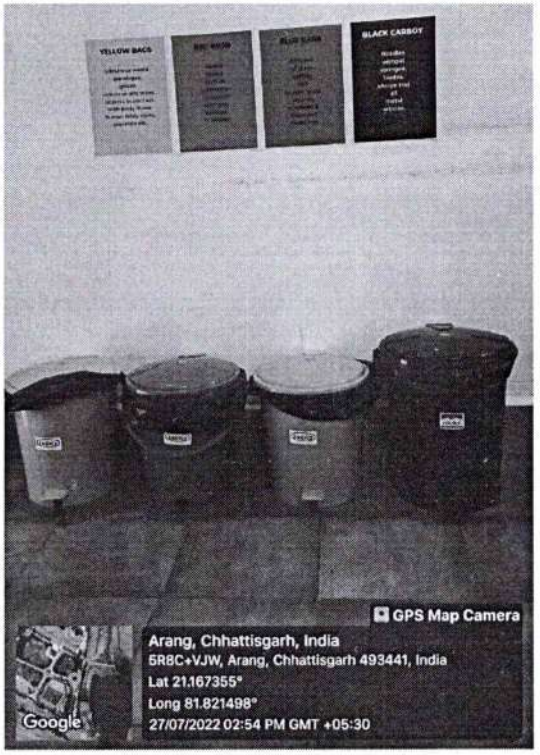
Fallen leaves, flowers and other organic materials are collected through manual sweeping and transported to vermicomposting plant.

The university also generates plastic wastes depending on the usage. However, considering that around 48,000 TPA of plastic waste is generated in the state with a population of 32,941,966 in 2021. The average plastic waste per capita comes around 1.45 kg per capita annually, which translates to 0.4 gm per capita daily.



The inert and other solid wastes are collected and stored before being discarded to authorised agencies on regular basis.

The university is steadily moving towards achieving zero plastic thought. The university encourages segregation and has placed several blue and green bins across the campus site.



The sources of solid wastes are as follows:

1. Hostel Canteen – cut fruits and vegetables, eggshells, peels, skins, meat leftovers, etc.
2. General campus – crunchies packet, plastic water bottles, packaging, used and won out fabric and clothes, used paper, cardboards, stationery items, etc.
3. Fallen leaves, flowers, dried stems, road, and kerb side dusts, etc.

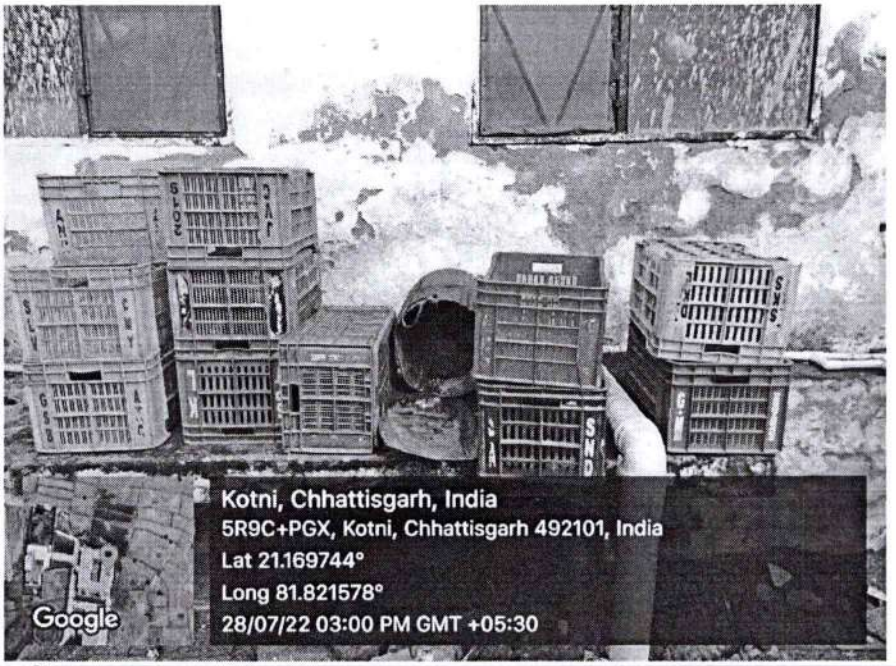
There are solid waste generations from laboratories and offices.

