ENERGY AUDIT

CONDUCTED

AT

GOVERNMENT SCIENCE COLLEGE

VANKAL, TALUKA: MANGROL, DIST – SURAT – 394430, GUJARAT

AISHE Code : C-46595

GREEN ENERGY AUDIT
AUTHORISED SIGNATORY

on July 2024

Under Provisions of Energy Conservation Act 2001.

Consumer No – 08203022529

<u>Conducted By</u>

Green Energy Audit

Green Energy Audit

Green House -B-20 Asha Lata Park ,Kamla Nagar,Ajwa Road, Baroda 390 019

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GUJ/0013

सत्यमेव जयते

GOVERNMENT OF GUJARAT

AUTHORISATION FOR ENERGY AUDIT

(Under Clause -4 (2) (a) of Government Order E & P.C. Deptt. No.GHU/99/31/GUE/1196/9018/K1 Dated 5th October, 1999)

Shri / M/s ***M/s GREEN ENERGY AUDIT ., BARODA*** *is/are hereby granted authorization to carry out the energy audit in the State of Gujarat as required under clause 3 of the Government order Energy and Petrochemicals Department No.GHU/99/31/ GUE/1196/9018/K1 Dated 5th October, 1999.*

Office of the Chief Electrical Inspector
Udyog Bhavan, Block No.18, 6th Floor,
Sector-11, Gandhinagar.

Chief Electrical Inspector
Gujarat State

Acknowledgement

1 M/s, Green Energy Audit are thankful to the Management of College who have provided valuable co-operation and guidance to our audit team during the course of site visit and measurements. We are also thankful to all those who gave us the necessary inputs and information to carry out this very vital exercise of energy audit specifically Dr. Parthivkumar K. Chaudhari (Principal) , Dr Anil Kumar Singh Coordinator, IQAC, as a team whose dynamic interference and zeal to carry out energy audit has helped us for the ground work done at the institute. We also appreciate the best efforts put in by them for carrying out energy audit and also to their interest to implement some of the measures readily in the plant.

1.1 At last we are thankful from our bottom of the heart to all the staff members who were directly and indirectly involved in collecting the data and conducting field measurements.

This being a mandatory energy audit, and the results can be sent to the Government office, the report is being prepared according to requirement of Government and to cover the topics framed under Indian Energy conservation act -2001 as well as the NAAC requirements.

DISCLAIMER

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GREEN ENERGY AUDIT

AUDIT CERTIFICATE

PRESENTED TO

Government Science College , Vankal

Has been assessed by Green Energy Audit for the comprehensive study of energy Usage impacts on institutional working framework to fulfill the requirement of

ENERGY AUDIT

The green initiatives carried out by the institution have been verified on the report submitted and was found to be satisfactory.

The efforts taken by the management and the faculty towards environment and sustainability are appreciated and noteworthy.

GREEN ENERGY AUDIT
AUTHORISED SIGNATORY

AUDITOR SIGNATURE

08/07/2024
Date of Audit

e-mail- g.energy875@gmail.com
Web -https://green-energy-audit.business.site

Schedule of Measures Suggested during Energy Audit at College

1) The Annual Monetary savings of Rs 6,37,988 & Unit savings of 79,748 units can be achieved by replacing 601 nos of Ceiling Fans with Energy Efficient BLDC Fans. (**Page-13)**

2) Solar Capacity installation of 36 kw with net metering has Capacity to Provide free energy to the campus with 59,400 Electrical Units Annually. Regular Cleaning and Maintenance of the panels will ensure the same. (**Page-8)**

Energy savings by Installing Solar Panels in place of Conventional Electricity.

Under Gujarat Solar Policy 2015 , the college has installed solar rooftop panels by state designated agency Gujarat Energy Development Agency (GEDA) . As per the Policy 50 % of Contract demand (73 KW) is taken for Rooftop Installation. Henceforth 36 KW Rooftop Solar Panels are installed on the College Roof.

College Solar Rooftop Installed Capacity – 36 KW

1 KW System Produces 5 Units Per Day

36 KW System Produces 180 Units Per Day

Annual Units Production 330 Days (Considering Monsoon & No Sun Days) – 59,400 Units Annually

Energy Savings Achieved is 59,400 Units Per Year

As the college activities are mostly in day time, hence the solar generation is beneficial for the college with a 3 Years Payback period.

