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Audit Process on Water Treatment Plant

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Abstract:- I want to discuss about water treatment plant which is established in Jabalpur area at lalpur (M.P).auditing process has done on water treatment plant. This plant purified about 97 million litter water per day at present time. Two section 42MLD and 55MLD are used for water purification. I see and found that, more energy consume in Electric motors, pumps, lighting, wastewater etc. A large amount of electrical energy is consumed in induction motor used in Industry. These papers describe the auditing process and various factors affecting the efficiency of any equipment and how to calculate the exact values from the electricity bills, we are discussing use of energy per day - savings measures which energy auditors frequently use. Others have good energy saving potential but must be implemented carefully to avoid increasing energy use rather than decreasing it.

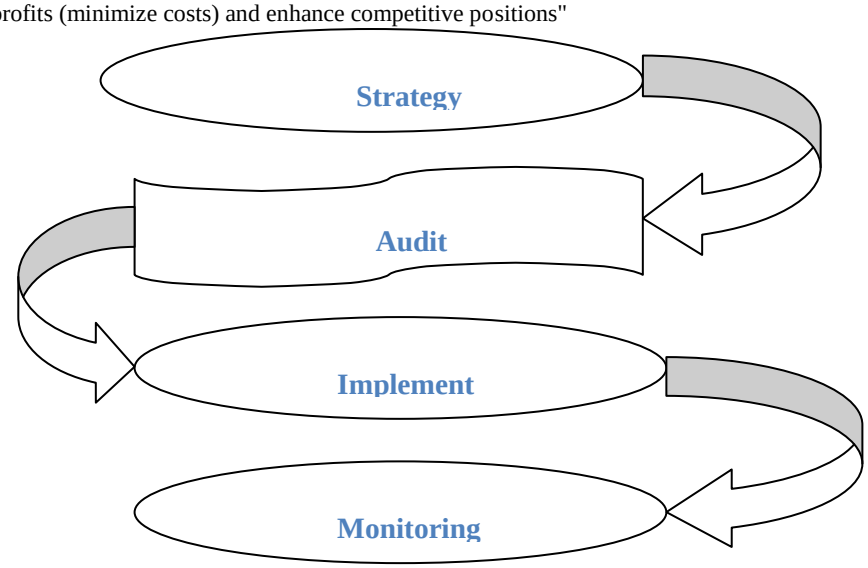
Keywords: - Energy Efficiency, Audit, Efficient Induction drive, Payback Period, Energy saving, Reducing cost etc.

I. INTRODUCTION

The main focus of an energy audit is to water treatment plant lalpur in Jabalpur (m.p) with energy savings opportunities that would reduce their yearly operating costs. Savings such as rebates and/or cost deductions are also identified during the audit process. Audits may also be part of a comprehensive plan to achieve the save energy, water treatment plant was establish 1986, lalpur water treatment plant 97 MLD (million liter per day) water supply per day, these water taken from Narbada river. The Narmada River is the biggest source of water Supply to the Jabalpur city. The Lalpur water treatment plant has two units of 42 MLD (9.3 MGD) and 55 MLD (12.1 MGD). Water from Narmada River is supplied to raw water pump house, 3 hours are required to purify for water process. With the help of 6 pump (225hp) and 8pumps (300hp) water supply to Jabalpur city.

II. AUDIT

Energy Audit is a systematic study, or survey, to identify how energy is being used in a plant, and identifies energy savings opportunities. Using proper audit methods and equipment, an energy audit provides essential information on where, how, and how much energy is used, so owners can analyze performance efficiencies at the overall plant or process level. The Energy Audit itemizes improvement recommendations, describing the cost, savings, and payback, effectively giving for future energy savings. An energy audit is a package of services that deliver the following benefits to customers:-Educates and creates awareness regarding energy usage and conservation opportunities Provides customers with recommendations which will increase the comfort, health, safety and prolong the durability of the property. Another word according to (Cape Hart, Turner and Kennedy, Guide to Energy Management Fairmont press inc. 1997)"The judicious and effective use of energy to maximize profits (minimize costs) and enhance competitive positions"



A-Energy audit flow up diagram

The study mainly focuses on improving energy usage efficiency and identifying energy saving and space savings opportunities, during the audit.