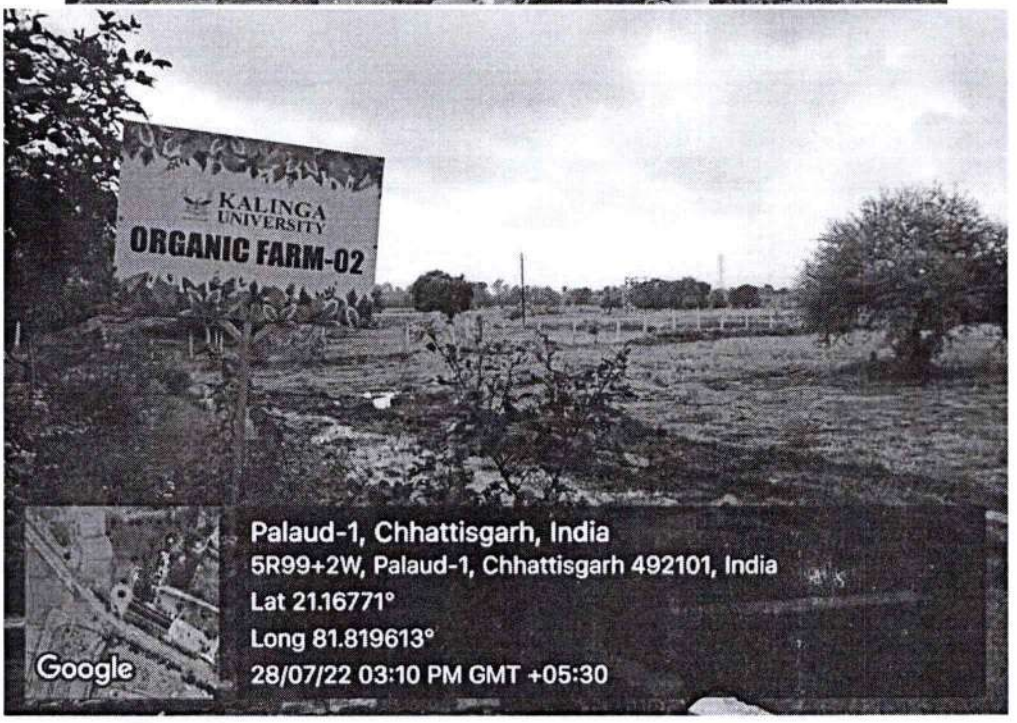
Food waste

The food waste is generated from various locations:

1. Hostel canteens
2. Offices
3. Small campus stalls
4. Restaurant

These are collected in boxes and sent for composting. There is also visit by municipal authorities daily for picking up garbage and municipal waste.





E- waste

The university has several sources of e-waste such as from laboratories, hostels, and offices. Some of the equipments which are deemed fit for upscaling and re-furbishing are completed in these two aspects and donated for primary school use in nearby villages.

University is committed to practicing sustainable development and the management of E-waste is an important aspect of the sustainability goal. E-waste is collected and

segregated in reusable and non-usable items. The life of electronic equipment is extended by appropriate upkeep and minor repairs carried out by University's own technical experts. Flip flops, memory chips, motherboard, compact discs, cartridges etc generated by electronic equipments such as Computers, Radio, TV, Phones, Printers, Fax and Photocopy machines are recycled properly. Instead of buying a new machine buyback option is taken for technology upgradation.

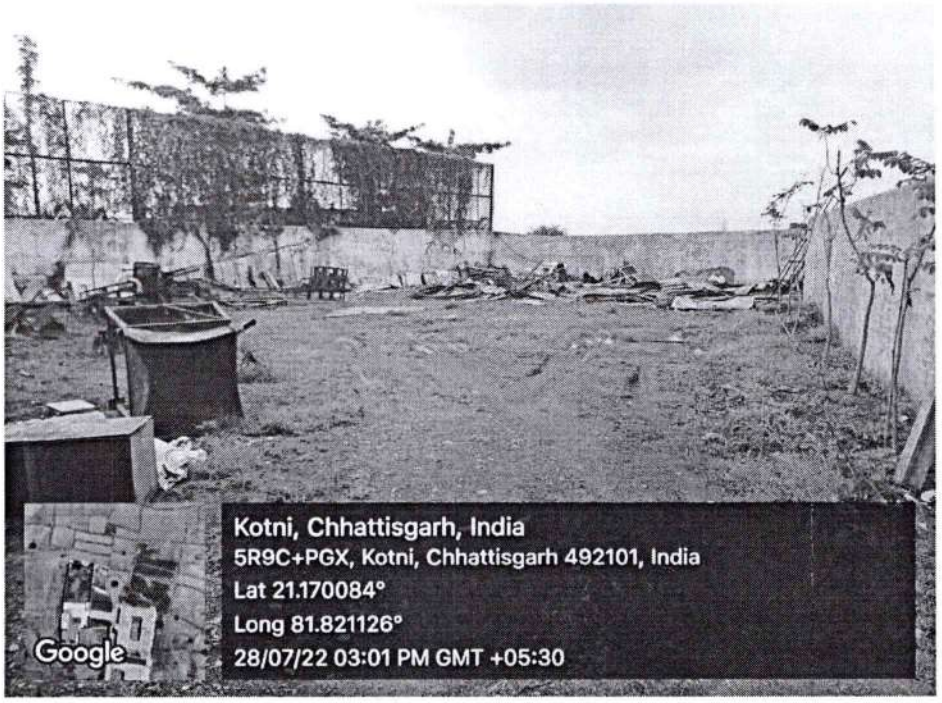
The e-waste generated from hardware which cannot be reused or recycled is being disposed off centrally through authorized vendors. Kalinga University has MoU with Adatte E- Waste Management Private Limited, New Delhi for E-Waste disposal.

Biomedical waste

The biomedical wastes are generated from the campus, especially from laboratories and hostels. However, the quantity is small.