With Net metering policy, college can get benefit of selling extra generated units, back to DGVCL at approx. 2.50 per Unit, which can be beneficial.

CO2 EMISSION REDUCTION USING SOLAR PANELS

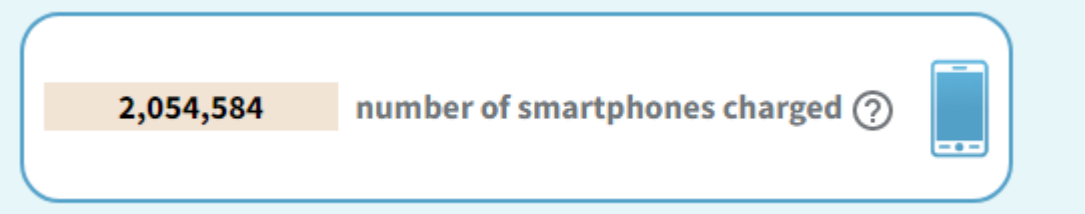
Installing solar panels on College roof will reduce the carbon footprint, The carbon dioxide which college will be saving from the atmosphere by utilizing solar energy in college will be as follows :

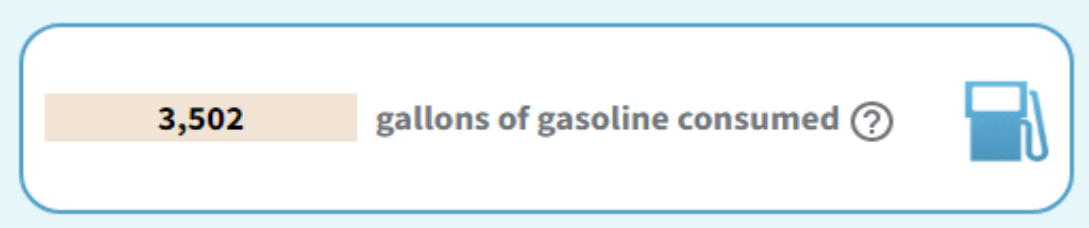
Energy Savings Achieved is 59,400 Units Per Year

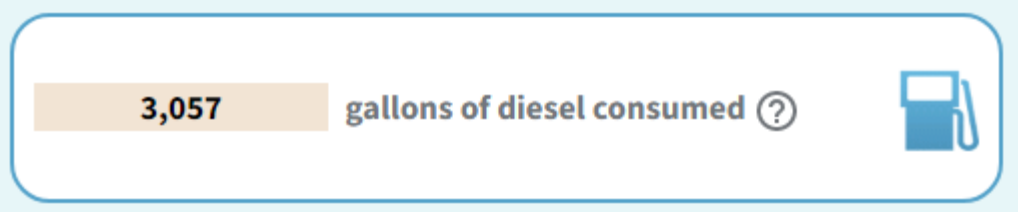
CO2 Reduction Per Year is (59,400 /1000) x 0.84 = 49.8 Ton

There is Reduction in Green House Gas Emissions (CO2) by Installation of Solar Panels.

49.8 Ton of CO2 reduction is equivalent to :







Note - One Gallon Gasoline (Petrol) = 3.78 Liter of Petrol

Energy Analysis

ENERGY ANALYSIS- Science COLLEGE						
Sr No	Equipment	Nos	Watts	Usage Per Day (In Hours)	KW Load	Average KWH Per Day
1	Fan	601	80	6	48.08	288.48
2	Tubelight	1132	20	7	22.64	158.48
3	Exhaust Fan	28	60	3	1.68	5.04
4	AC	13	1500	2	19.5	39
5	Refrigerator	16	180	18	2.88	51.84
6	Oven	7	1000	5	7	35
7	Deepfreezer	3	240	6	0.72	4.32
8	PC	53	300	3	15.9	47.7
9	Xerox Machine	2	240	4	0.48	1.92
10	LED TV	3	200	1	0.6	0.6
11	Projector	2	240	2	0.48	0.96
12	Incubator	12	1000	24	12	288
13	Laminar Air Flow	3	450	1	1.35	607.5
14	Shaker	5	220	8	1.1	242
15	Autoclave	2	2000	1	4	8000
16	BOD Incubator	3	220	8	0.66	145.2
17	Water Cooler	2	1000	3	2	2000
				TOTAL	**141.07**	**11916.04**