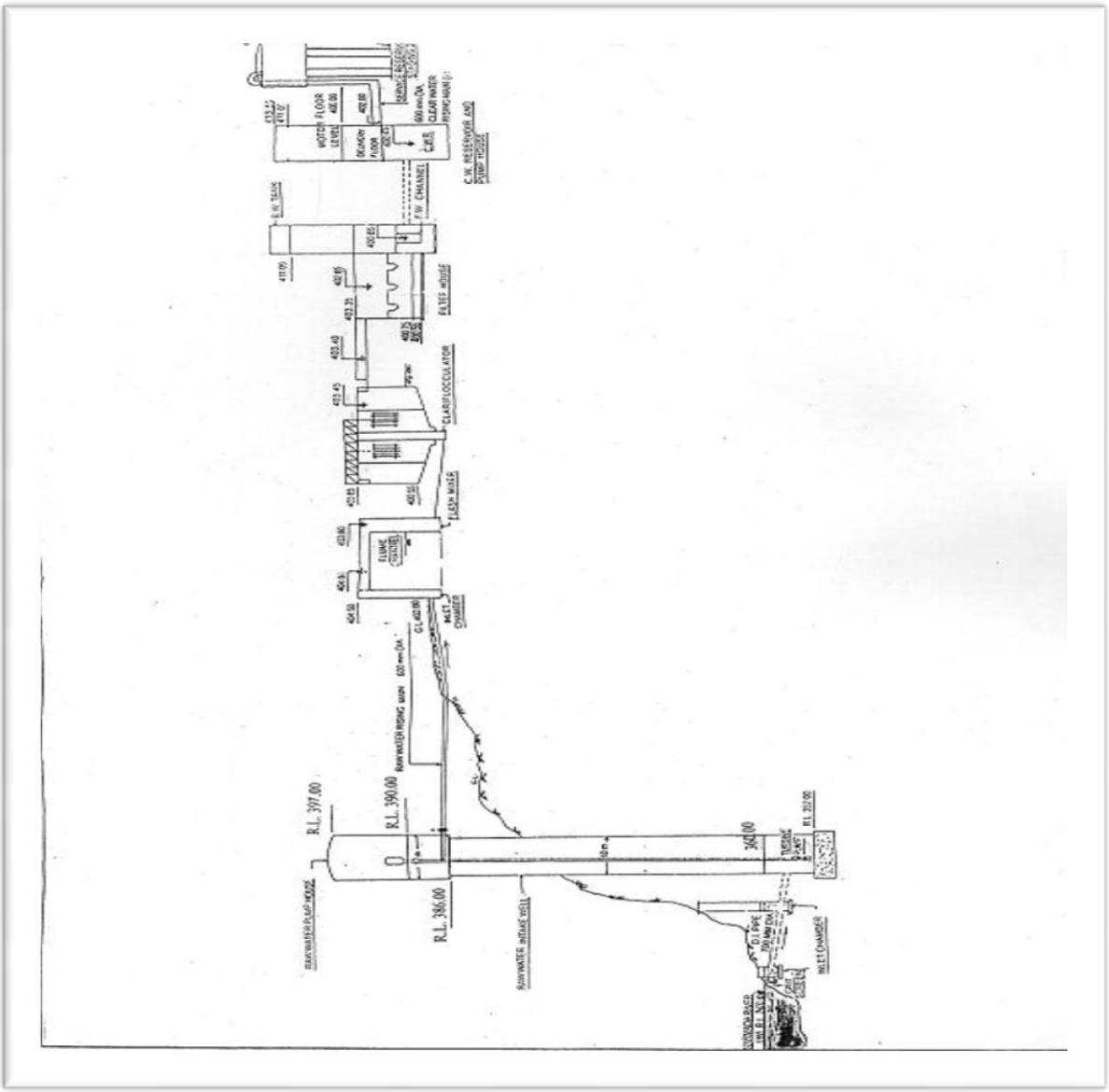
2.1-Preliminary Audit

Carried for all three plants supply water to Jabalpur City
Duration: One Day for each plant
Observations: Output and Energy Consumption of each plant
Energy saving and are performed to determine if a detailed process audit should be undertaken at a facility. The field work can be as four hours for simple plants (such as lagoon wastewater treatment plants), or as long as one to two days or more for complex facilities. the thrust of a walk-through audit is to collect plant energy data, review energy bills with the customer, compare the facility's unit energy consumption with plants using similar processes, and Lalpur Water Treatment plant is Biggest one which is selected for detailed energy Audit .

2.2-Detailed Energy Audit

2.2.1-Conducted Meeting:

First of all create a meeting with my facility & auditor experts, with the help of decided auditing process on water treatment plant in Jabalpur, the agenda for the meeting can include the following topics, first identification of goals and objective for the audit. Discussion by representatives of the electric utility, water resources, pumps performance etc. Development of



B-Plant Layout

Audit schedule and detailed discussion of audit goals. Than identification of plant data collected to date and requests for additional data if needed.