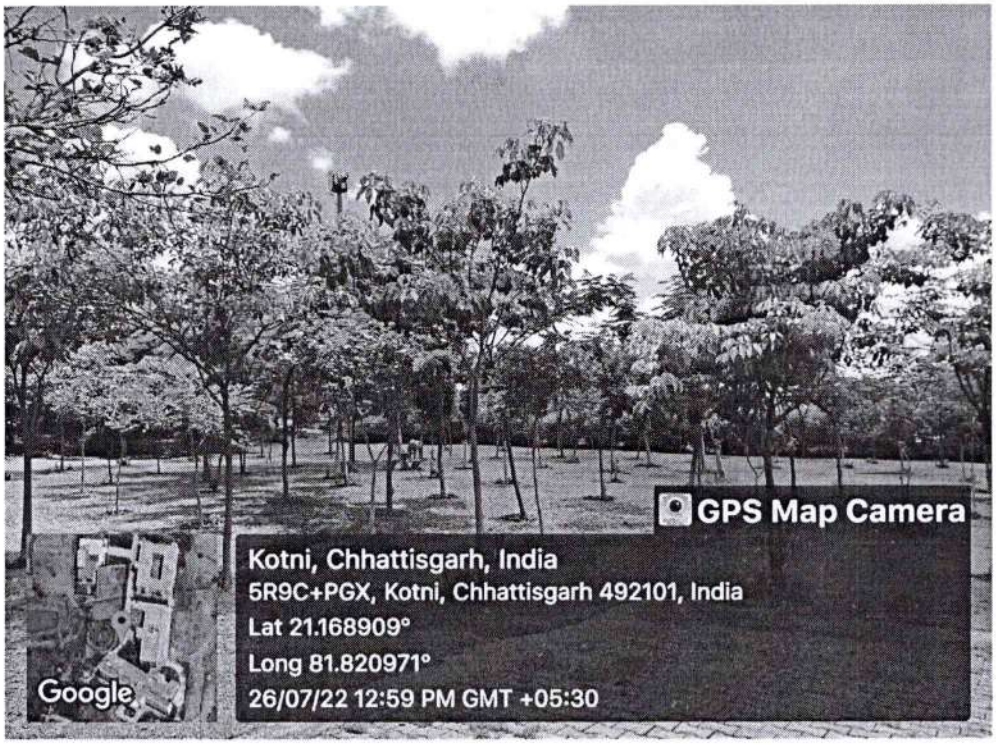
Hazardous waste

The university generates hazardous waste from laboratories. A very small proportion of the hazardous waste is also generated from hostels and offices, especially used cells and batteries.



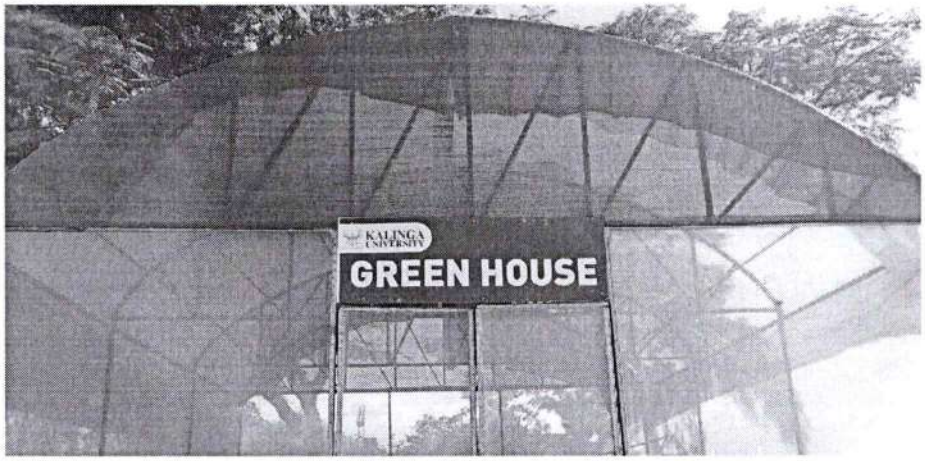
Green Campus

The university has a small green house, which is utilized for cultivation of smaller plants. The campus has ample green spaces and has undertaken plantations wherever feasible. Kalinga University believes that a clean, green and pollution free environment provides a pristine backdrop for an effective learning experience.



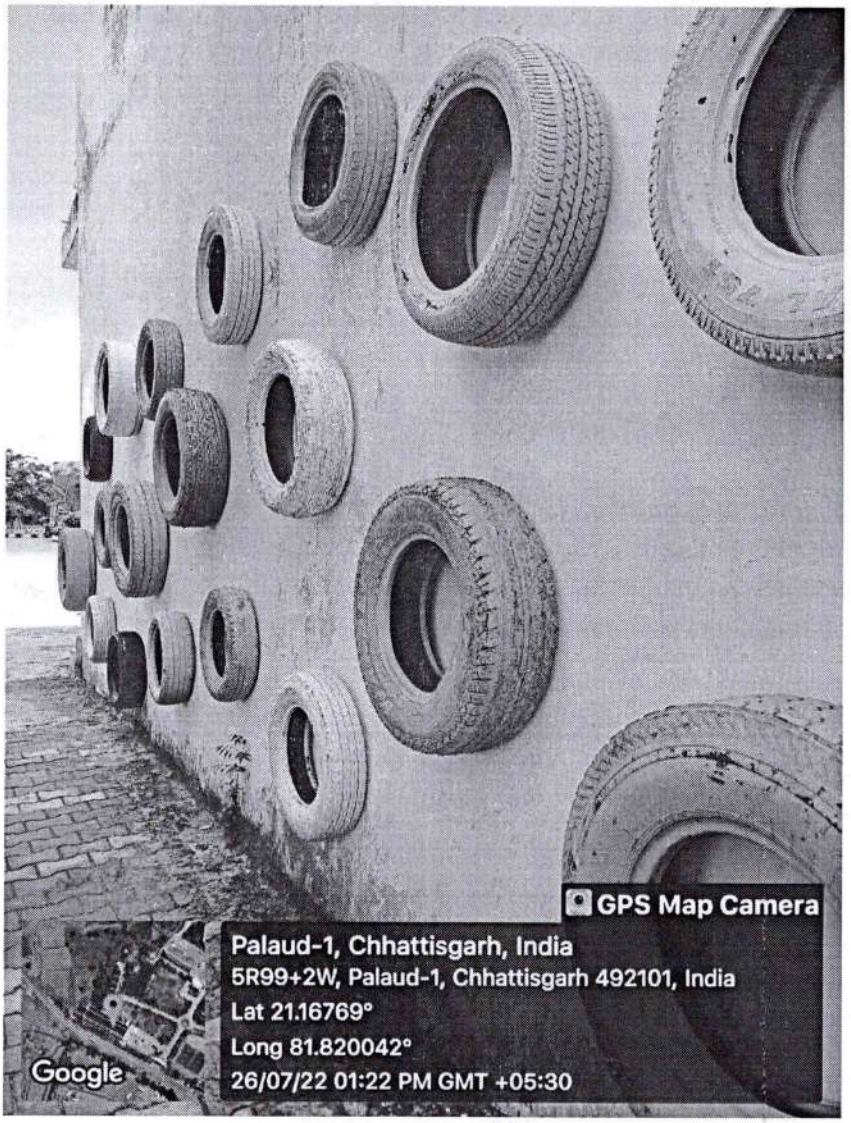
They have therefore resolved to provide a Green Campus. They have taken up environmental initiatives by creating a green environment in and around the campus. This is done by planting 1000's of plants and trees and ensuring a regular upkeep of the same. Another initiative taken up by the University is that the treated and re-cycled wastewater is utilised for these plants and trees.

