

Energy Audit Report (2020-21)

Institute of Health Management Research

1. Prabhu Dayal Marg, Sanganer Airport, Jaipur

DGENS Enterprises

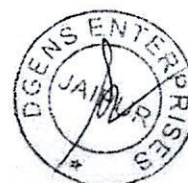
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Executive Summary & Observations**Section 1**

DGENS enterprises audit team conducted detailed energy audit in the year 2020-21 for identifying the energy conservation opportunities and evolving the energy conservation proposals.

The following conservation proposals have been evolved:

Propo- sal No.	Proposal Title	Energy saving (kwh)/Year	Saving in lacs Rupees (@ 8 /unit) /annum	Invest- ment	Payback period
1.	Providing APFC	12480	0.998	1.75	21 months
2.	Replacement of conventional Tube lights with LED tube lights	58800	4.70	1.54	04 months
3.	Providing cyclic timer for exhaust fans.	5550	0.44	0.38	11months
4.	Energy saving in AC by providing energy saver	19530	1.56	1.00	08 months
5.	Reduction in stand by energy	8760	0.70	0	immediate
	Total	105809	8.45	4.67	07 Months

Payback period has been calculated based on simple payback method.




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OBSERVATION

1. Power Factor is being managed by manual method of switching on fixed capacitor bank having a capacity of 100 KVAR (25 KVAR x 4). This bank gets under sized during full load requirement and gets over compensated when the load varies, after n of solar plant of 100KW the load is varying sudden resulting in an average P.F. of between 0.90 to 0.96. So as to get power factor above 0.95 and up to 0.99 APFC (Automatic Power Factor Controller) is required.
2. Earthing pits should be checked once in year, it is mandatory as per Indian Electricity Rules 1956 Rule 67 part 5(B). Testing should be done as per IS-3043, 1987 by IIIrd party. And proper watering provisions for the earthing pit should be provided.
3. Main bus bar is to be change in B- guest pannel.
4. In LT room Panel mounted on wall is to be shifted. In front of hostel no.4 panel maintenance required.
5. B-Block, Ist hostel, Canteen, club house, IIIrd hostel, LT & HT room panels, required new earth pits.
6. Shed is to be provided over transformer, DG set and Housing electric distribution panel.
7. Distribution transformer needs painting.
8. New pole for compound lighting from Subodh college wall to canteen gate is to be provided.



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Brief Description of Audit location

IIHMR, Jaipur is the most prominent institute in India for Hospital & Health Management with two more institute branches at Delhi and Bangalore. IHMR Jaipur is located in Jaipur near Sanganer Airport with an area of 15 Acres. The infrastructure includes three Hostels, one residential complex and a guest house. Jaipur Discom (JVVNL) provides the power supply to these buildings. The facility has a sanctioned load of 950 KW and Contract Demand of 450 KVA. Power comes through a Single pole located outside the IIHMR premises. The substation receives supply at 11 kV, which is stepped down through transformer of 500 kVA rating to 440 V. Two DG sets meet the contingencies, one DG sets of 250 KVA and other DG sets of 125 KVA.

Connected Load Profile

1. Sanction Load/contract demand - 450 KVA

2. Transformer Ratings –

500 KVA, Voltas make

Current HT/LT – 26.24/666.7 Amp. , Voltage 11KV/440 V, 50 Hz,

Oil cap. 520 liters, Date of manuf. 29.11.88

3. System back up Power

250 KVA Cummins make with canopy

125 KVA, Greaves make DG set (Dismantal)

Engine Type: 6R1080TA, Engine No. / Sr.No. 6H.2516/0300186

HP/RPM – 156/1500

4. Energy Meter

Main Meter (HT Side) (Net. HT TVM)