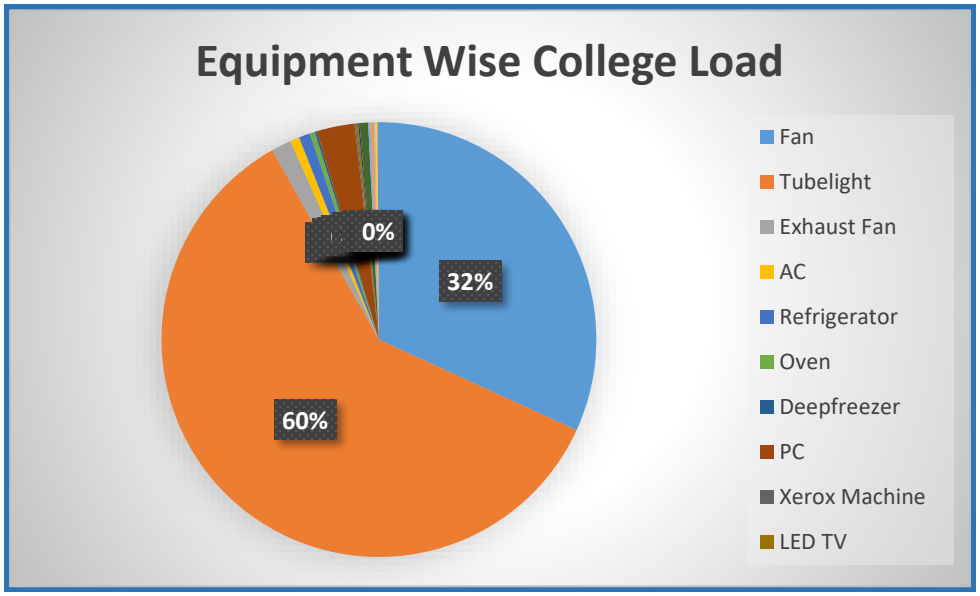
The Energy Analysis of college is done by observation of actual demand and the connection load taken from DGVCL.

The Full load in the condition of all equipment's running is 141 KW which is practically not the case. The 73.4 kw Contract Demand load presently taken is ok the connection already comes in the LTMD Tariff structure of DGVCL.

If the connected load reduces to 40 KW college can move to Subsidised Tariff structure of GLP from DGVCL.The GLP tariff is already subsidized tariff structure for educational and research institutions under Govt of Gujarat.

Further as there is no penalty for low Power factor is levied by Discom , it is not required to install capacitor banks on main panel.

Good Energy Saving Practices followed in the college.



As is evident from the Energy Analysis, the Major Power Consumption of college is in

- **Tubelight-60% ,**
- **Fan – 32%**
- **Others– 8% .**

It is Good Practice followed by Institute by Installing LED Lights which consumes only 2% of total Power consumption of the institute.

Electric lights contribute substantially towards the building's total energy costs which can be minimised by providing natural light in working spaces. Electric lights also contribute to internal heat gain in spaces.Minimising their use can lower the cooling loads in summer.

Functions should be placed such that those with heating requirements are south facing. Spaces with high internal heat gains due to high occupancy or equipment such as IT and computer rooms should be placed on the north facing side. North light is also free from direct glare and reflection, and hence is ideally suited for computer rooms where direct glare on the screen can be a problem.

Natural Ventilation - The stack effect can be used to naturally create a ventilation system in the building. During the summer, the hot air inside the building rises and can be let out through controllable vents or openings at a higher level. High ceilings of around 3m or atriums can be designed to achieve this. How to Conserve Energy in Further Education Colleges 10 Negative pressure due to the rise of warm air draws cooler air from outside through openings at the lower levels, thus creating an air flow.

Rain water Harvesting Facility and associated Piping

Rain water storage facility has great impact for saving the energy required to pump the water from a bore and use it for various purposes

Energy savings by Energy Efficient Fans in Place of Conventional Fans

By replacing the conventional Fans by BLDC technology fans the Annual monetary savings of Rs 6,37,988 and a Unit savings of 79,748 units per annum.