The University has a Green House, Rainwater Harvesting System, Medicinal Plants Garden and Botanical Garden.



During the visit of prominent guests as a memento, they are presented with a potted plant and a tree is also planted by them in the University campus with a plaque plate/name plate stating their details.

The students have also put in creatives around the campus with used materials. These look attractive and demonstrate that waste is a resource if taken as one.



Green Cover

Kalinga university has taken several initiatives for maintaining a healthy green cover throughout the campus.

There are several green spaces inside the campus. These serve both as lungs for the campus as well as creating hubs for biodiversity to thrive. The open parks are also availed for student activities and cultural engagements.

GREEN AREA AT KALINGA UNIVERSITY CAMPUS			
S.NO	PARTICULARS	AREA	
		SQUARE METER	SQUARE FEET
A1+A2	HORSE GARDEN	2461	26476.5
A3	PORCH GARDEN	140	1506
A4	KHO KHO GARDEN	1596	17170
A5	CIRCLE GARDEN	94.98	1021
A6	KABADDI GARDEN	1595	17159
A7	OLD BOYS HOSTEL GARDEN	1015	10919
A8	BOTANICAL GARDEN	1980	21301
A9	MINI CANTEEN GARDEN	352.8	3796
A10	ELEPHANT FOUNTAIN GARDEN	29.4	316.3
A11	MAIN CNATEEN GARDEN	847.3	9115.59
A12	GIRLS HOSTEL	595	6401.24
A13	INTERNATIONAL BOYS HOSTEL	304.7	3278.08
A14	NEW BOYS HOSTEL	3680	8071.28
A15	SPORTS GROUND (16 Acre)	64782.86	696960
GRAND TOTAL AREA		79474.04	855013.511
GRAND TOTAL AREA IN ACRES =18.36 ACRES			
PREPARED BY : DEPARTMENT OF CIVIL ENGINEERING , NAYA RAIPUR C.G.			

List of Plant Species in the Campus Area Wise

S.No.	Area	Local Name	Botanical Name	Numbers
1	Finger Garden	Paper Flower	*Bougainvillea glabra*	427
2		Chhatim Tree	*Alstonia scholaris*	3
3		Gulmohar	*Denolix regia*	10
4		Badam, Almond	*Termalaria catappa*	5
5		Palm	*Syagrus romanzoffiana*	13
6		Shami Plant (Sonapatti)	*Bauhinia racemosa*	2
7		Cape honeysuckle	*Tecoma capensis*	5
8		Canna	*Canna indica*	25
9		Morning glory	*Ipomoea carnea*	2
10	Basket Ball area (Inside)	Badam, Almond	*Termalaria catappa*	1
11		Gulmohar	*Denolix regia*	11
12		Kaner	*Nerium oleander*	1
13		chandani plant	*Tabernaemontana divaricata*	2
14		Paper Flower	*Bougainvillea glabra*	6
15	Basket Ball area (Outside)	Kadam	*Neolamarckia cadamba*	3
16		Palm	*Syagrus romanzoffiana*	6
17		Gulmohar	*Denolix regia*	7
18		Badam, Almond	*Termalaria catappa*	5
19			*Tecoma stans*	19
20			*Tecoma trumpet vine*	80
21		4 o'clock	*Mirabilis jalapa*	15
22		10 o'clock plant	*Portulaca grandiflora*	30
23	Gol chowk area	Paper Flower	*Bougainvillea glabra*	40
24		Red leaf plant	*Acalypha*	22
25		Cape honeysuckle	*Tecoma capensis*	5
26		Gudhal	*Hibiscus rosa sinesis*	2
27		Morning glory	*Ipomoea carnea*	2