Sr.No. XB462868, make Secure, class = 0.5

Meter CTR = -/5, Meter PTR = 11KV/110V, Meter constant = 160 pulse/KWh

CTPT set of CTR = 50/5 Amp. , PTR = 11 KV/110 V

Over all MF (Multiplying Factor) = 10 (TEN) for all


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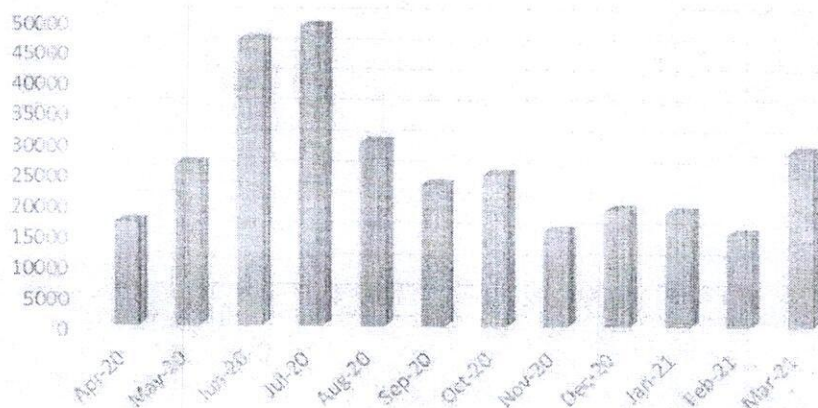
5. Power Factor improvement equipment

- (i) APFC – not available / manual operation
- (ii) Capacitor ratings – 100 KVAR (25KVAR x 4)
- (iii) Installed at LT side

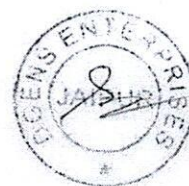
6. Energy consumption pattern (from utility)

Energy consumption pattern (from utility)				KWH Solar Generation
Month	KWH	KVA	PF	
Apr-20	16740	84	0.96	14640
May-20	26270	61	0.95	15120
Jun-20	46570	109	0.96	13560
Jul-20	48750	109	0.95	12880
Aug-20	29860	109	0.94	9920
Sep-20	22980	121	0.93	12560
Oct-20	24650	121	0.92	11360
Nov-20	15390	91	0.90	11440
Dec-20	18850	121	0.92	11952
Jan-21	18550	70	0.91	11600
Feb-21	14970	57	0.90	12588
Mar-21	28420	54	0.91	15280
	312000			152900

