



Energy Audit Report

Audit Report

at

ASHOKA BUSINESS SCHOOL

Mumbai-Agra Road, Nashik

June 2019

Conducted By:

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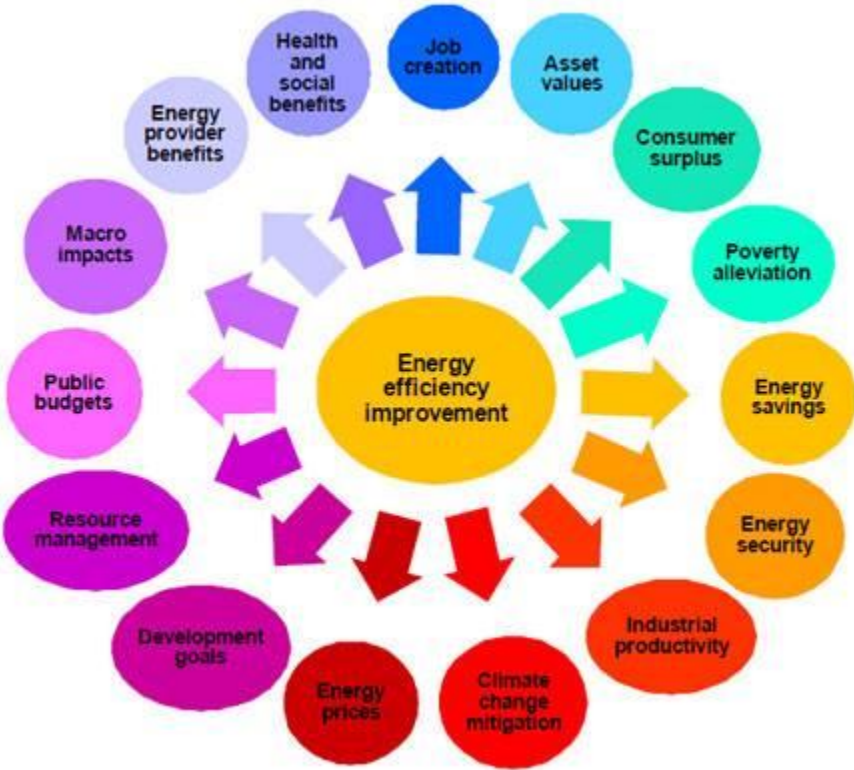


ACKNOWLEDGEMENT

We are thankful to:

Dr Wasudeo Bhende for giving us an opportunity to contribute in this endeavor of efficient energy management. We are thankful to all technical staff for co-ordination and co-operation given to us in Audit work.

We also would also like to thank **Mr.Vishal Sonkamble** for his co-operation during the audit period.



Site visit audit activity was conducted from 5th to 14th May 2019. The Audit team comprised of

1. Mr Sameer Vaze , B.E.(Mech.),BEE certified Energy Auditor(CEA-7461)
2. Parag Khedkar B.E.(Mechanical)
3. Atul Vairagkar B.E.(Electrical),BEE certified Energy Manager

1.0

Executive Summary:

- Power factor at the Main Panel was found to be fluctuating between 0.96 and 0.99 for a period of last 12 months.
- In the last 12 months, PF incentive to the tune of **Rs 13,500** is already lost. We recommend to upgrade the existing APFC for maintaining unity power factor.
- We recommend to revise the contract demand to 48 kVA from existing 115 kVA.
- Annual total monetary savings of **Rs. 1,50,700/-** can be achieved with an investment of **Rs. 70,000/-**
- The major areas of savings is power factor correction and revision in contract demand.
- Air conditioning load consumption is more than 80 % of the total electrical consumption load.
- 33 kW Solar Photo-Voltaic system is installed and commissioned in the month of April 2019.
- We recommend smoke detection and alarm system at electrical control room.
- Motion sensors may be installed in class rooms to avoid unnecessary running of Air conditioning and lighting load.
- **As per cost benefit analysis, the total savings from the recommendations is Rs.1,50,700 /- and the total investment cost would be 70,000/- with a payback of 5 to 6 months. The existing annual electricity bill amounts to Rs.5,80,200/-**
- **So, the annual savings would be more than 25 % of your existing electricity bills based on existing electrical consumption pattern.**

2.0 Scope of the Study:

2.1 Bill Analysis

- Connected load : 115 KW
- Contract Demand : 115 KVA
- LT-X-BIII

kVA charges: Rs. 350/kVA

kW charges : Rs. 8.41/KW As per revised tariff from April 2019.