28		Palm	*Syagrus romanzoffiana*	6
29		10 o'clock plant	*Portulaca grandiflora*	162
30	Parking area	Kadam	*Neolamarckia cadamba*	3
31		Ashoka plant	*Saraca asoca*	3
32		Gulmohar	*Denolix regia*	7
33		Chhatim Tree	*Alstonia scholaris*	3
34		Paper Flower	*Bougainvillea glabra*	438
35	Mini Market area	Gulmohar	*Denolix regia*	10
36		Kadam	*Neolamarckia cadamba*	3
37	Pond Area	Kaner	*Cascabela thevetia*	1
38		Babul Plant	*Vachellia nilotica*	15
39		Canna	*Canna indica*	5
40		Aak	*Calatropis procera*	2
41		Peepal Plant	*Ficus religiosa*	1
42		Chhatim Tree	*Alstonia scholaris*	36
43		Khajur	*Date palm*	226
44		Mango	*Mangifera indica*	11
45		Kadam	*Neolamarckia cadamba*	4
46		Madhavilata	*Hiptage benghalensis*	5
47		Cape honeysuckle	*Tecoma capensis*	5
48		Gulmohar	*Denolix regia*	10
49		Cape honeysuckle	*Tecoma capensis*	5
50		Paper Flower	*Bougainvillea glabra*	456
51		Shami Plant (Sonapatti)	*Bauhinia racemosa*	2
52	Main Building area	Gulmohar	*Denolix regia*	36
53		Shami Plant (Sonapatti)	*Bauhinia racemosa*	1
54		Bamboo	*Bambusa vulgaris*	42
55		Badam, Almond	*Termalaria catappa*	5
56		Chhatim Tree	*Alstonia scholaris*	2
57		Palm	*Syagrus romanzoffiana*	21
58		Bamboo palm	*areca palm tree*	28
59		Gulmohar	*Denolix regia*	36
60		Pitunia		8

61	Girls Hostel area	Cape honeysuckle	*Tecoma capensis*	28
62		Gulmohar	*Denolix regia*	2
63		Bamboo palm	*areca palm tree*	29
64		Palm	*Syagrus romanzoffiana*	8
65		10 o'clock plant	*Portulaca grandiflora*	30
66	New PharmacyBuilding	Kadam	*Neolamarckia cadamba*	24
67		Cape honeysuckle	*Tecoma capensis*	8
68		Pitunia		8
69	Boy International Hostel	Gulmohar	*Denolix regia*	50
70		Palm	*Syagrus romanzoffiana*	6
71		Amaltas	*Cassia fistula*	12
72		Madhavilata	*Hiptage benghalensis*	8
73		Bamboo palm	*areca palm tree*	29
74	General Boys Hostel	Bamboo palm	*areca palm tree*	12
75		Gulmohar	*Denolix regia*	75
76		Paper Flower	*Bougainvillea glabra*	55
77		10 o'clock plant	*Portulaca grandiflora*	84
78		Palm	*Syagrus romanzoffiana*	16
79	Botanical Garden	Gulmohar	*Denolix regia*	68 aprx
80		Adhusa, Vasaka	*Adhatoda vasica*	20
81		Ashoka	*Saraca asoca*	1
82				
83		physic nut, biodesiel plant	*Jatropha curcas*	2
84				
85		lipstick tree	*Bixa orellana*	2
86		cowplant, Periploca of the woods, *gurmar*	*Gymnema sylvestre*	1
87		Basil, Tulsi	*Ocimum sanctum*	10
88		Madar	*Calotropis procera*	1
89		Origano	*Origanum vulgare*	1
90		frangipani, Champa	*Plumeria alba*	3

91		Satavar	*Asparagus racemosus*	2
92		parijat, night flowering jasmine	*Nyctanthes arbor-tristis*	3
93		water hyssop, herb of grace	*Bacopa monnieri*	3
94		Aloe vera	*Aloe vera*	17
95		air plant, cathedral bells, life plant	*Bryophyllum pinnatum*	17
96		Babul	*Acacia nilotica*	4
97		Banana, kela	*Musa × paradisiaca*	1
98		hadjod and pirandai	*Cissus quadrangularis*	2
99		Bottlebrushes	*Callistemon*	1
100		Chinese chastetree	*Vitex negundo*	2
101		Neem	*Azadiracta indica*	1
102		Peepal	*Ficus religiosa*	1
103		Curry tree	*Murraya koenigii*	1
104		Sago palm	*Cycas revoluta*	9
105		gaduchi, and giloya,	*Tinospora cordifolia*	3
106		Asian pigeonwings, bluebellvine, blue pea, butterfly pea.	*Clitoria ternatea*	2
107		Rheo discolor, Moses-in-the-cradle	*Tradescantia spathacea*	2
108		Lemon	*Citrus limon*	1
109		Lemon grass	*Cymbopogon*	1
110		Cactus	Mammillaria,	1
111		Pudina	*Mintha*	15
112		asthma-plant	*Euphorbia hirta*	1
113		Jungle geranium, flame of the woods or jungle flame	*Ixora coccinea*	3
114		henna tree, the mignonette tree	*Lawsonia inermis*	2
115		queen palm	*Syagrus romanzoffiana*	7
116		Bird of paradise flower	*Strelitzia reginae*	2
117		Ti Plant	*Cordyline fruticosa*	8