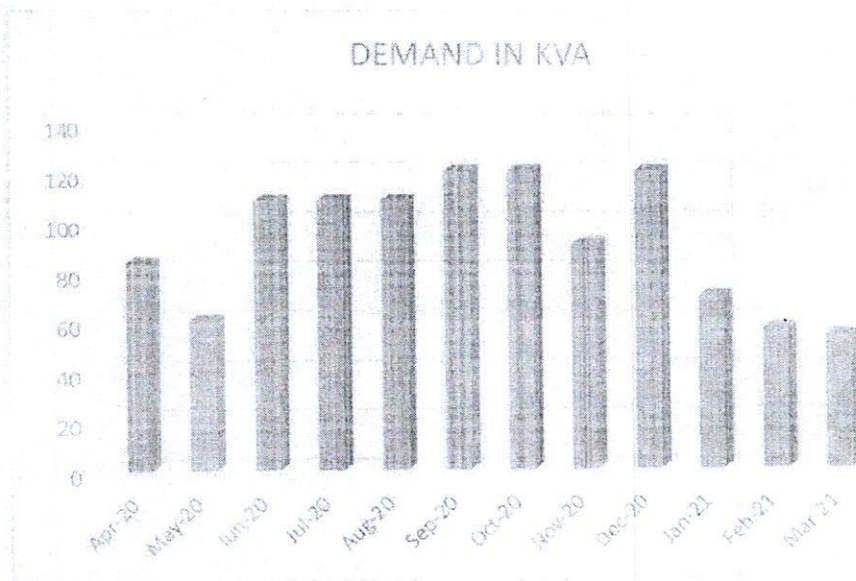
KWH CONSUMPTION 2020-21



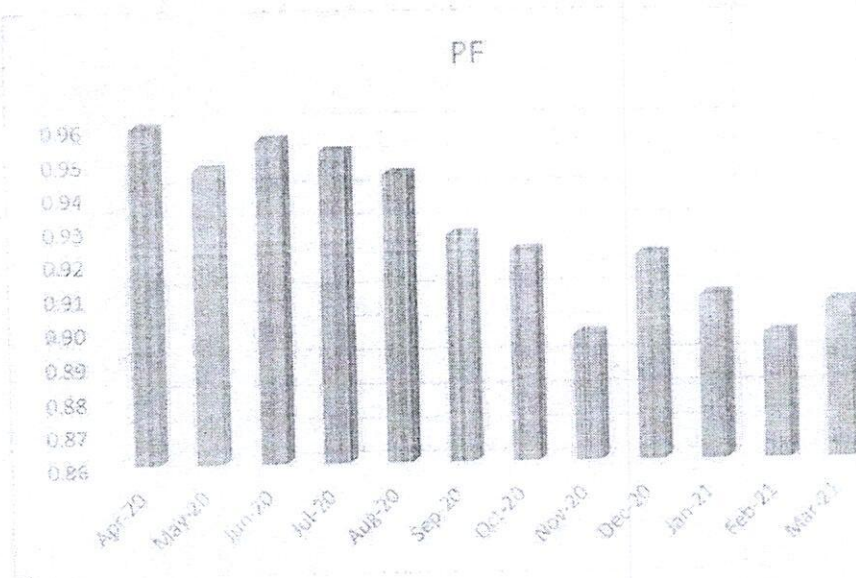

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7. Demand for the year 2020-21



8. Power factor in the year 2020-21



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9. Key parameters:

Average Kwh : 26000
Peak Kwh : 48750 (July- 2020)
Average Demand : 92.5
Peak demand : 121 (Oct- 2020)
Average pf : 0.92

Max pf : 0.96
Min pf : 0.90

10. DG set running hours in 2020-21

125 KVA DG : 24hrs 38 min
250 KVA DG : 87 hrs 40 min
Energy generated : 7213 Units/Year in 2020-21

11. Total Energy Generated by roof top solar plant: 152900 Unit (April-20 to Mar- 2021)

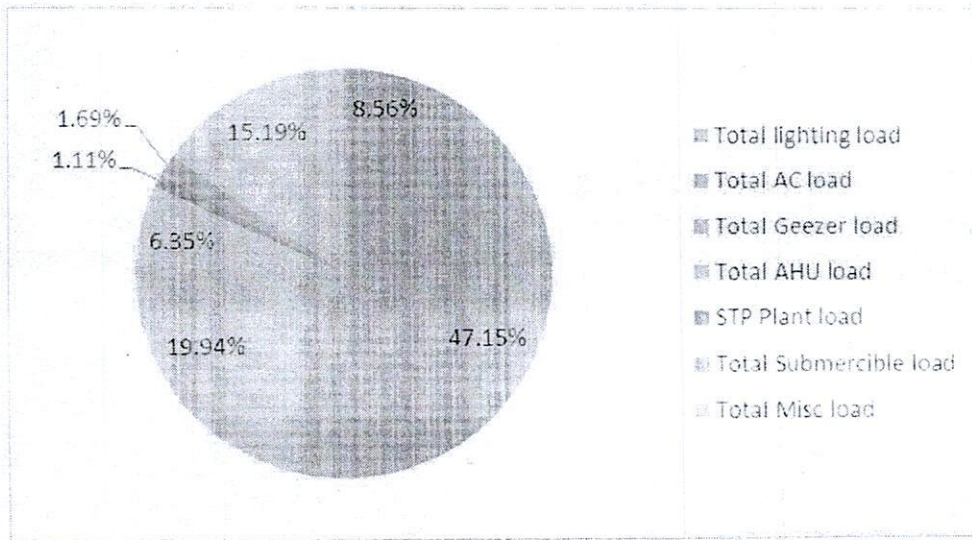
12. Connected load (Refer detailed load inventory at annexure).

Total lighting load : 118.645 KW
Total AC load : 689.235 KW
Total Geezer load : 255.6 KW
Total AHU load : 81.375 KW
STP Plant load : 14.27 KW
Submersible Pump load : 21.70 KW
Total Misc load : 210.235 KW
(Fan, exhaust fan, UPS, Water cooler, Fridge, etc.)

Total Load : 1391.060 KW




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Proposal Number 01**Proposal Title:** Installation of Automatic Power Factor Correction (APFC) Unit at Electric room.**Existing Arrangement:**

- a) The Power factor is maintained manually by switching the capacitors as per the requirement of the connected load.
- b) The Power factor for the last twelve months is as following with the average P.F. being 0.925

Month	PF
Apr-20	0.96
May-20	0.95
Jun-20	0.96
Jul-20	0.95
Aug-20	0.94
Sep-20	0.93
Oct-20	0.92
Nov-20	0.90
Dec-20	0.92
Jan-21	0.91
Feb-21	0.90
Mar-21	0.91

- c) The available capacitor ratings are 25 KVAR x 04= 100 KVAR

Recommendation: APFC panel should be installed immediately for automatic maintenance of the power factor.