Energy Savings by Replacing 80 Watt Fan with 33 Watt Energy Efficient BLDC Fans.				
Fan type	**Nos.**	**Actual Wattage(in watt)**	**Total**	**Unit**
Installed Conventional Fan with AC Motor	601	80	48080	Watt
Energy Efficient Fan (BLDC Motor Technology) with Remote	224	33	7392	Watt
Savings in KW			40.688	KW
For Average 7 hrs, kwh (From 9 am to 4pm)	7		284.816	KWH
Savings in Kwh/Annum- (280 working days/Annum)	280		79748	KWH
Annual Savings @8 Rs.per kwh (Per Unit price)	**8**		**637988**	Rs

The Replacement with Energy Efficient Fans can be done in a phased manner with the most old fans can be replaced initially and then the newer ones. The Energy efficient fans run on BLDC Technology which is brushless DC motor technology.

LIST OF MANUFACTURERS OF ENERGY SAVING/EFFICIENCY INSTRUMENTS / EQUIPMENTS / DEVICES

1	*Electronics Energy Meters & Clip on Power Meters*
	Secure Meter Limited , *P.B. No. 30, Pratap Nagar Indi. Area ,* *UDAIPUR -313 003* *Alacrity Electronics Ltd.,* *Atandra , 15, Tirumalia Road,* *T. Nagar , CHENNAI-600 017* *Trinity Engineering,* *B/5, Akash Ganga Complex, Near Pranav ExtentionSocity,* *Manjalpur , Baroda-390 004 Trinity @wilnettonline.net* *Larson &Tourbo Limited,* *P.O.Box No. 8119 Mumbai -400 071* *Industrial Controls & Devices (I) Pvt.Ltd.,* *Mettukppam Road, Via- Alapakkam Road,* *Madura Voyal, CHENNAI-602 102* *Meco Instrument Pvt. Ltd.,* *P.O. Box No.6388, Sewree, MUMBAI-400 015* *Enercon System Pvt. Ltd.,* *23, KHB Light Industires Area, P.O. Box No. 6418, Yelahanka,* *BANGALORE -560 064,* enercon@giasbg01.vsnl.net.in
2	*Led Lighting System*
	Philips Electronics India Ltd *W-234, Rabale MIDC, Navi Mumbai,* *Mumbai-400 071* *Osram India Pvt Ltd* *EL-21 Electronics Zone, MIDC, Bhosari,* *Pune-411 026* *Havells India Ltd,* *23, KHB Light Industries Area, P.O. Box No. 6418,Yelahanka* *BANGALORE-560 064* enercon@giasbg01.vanl.net.in
3	*Energy Efficient Fans Manufacturere*
	Atomberg Technologies. Ltd., *1205,Millenium Business Park* *MIDC,Navi Mumbai,Maharashtra-400710* *Super fans Ltd.,* *C/0 Versa Drives Pvt Ltd , Coimbature,* *Industries Meters Pvt. Ltd.* *Advent ,12-A, Gen. Jagannath, Bhosle Marg,* *Mumbai-400 021* *Secure Meter Limited.,* *P.O. Box 30 Pratapnagar Industrial Area,* *Udaipur-313 003* Sml.udp@sprintrpg.ems.vsnl.net.in
4	*Air Flow meters*
	ACD Machine Controls Co. Pvt. Ltd. *E/6, UdyogSadan, 2, MIDC, Andheri (East)* *Mumbai-400 093* *Air Devices Corporation* *12/A, Bombay Shopping Center, Race course Road,* *Baroda -390 005*