118	Old Boys Hostel			
119		Malabar Madhu Malati	*Combretum malabaricum*	9
120		Palm	*Syagrus romanzoffiana*	2
121		Gulmohar	*Denolix regia*	5
122		Badam, Almond	*Termalaria catappa*	5
	Butterfly garden			
123		Paper Flower	*Bougainvillea glabra*	150 apx
124		Gudhal	*Hibiscus rosa sinesis*	1
125		Gulmohar	*Denolix regia*	14
126		Shami Plant (Sonapatti)	*Bauhinia racemosa*	2
127		Badam, Almond	*Termalaria catappa*	5
128		Palm	*Syagrus romanzoffiana*	2
	Horse Garden			
129		Badam, Almond	*Termalaria catappa*	7
130		Shami Plant (Sonapatti)	*Bauhinia racemosa*	3
131		Palm	*Syagrus romanzoffiana*	12
132		Cape honeysuckle	*Tecoma capensis*	6
133		Ticoma	*Tecoma stans*	12 aprx
134	Small Canteen Area			
135			*Petunia*	80 apx
136		Ticoma	*Tecoma stans*	12 aprx
137		Gulmohar	*Denolix regia*	1
138		Badam, Almond	*Termalaria catappa*	1
139		Chhatim Tree	*Alstonia scholaris*	3
140		Shami Plant (Sonapatti)	*Bauhinia racemosa*	26 apx

Annexure-2
Solar Wheeling

Annexure-3
Sensor based Lighting

Annexure-4
LED lights

Annexure-5
Borewells

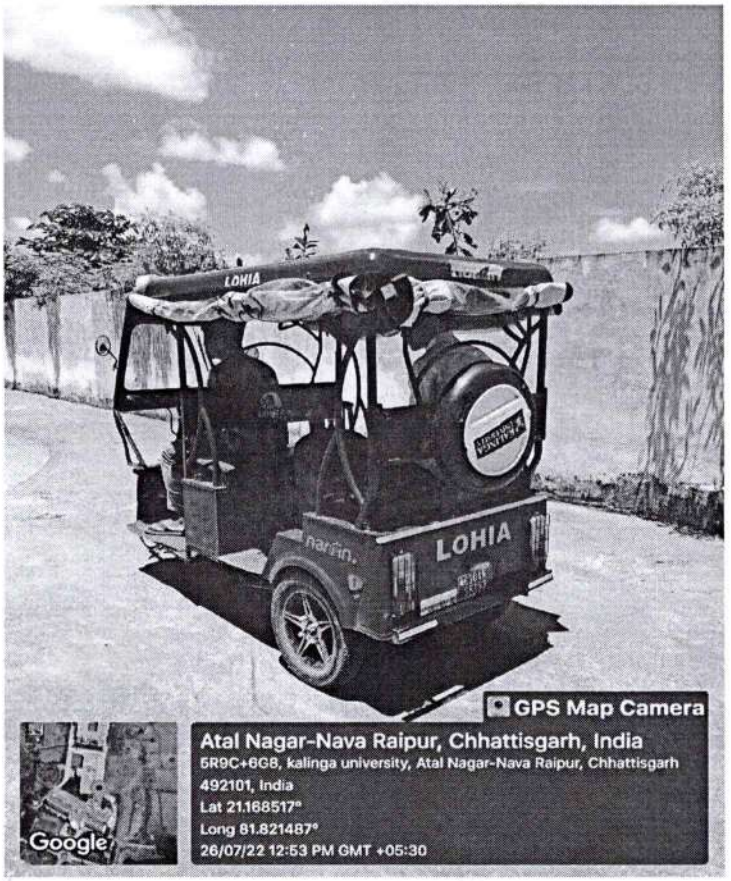
Annexure-6
Tanks and Bunds

Annexure-7
Water Bodies

Annexure-8
Transportation within Campus

The university has a vehicle parking system inside the campus. Only very selected vehicles are allowed to ply. Staff, students, and visitors must park their vehicles at designated places.

The university has deployed golf carts and battery-operated rickshaws inside the campus for movement. Moreover, the campus has beautiful pathways for pedestrian movements.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Lat 21.168517°
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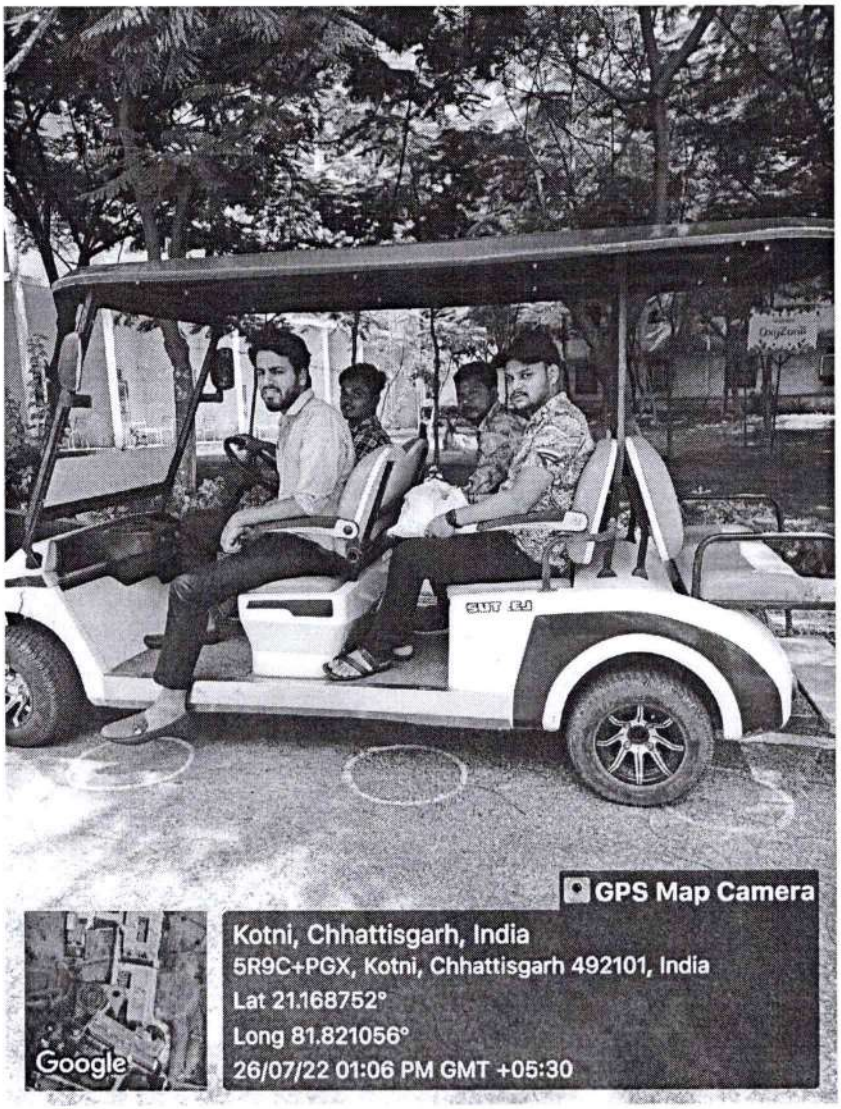
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Annexure-9