Sr No	Mth/Yr	MD/KVA	MD billed	Power factor	KWH	Demand charges	Energy charges	Power factor Penalty/Incentive	Total Bill	INR/kWH
1	Apr-18	46	46	0.99	5942	16100	50566	-3183	61031	10.27
2	May-18	49	46	0.99	5750	16100	48933	-3127	59950	10.43
3	Jun-18	32	46	0.99	4842	16100	41205	-2760	52890	10.92
4	Jul-18	20	46	0.98	3721	16100	31666	-1308	42640	11.46
5	Aug-18	30	46	0.99	4660	16100	39657	-2620	50219	10.78
6	Sep-18	30	46	0.99	4627	16100	39376	-2671	51181	11.06
7	Oct-18	41	46	0.97	4434	16100	37733	-576	57461	12.96
8	Nov-18	4	46	0.98	2889	16100	24585	-616	40745	14.10
9	Dec-18	21	46	0.99	2545	16100	21658	-968	38021	14.94
10	Jan-19	13	46	0.97	2613	16100	22237	-397	39820	15.24
11	Feb-19	35	46	0.97	2787	16100	23717	-406	40756	14.62
12	Mar-19	26	46	0.96	3228	16100	27470	-226	45520	14.10
	Total	347	552	11.77	48038				580234	150.88
	Avg	29	46	0.98	4003				48353	12.57
	Minimum	4	46	0.96	2545				38021	10.27
	Maximum	49	46	0.99	5942				61031	15.24

33 kW Solar PV system is installed and commissioned in the month of April 2019.

As per MSEDCL electricity bill, the total units(kWH) consumption for the month of April & May 2019 is zero and only the demand charges are billed.



Power factor is fluctuating between 0.96 and 0.99 over a period of last 12 months.

Average MD recorded over a period of last 12 months is 29 kVA with max. of 49 kVA. Existing Contract Demand (CD) is 115 kVA. There is still sufficient CD available at your disposal for any future expansion. Hence, we recommend to revise the existing contract demand from 115 kVA to 48 kVA. This will result in annual monetary savings of Rs.1,37,200

Since Sept 2018, MSEDCL power factor calculations have been revised. Earlier only the lag KVAR was taken into consideration for PF calculation. As per revised tariff structure from Sept 2018, both lead and lag KVAR will be taken into consideration.

Hence we need to re-configure our APFC KVAR compensation accordingly.

We have already lost Rs.13500/- in last 12 months on account of PF not being maintained as unity.

We recommend to upgrade existing APFC panel to 14 step 82.5 kVAR with 3 ph, MPP filled Gas capacitors and intelligent relay.

The above APFC requirement is based on your existing electrical consumption load pattern.



2.2

Verification of Existing Load List:

Existing Load list was checked against the connected load (HP).The actual load was more than the sanctioned connected load .

Connected equipment load list is attached.

2.3

Meter correctness

Electrical meter installed by MSEDCL bearing number 053-14034006 with accuracy of 0.5S.

2.4

Capacitor Banks

ABB make MPP type capacitors are used in 7 stage 82.5 kVAR APFC installed for power factor control. But existing APFC is not connected in line. As per the revised power factor calculations, existing 7 stage APFC is to be upgraded to 14 stage, 82.5 KVAR APFC to maintain unity power factor. We recommend to monitor the power factor on daily basis.

2.5

Tariff Applicability

The industry is operating on 24x 6 basis. It is registered under LT-X BIII type. As per revised Tariff structure WEF April 2019, Demand charges are Rs.350/kVA and Energy charges are Rs. 8.41/kWh

2.6

Consumer classification

The unit is classified under LT-X BIII.