	Electronics International *P.B. no. 385, Sampige Road, Near 11th Cross , Malleswaram* *Bangalore -560 003* *Keith Electronics* *426, Ansal Chamber Place, New Delhi -110 066* keith@del3.vsnl.net.in
5	*P.F. Controller/ Indicator*
	Trinity Engineering, *B/5, Akash Ganga Complex, Near Pranav ExtentionSocity,* *Manjalpur, Baroda -390 004* trinity@wilnetonline.net *Process technique Electronics Pvt. Ltd.,* *Sandilya, 324 –KonenaAgrahara, P.B. No. 1776, Vimanpura P.O.,* *Bangalore -560 017* ssn@bir.vsnl.net.in *Neutronics Manufacturing Co. Ltd.,* *12-A, MarolMaroshi Road, Opp. Old State Bank, andheri (E)* *Mumbai-400 059* *Yesha Electronics Pvt. Ltd.,* *C-2/18 , Industrial Estate, Gorwa Road,* *Baroda -390 016* Yesha.brd@sme.sprintrpg.emg.vsnl.net.in *Larsen & Turbo Ltd.,* *P.O. Box No: 8119, Mumbai -400 051*
6	*P.F. controllers with Thyristor Switches*
	R.M.S. Automation Systems Pvt. Ltd., *W-218, MIDC, Ambad, Nasik -422 010* *Bharat Heavy Electronics Ltd.,* *Electronics Division, P.B. No. 2606,* *Mysore Road, Bangalore -560 026*
7	*Static P.F. Controller*
	ABB Ltd., *Reactive Power Compensation Division,* *Plot no. 5&6 ,II Phase, Penya Industrial Area,* *Bangalore -560 058*
8	*Current density meter*
	Fisher Instrumentation (GB) Ltd., *Gordletn Industrial Park, Hannah Way, Lymington / Hampshine* *England* *Globatek* *684-5, 47 th Cross, 8th Block, Jayangar,* *Bangalore -560 082*
10	*Temperature Control & Monitoring*
	S.J. Enterprise, *Opp. Industrial Estate, Makarpura,* *Ajamer -305 002* *Atlop Industries* *No. 392, G.I.D.C., Makarpura,* *Vadodara -390 010* *Artech Labs,* *A-3, UdyogSadan, No.3, Opp. SEEPZ, Central Road,* *M.I.D.C., Mumbai -400 093* *Toshnival Industries Pvt. Ltd.,* *Industrial Estate,* *Makhupura, Ajmer -305 002* *Masibus Process Instruments,* *B/30, G.I.D.C., Electronics Zone,* *Gandhinagar -382 044* *Instrument Reaserch Associates Ltd.,* *Instrumentation House, P.B. No. 2304, No.19,*

	Mysore Deviation Industrial Estate, *Bangalore – 560 023* *Radix Sensors Pvt. Ltd.* *Unit 1,B/4, 1st Floor, Ghanshyam Industrial Estate,* *Andheri (East), Mumbai -400 053* *G.P. Electronics,* *987/5, G.I.D.C. Industrial Estate,* *Makarpura, Vadodara-390 010*
10.	*Pressure Guages*
	Manometer (India) Pvt. Ltd., *Manu Mansion, 16, ShahidBhagat* *Singh Road Mumbai – 400 023* *Fitzer Sales Pvt. Ltd.,* *248, Ambedkar Estate, Atali,* *P.O. Mohone, Thane -421 102* *Instrument Research Associates Pvt. Ltd.,* *Instrumentation House, P.B.No. 2304,* *No. 19, Mysore Deviation Rd.,* *Bangalore – 560 023* *J.N. Marshall Systems & Services* *P.B. No. 1 Bombay –Pune Road,* *Kasarwadi, Pune -411 018*
11	*High Efficiency Motors*
	Crompton Greaves Ltd. *Machine Division-1, Dr. E. Moses* *Road, Worli, Mumbai -400 018* *N.G.E.F. Ltd.,* *P.B. No. 3876, Byappanahalli,* *Bangalore – 560 038* *Bharat Bijlee Limited* *P.B. No. 100, Thane –Belapore Road,* *Thane -400 601* *Kirloskar Electronic Ltd.,* *Unit no. 1, P.B. No. 5555,* *Malleswaram (West), Bangalore -560 055* *Siemens Ltd.* *Electric Mansion, 1086, Appasaheb* *P.B. No. 19111. Mumbai -400 071* *Asea Brown Boveri Ltd.,* *Plot no. 32, Industrial Estate, Faridabad -121 001* *Polyphase Motors* *720, GIDC, Makarpura, Baroda -390 010*
12	*Star –Delta Auto Controllers For Motors*