Energy Audit Report

Annexure-10

Environmental Parameters Quality Monitoring Analysis

TEST REPORT

AMBIENT AIR QUALITY REPORT		
Name & Address of the Customer To, **M/s** Kalinga University Address: Raipur, Chhattisgarh	**Test Report No.: CES/LAB/22-23/** Issue Date: 08.04.2022 Client Ref: Nil Date : Nil	
Method of test : IS: 5182	**Sampling Details**	
Test required: As per work order	Sample Monitored	: Ambient Air Quality
Sample Collected By:- CES Representative	**Date of Sampling**	: 01.04.2022 to 02.04.2022
Instrument used: Eco Tech FDS	**Date of Receipt**	: 02.04.2022
Atmospheric condition : Clear	**Period of testing**	: 02.04.2022 to 08.04.2022
Page : 1 of 1	**Duration of sampling**	: 24 hrs

AMBIENT AIR QUALITY RESULTS				
S. No.	Parameters	NAAQ Standards (industrial area)	Pollutant Concentration	
			Near Main Gate	Near Girls Hostel
1	Wind direction		SE	SE
2	Wind speed Km/h		13	13
3	Relative Humidity %		31	31
4	Ambient Temp. (°C)		39	39
	Parameters		Pollutant Concentration	
1	Particulate matter (size less than 10µm) or PM_{10} (µg/m³)–Part-23-2006	100	57.22	61.30
2	Particulate matter (size less than 2.5µm) or $PM_{2.5}$ (µg/m³)–Part-24	60	30.16	30.44
3	Sulphur Di-Oxide (SO_2) (µg/m³) – Part-2	80	9.20	12.35

4	Oxide of Nitrogen (NO_2) ($\mu g/m^3$)-Part-6	80	15.30	19.24
5	Carbon monoxide (CO) mg/m^3 Part-10 By Indicator tube method	04	<1.00	<1.00

NAAQ- National Ambient Air Quality Standards CPCB Notification 18th Nov. 2009

The Results relate only to the sample tested/Sampled

Note:-The report will not valid for legal case, if Prior permission not taken from CES.

TEST REPORT

Name & Address of the Customer To, **M/s** Kalinga University Address: Raipur, Chhattisgarh	**Test Report No.: CES/LAB/22-23/** Issue Date: 08.04.2022 Client Ref: Nil Date : Nil	
Qty : 1 No. x 1 litre	Date of Collection	: 02.04.2022
Method of test : APHA 23rd edition	Date of Receipt	: 02.04.2022
Packing :- Plastic bottle	Period of testing	: 02.04.2022 to 08.04.2022
Sample Condition at receipt: packed	Method of sampling	: IS:3025
Sample Discipline: Chemical Testing Sub Group: Surface Water	Sample tested as received	: OK
Sample Collected By:- CES Representative	Page no.	: 1 of 1

S. No	Test Parameters	Unit	Method No.	Result Obtained Pond Water
1	pH	-	4500 H+B	7.41
2	Conductivity	µmhos/cm	2510 B	1272.00
3	Turbidity	NTU	2130 B	0.70
4	Total Solid	mg/lit	2540 B	743.00
5	Total Dissolved Solid	mg/lit	2540 C	683.00
6	Total suspended solid	mg/lit	2540 D	60.00
7	Total Alkalinity	mg/lit	2320 B	144.00
8	Total Hardness as $CaCO_3$	mg/lit	2340 C	258.00
9	Calcium as Ca	mg/lit	3500 B	57.72
10	Magnesium as Mg	mg/lit	3500 B	27.70
11	Sulphates as SO_4	mg/lit	4500- SO_4 E	48.93
12	Chlorides as Cl	mg/lit	4500-Cl^- B	61.98
13	Iron as Fe	mg/lit	3500- Fe B	<0.05
14	Nitrate as NO_3	mg/lit	4500-NO_3 B	20.83
15	Sodium as Na	mg/lit	3500- Na B	1.50

16	Potassium as K	mg/lit	3500- K B	<1.00
17	Fluoride as F	mg/lit	4500- F D	<0.10
18	Acidity	mg/lit	2310 B	18.00

The Results relate only to the sample tested/Sampled

Note:-The report will not valid for legal case, if Prior permission not taken from CES.