2.7

Suggestions & Recommendations:

- Since electrical control room is unmanned area, we recommend to install smoke detection and alarm system.
- Earthing is connected to only one point at the main panel-PCC in electrical control room. As per IE rules two distinct separate earthing needs to be provided.
- Earthing is connected to only one point at the solar panel in electrical control room. As per IE rules two distinct separate earthing needs to be provided.
- No Earthing is provided to the cable tray in electrical control panel. As per IE rules two distinct separate earthing needs to be provided.
- Rodent shits were observed inside the main PCC panel in the electrical control room. We recommend to check the panel doors for proper tightness and maintain proper cleanliness.
- Back side cable trench was found open with open wall openings in the electrical control room. We recommend to cover the cable trench properly and wall openings to be blocked and sealed to prevent water & entry of rodents in the control room.
- We recommend smoke detection and alarm system in the server room.
- 43 W LED fixtures with existing diffusers emit only 50 % light. These fixtures may be replaced with transparent diffusers with 22 W fixtures which will give better illumination.
- Supply source and feeder details should be clearly displayed on the panels in the electrical control room and top floor Air Conditioning ODU control panel.
- Energy efficient Mitsubishi make VRF Air conditioning system is installed for first, second and some part of ground floor.
- As a good practice , all the installed split A.C. units at the ground floor are energy rated 3 star and above.



➤ **3.0**

Cost Benefit analysis:

Sr. No	Item	Savings in INR (Annual)	Investment in INR	Payback
1	APFC for Power factor control	13,500	65,000	Although the payback is more it is recommended for future KVA billing purpose.
4	Revision in Contract Demand	1,37,200	5000	1 month
Total		1,50,700	70,000	5 to 6 months

Note: All the above calculations are excluding the depreciation benefits.

Point No.1:

APFC for Power factor control:

Existing ABB make 82.5 kVAr capacitors are connected in 7 stage APFC. But the existing APFC is not connected in line.

We recommend to revise the existing 7 stage APFC to 14 stage with 79 kVAr rating capacitor bank (2 kVAR x 2 ,3 kVAR x5, 5 kVAR x 3, 7.5 kVAR x 2 ,15 kVAR x 2).This will result in annual monetary savings of Rs.13,500

Existing electricity unit cost is Rs.12.57/kWh.



Point No.2

Revision in Contract Demand:

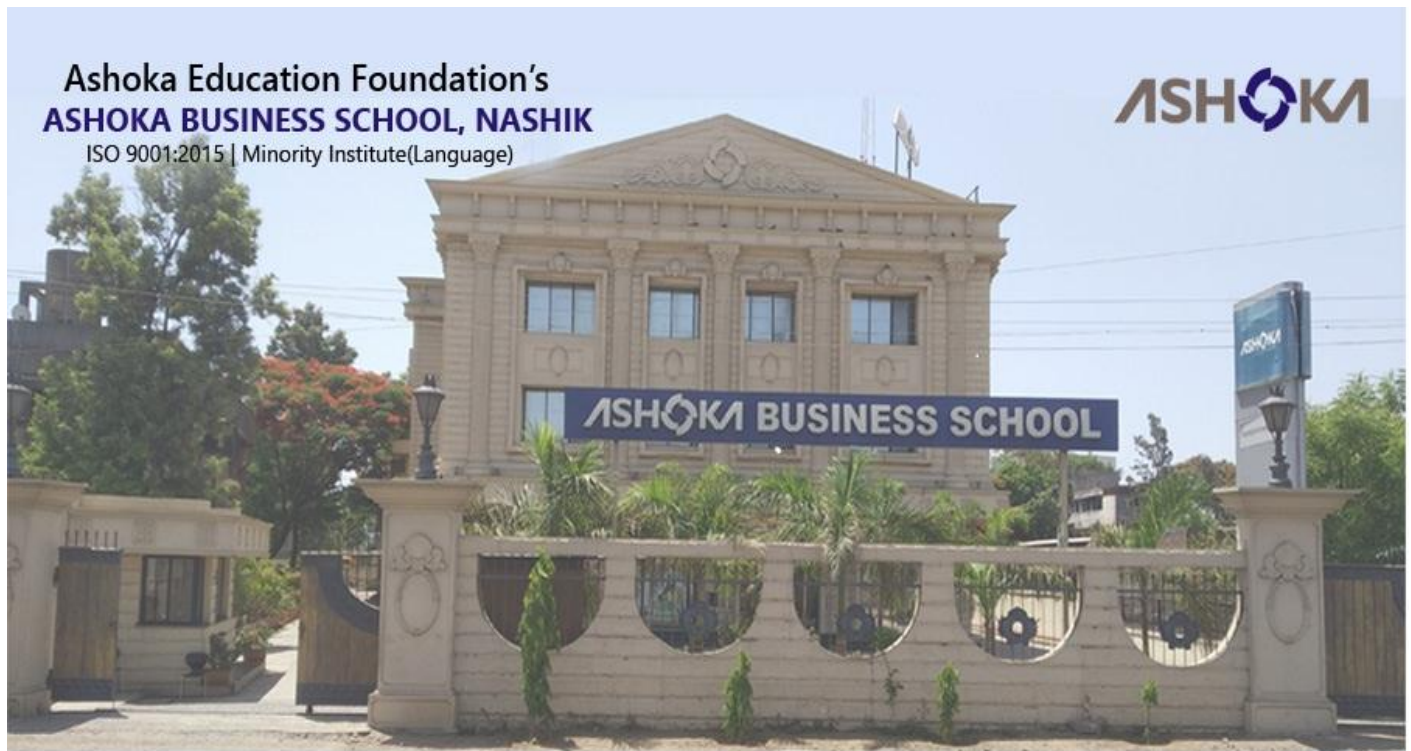
Existing 115 kVA contract demand is un-utilised. During the load analysis it was observed that the maximum kVA demand recorded is 69 kVA and the average kVA demand recorded is 45 kVA.