Benefits of installing APFC panel:

- a) The KVA demand would reduce as also the loading of the transformer.
- b) Financial benefit by availing rebate up to 4% on maintaining power factor of 0.99.
- c) The existing capacitor bank can be suitably utilized.

Saving Calculations:

- | | |
|--|--------------|
| a) Annual Energy Consumption | 312000 units |
| b) Annual Energy cost @ Rs 8/unit | Rs 2496000 |
| c) Total rebate can be availed in a year | Rs 99840 |
| d) Approx cost of APFC panel | Rs 1,75,000 |

Simple Payback: 21 months



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Proposal No.2:

Proposal Title: Replacement of conventional Tube lights with LED tube lights.

Present Condition:

Presently Conventional tube lights are used in most of the areas in the premises and these tube lights have copper wound ballast.

Recommendations: Conventional Tube lights should be replaced by LED Tube lights. The conventional tube lights are of 36 watts each and the choke also consumes approx 17 watts (avg. as measured). In comparison to this the LED tube lights with electronic driver consume about 16 watts. (18 watts with driver).

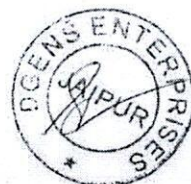
Benefits of LED tube lights:

- 62% or more power saving in lighting power bills.
- High power factor, more than 0.90.
- Higher light efficiency, up to 250 lumens/watts, latest technology.
- Operating range 90 V to 265 V.
- Excellent lux maintenance.
- Efficient LED driver.

Savings calculations

Existing wattage consumption	= 53 watts/Tube light
LED Tube light system wattage	= 18 watts
Saving in watts per tube light point	= 35 watts
No. of T-8 conventional tube light point in the premises	= 700 nos.
Power tariff	= Rs. 8.0
Average running	= 8 hrs per day, 25 days in a month
So total annual saving	= $(700 \times 25 \times 8 \times 35 \times 12) / 1000$ KWH
	= 58,800 KWH per annum
So saving in @ Rs.8	= $58,800 \times 8.0$
	= 4,70,400 Rs per annum
Cost of one LED tube light	= Rs. 220.00
Cost of 700 LED tube light	= Rs 1,54,000.00
Pay back period	= 4 months


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Proposal No.3:

Proposal title: Providing cyclic timer for the exhaust fans.

Existing arrangement:

1. The following quantity of exhaust fans are provided in the institute premises in the toilets/ canteen etc.
Small exhaust fans - 40 No's (1.342 KW)
Large exhaust fans - 08 No's (1.750 KW)
2. The detailed installation places of the exhaust fans are covered in the annexed load inventory.
3. The exhaust fans are normally kept ON for fresh air/ ventilation purposes.

Recommendations:

To provide cyclic timer with automatic 5 minutes ON and 5 minutes OFF cycle. The air exchange capacity of the fans is adequate for the above arrangement. The cyclic timer can be set for any ON/OFF cycle.

Saving Calculations:

- Total load of the exhaust fans - 3.092 KW
- Hours of operation - 12 Hrs cumulative average
- Total energy used per day - 37 units
- Energy used per year - 300 days x 37 units =11,100 units
- Amount @ Rs 8.0/ unit - Rs.88,800
- Cost of cyclic timers @800/unit - Rs.38,400
- Saving of energy - 5550 units
(half of present consumption)
- Saving amount - Rs.44,400 /annum
- Pay back period - 11 months approximately



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Proposal No. 04

Proposal Title: Energy saving in AC by providing energy saver.

Present Arrangement:

a) The following AC's are being used in the institute-

Window AC's:	0.75 Tons	: 31 No's (34.1 Kw)
	1.0 Tons	: 02 No's (2.92 Kw)
	1.5 Tons	: 03 No's (6.75 Kw)
	2.0 Tons	: 24 No's (72 Kw)
Split AC's	1.5 Tons	: 02 No's (4.5 Kw)
	2.0 Tons	: 111 No's (333 Kw)
	3.0 Tons	: 06 No's (27 Kw)
	7.0 Tons	: 01 No's (10.5 Kw)
Packaged Units	10 Tons	: 01 No's (15 Kw)
	03 Tons	: 03 No's (13.5 Kw)

Total TR : 347 TR

Total AC Load : 519.27 Kw

b) Star rated AC's are not deployed though there are few exceptions.