TEST REPORT

Name & Address of the Customer To, **M/s** Kalinga University Address: Raipur, Chhattisgarh	**Test Report No.: CES/LAB/22-23/** Issue Date: 08.04.2022 Client Ref: Nil Date : Nil	
Qty : 1 No. x 1 litre	Date of Collection	: 02.04.2022
Method of test : APHA 23rd edition	Date of Receipt	: 02.04.2022
Packing :- Plastic bottle	Period of testing	: 02.04.2022 to 08.04.2022
Sample Condition at receipt: packed	Method of sampling	: IS:3025
Sample Discipline: Chemical Testing Sub Group: Ground Water	Sample tested as received	: OK
Sample Collected By:- CES Representative	Page no.	: 1 of 1

S. No	Test Parameters	Unit	Method No.	Requirement as per IS-10500-2012		Result Obtained Handpump within University Campus
				Desirable Limit	Permissible limit	
1	pH	-	4500 H+B	6.5-8.5	No relaxation	7.27
2	Conductivity	µmhos/cm	2510 B	-	-	910.40
3	Turbidity	NTU	2130 B	1	5	0.80
4	Total Solid	mg/lit	2540 B	-	-	498.00
5	Total Dissolved Solid	mg/lit	2540 C	500	2000	456.00
6	Total suspended solid	mg/lit	2540 D	-	-	42.00
7	Total Alkalinity	mg/lit	2320 B	200	600	132.00
8	Total Hardness as $CaCO_3$	mg/lit	2340 C	200	600	168.00
9	Calcium as Ca	mg/lit	3500 B	75	200	56.11
10	Magnesium as Mg	mg/lit	3500 B	30	100	6.80
11	Sulphates as SO_4	mg/lit	4500- SO_4 E	200	400	31.91
12	Chlorides as Cl	mg/lit	4500-Cl^- B	250	1000	29.99
13	Iron as Fe	mg/lit	3500- Fe B	0.30	1	<0.05

14	Nitrate as NO_3	mg/lit	4500-NO_3 B	45	No relaxation	14.00
15	Sodium as Na	mg/lit	3500- Na B	-	-	12.33
16	Potassium as K	mg/lit	3500- K B	-	-	<1.00
17	Fluoride as F	mg/lit	4500- F D	1.0	1.5	<0.10
18	Acidity	mg/lit	2310 B	-	-	8.00

The Results relate only to the sample tested/Sampled

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TEST REPORT

Name & Address of the Customer To, **M/s** Kalinga University Address: Raipur, Chhattisgarh	**Test Report No.: CES/LAB/22-23/** Issue Date: 08.04.2022 Client Ref: Nil Date : Nil	
Qty : 1 No. x 2 litre	Date of Collection	: 02.04.2022
Method of test : APHA 23rd edition	Date of Receipt	: 02.04.2022
Packing :- Plastic bottle	Period of testing	: 02.04.2022 to 08.04.2022
Sample Condition at receipt: Packed	Method of sampling	: IS:3025
Sample Discipline: Chemical Testing **Sub Group:** Waste Water	Sample tested as received	: OK
Sample Collected By:- CES Representative	Page no.	: 1 of 1

S. No.	Test Parameters	Unit	Method No.	Permissible limit	Result Obtained STP Outlet
1	pH	-	4500 H+B	6.5-9.0	7.36
2	Total Solid	mg/lit	2540 B	2200	788.00
3	Total Dissolved Solid	mg/lit	2540 C	2100	724.00
4	Total Suspended Solid	mg/lit	2540 D	100	64.00
5	COD	mg/lit	5220 B	250	90.00
6	BOD (3 day 27degree)	mg/lit	IS/3025/P-44	30	8.00
7	Oil & Grease	mg/lit	5520 B	10	3.00

The Results relate only to the sample tested/Sampled

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TEST REPORT

Name & Address of the Customer To, **M/s** Kalinga University Address: Raipur, Chhattisgarh	**Test Report No.: CES/LAB/22-23/** Issue Date: 08.04.2022 Client Ref: Nil Date : Nil	
Qty : 1 No. x 2 litre	Date of Collection	: 02.04.2022
Method of test : APHA 23rd edition	Date of Receipt	: 02.04.2022
Packing :- Plastic bottle	Period of testing	: 02.04.2022 to 08.04.2022
Sample Condition at receipt: Packed	Method of sampling	: IS:3025
Sample Discipline: Chemical Testing **Sub Group:** Waste Water	Sample tested as received	: OK
Sample Collected By:- CES Representative	Page no.	: 1 of 1

S. No.	Test Parameters	Unit	Method No.	Result Obtained STP Inlet
1	pH	-	4500 H+B	7.75
2	Total Solid	mg/lit	2540 B	850.00
3	Total Dissolved Solid	mg/lit	2540 C	670.00
4	Total Suspended Solid	mg/lit	2540 D	80.00
5	COD	mg/lit	5220 B	130.00
6	BOD (3 day 27degree)	mg/lit	IS/3025/P-44	14.00
7	Oil & Grease	mg/lit	5520 B	5.00

The Results relate only to the sample tested/Sampled

Note: -The report will not valid for legal case, if Prior permission not taken from CES.