Revision in contract demand to 48 kVA will help in reduction of demand charges and annual monetary savings of Rs. 1,37,200.

[(46-19) x 350 x 12 x 1.21= Rs.1,37,200]

4.0

Introduction :



Leading Business School in Nashik :

Masters of business Admission at Ashoka Business School is permanently approved by University of Pune & approved by AICTE. MBA at Ashoka Business School , is one of the 'coveted' programs for achieving proficiency in all areas of Business Management & Administration credentials.

The MBA Course of studies spanning four semesters (Two years), provides a structured journey for the students to explore, learn and experience the Business Management subjects through rigorous class room lectures combined with continuous interactions with industry environment enabled through periodical industry visits, guest lectures and seminars from industry executives, Internship projects as per syllabus and many more opportunities.



5.0

Metering & Monitoring:

We recommend to install internal energy meters in the factory premises which will measure section wise electrical consumption. This helps for better monitoring and control of electrical power consumption.

Things which cannot be measured cannot be controlled.

6.0

Electrical Motors

Existing motors of more than 5 kW may be replaced by energy efficient IE3/IE4 motors in phases.

7.0

Pumps

It was observed that there are not many pumps in the factory above 7.5 KW which amount to considerable energy consumption.

8.0

Lighting

We recommend to install separate LDB for lighting load.

9.0

Power Quality Analysis:

Power Quality analysis was done by Fluke make 1735 model Power Quality Analyzer.

Average recorded values are noted below.

Sr No	Machine	Max.active power(kW)	Max.reactive power(kVAr)	Max. apparent power(kVA)	Average power factor
1	Total Main Incomer	40.5	6.5	43.5	0.9
2	Main Incomer L1N	14.4			
3	Main Incomer L2N	15.02			
4	Main Incomer L3N	11.08			
5	Total Air Conditioning	41.9	6.2	45.3	0.93
6	Air Conditioning L1N	14.38			
7	Air Conditioning L2N	12.8			
8	Air Conditioning L3N	14.8			
9	Ground Floor lighting	2.26	3.73	4.6	
10	UPS Power	1.82	-0.39	4.5	
11	First Floor lighting	0.85			
12	Second floor lighting	3.17			

Findings:

- It can be noted that average maximum demand recorded is 45.3 kVA.
- Phase-wise electrical load distribution is Ok at the main incomer.