Recommendation:

- 1) Deploy only the star rated AC's. (3 star and upwards) for window and split AC's. The energy saving of star AC is minimum 15% less than the non rated AC's. (For new AC's and replacements)
- 2) Use energy saver for optimizing the AC's use.
- 3) Set the thermostat settings to 25-26 deg Celsius.
- 4) The energy saver is a simple cyclic timer based control. This can be aptly used in classrooms and the offices. Even a ten minute reduction in the operating time of AC/hour can result in substantial savings without affecting the comfort adversely. The features are also built in the remote of the AC units in certain cases.

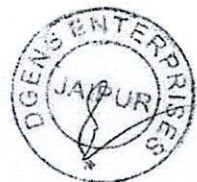


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COMPARISON OF ***** 5 STAR SPLIT TYPE AC WITH ORDINARY AC		
Parameters	Ordinary AC	***** 5star split AC
Capacity	1.5 Ton	1.5 Ton
Cost	Rs 21000/-	Rs 33000/-
Power consumption if used for 8 hours daily	20.0 units	13.4 units
Power consumption if used for 8 hours daily for one month	600 units	402 units
Power consumption per year [200 days]	4050 units	2400 units
Cost of electricity @ Rs. 4.00/unit	Rs. 16200/-	Rs. 9600/-
Money saving per year	-	Rs. 6600/-annually
Pay back period	-	2 to 3 years

Saving calculations:

- 1) Present Energy consumption: 100 days (minimum) x 5 hrs x 372 kw x 0.7(diversity factor)
= 1, 30,200 units
- 2) 15% saving =19,530 units
- 3) Eqvt in Rupees @ 8.0 Rs/unit= Rs 1, 56, 240 (approx)
- 4) Cost of cyclic timers/ac saver= Rs 2,500 (approx) for 40 No's= 1,00,000 Rupees
- 5) Payback period = 08 months




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Proposal No. 5:

Proposal Title: Reduction in stand by energy consumed by computers, LCD's, AC's with remotes, TV's with remote etc.

Existing scenario:

- 1) The Ac's with remote are switched ON/OFF through remote.
- 2) The computers are switched ON/OFF from the frontal switches.
- 3) The TV's in guest houses are switched ON/OFF through a remote.
- 4) The electric kettles are not switched off from mains.
- 5) The LCD's are switched ON/OFF through a remote.
- 6) The mobile phone/laptop chargers in the hostels are not switched off from the mains.
- 7) The ovens in canteen are not switched OFF from mains.
- 8) The geysers are OFF through a thermostat.
- 9) Set top boxes and printers are not switched OFF from the mains

Recommendations:

The electric gadgets consume a small amount of energy when they are in stand by mode; cumulatively this becomes a significant amount. For example, it is a common practice to use the remote control device to switch off television. This keeps the TV on, in stand-by mode-where it consumes 6 watts per hour. Even if u switch OFF the TV set and not in the switch at the plug point, the TV consumes 0.5 to 1 watt power. Similar is the case for computers, printers, mobile chargers etc.

Energy saving calculations: The amounts of energy spent in stand by common gadgets are as following

Fax machine	- 5.2 watts
Printer	- 4.3 watts
Compact stereo	- 4.3 watts
Tool charger	- 4.2 watts
Battery charger	- 2.6 watts
TV, CRT (26-31 inches)	- 1.3 watts
Desktop computer	- 2.4 watts
Modem	- 1.5 watts
Scanner	- 1.5 watts



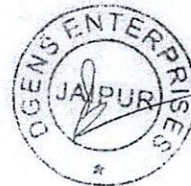
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Monitor	- 1.2 watts
Laptop computers	- 0.7 watts
DVD player	- 0.4 watts

The list is only indicative and one can save energy without sacrificing any comforts. What is needed is to be vigilant of the electricity usage practices and to switch off the gadgets from the mains when they are not in use. In case of multiple points power usage like computer/Printer/Fax/Scanner etc use a multiple point power strip with single ON/OFF switch.

In case of IIHMR by a conservative estimate the standby energy which can be saved by simple practices has been taken as 1 Kw.

Energy spent on stand by supply	= 1 x 24 hrs x 365 days = 8760 units
Amount @8.0 Rs/unit	= 70,080 Rs
Investment	= Nil
Payback	= immediate



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