2.2.2-Collected Plant Data:

Obtaining plant data is essential to initiating the audit. The data collection effort should be appropriate for the level of effort for the audit. Some useful data can include-plant flow chart (average and yearly total for one year).one year of electric utility bills. Pumping records and pump performance curve and hour per day plant is operated. Design summary and drawings and specification and most important water treatment plant water quality standers, wastewater treatment plant effluent discharge standards.

Month	KWH (consumed)	Avg (P.F)	KWH (PF penalty)	KVA (Billed demand)	Total maximum demand(KVA)	Energy charge (paisa per unit)	monthly fixed charge(Rs/ KVA of billing demand per month	total charge(R.s)	average load factor
MAY(2011)	1440000	0.93	0	2500	2456	360	165	4937456	84
JUN	1367000	0.93	0	2500	2362	360	165	5394544	84
JULY	1423800	0.93	0	2500	2388	360	165	5596259	84
AUG	1435400	0.93	0	2500	2472	360	165	5652040	84
SET	1026300	0.93	0	2500	2440	360	165	5743220	84
OCT	1399200	0.93	0	2500	2356	360	165	5527321	84
NOV	1373700	0.93	0	2500	2374	360	165	5439473	84
DEC	1424900	0.93	0	2500	2356	360	165	5618037	84
JAN(2011)	1480800	0.92	0	2500	2392	360	165	5827459	84
FEB	1282600	0.92	0	2500	2384	360	165	5095094	84
MARCH	1436600	0.92	0	2500	2416	360	165	5539473	84
APR	1376600	0.92	0	2500	2452	360	165	5649473	84
TOTAL	16466900							66019849	

C-Plant Bill Detail (One Year)

2.2.3-Conducted Field Investigation:

Detailed field investigation that is used to gain a thorough knowledge of the plant operation. A brief investigation can be accomplished in three day or less for a walk-through audit. Two or four days may be required for a detailed process audit.

2.2.4-Create Equipment Inventory:

A typical equipment inventory includes the following information:-
Name of equipment.
Nameplate horsepower.
Hours of operation per year.
Field measured power, if available.
Kilowatt hours per year.

2.2.5-Follow-Up:

Proper follow-up is the most often overlooked element of an energy audit. the enthusiasm for conducting an audit and identifying energy conservation measures quickly dissipates at the conclusion of a study. The flow-up process should be performed for as long as two years to check the progress of implementing conservation measures. Parameters to be monitored include but not limited to:-
Plant flow
Plant demand, KW
Plant energy KWh
Demand and energy for individual process or pieces of equipment.
Unit energy consumption for the plant (kWh/MG)
Pump efficiency as measured

III. CALCULATION PROCESS

3.1-Calculation for Cooling

	Pump House	Staff Room-01	Staff Room-02		
	Exhaust	Fan	Fan		
Jack Pomp House	1	1	1		
Rating	350	90	95		
Use Hours	12	18	18		
Working Days	270	180	180		
Present Consumption	1134	291.6	307.8		
	Pump House	Pump House	Staff Room-01	Staff Room-02	
	Cooler	Exhaust	Fan	Fan	
42mld	4	1	1	1	
Rating	350	90	95	95	
Use Hours	12	18	18	18	
Working Days	270	180	180	180	
Present Consumption	4536	291.6	307.8	307.8	
	Pump House	Staff Room-01	Staff Room-02	Laboratory	
	Exhaust	Fan	Fan	Fan	Freeze
55mld	1	1	1	1	1
Rating	350	90	95	95	250
Use Hours	12	18	18	18	12
Working Days	270	180	180	180	365
Present Consumption	1134	291.6	307.8	307.8	1095

3.2-Calculation for Pumping

	Pump House		Pump House		Pump House
	Pump		Pump		Pump
Jack Pomp House	6	42mld	3	55mld	3
Rating(H.P)	215	Rating	225	Rating	350
Use Hours	24	Use Hours	24	Use Hours	24
Working Days	365	Working Days	365	Working Days	365
Present Consumption	8430098	Present Consumption	4411098	Present Consumption	6861708

3.3-Saving due to Installation of Capacitor Bank

Month	Consumption KWH	Demand KVA	PF	Demand reduces on the base of .93 KVA	Reduction in KVA	Saving on fix charge only demand	unit x energy charge x incentive%	save
April	1376600	2452	0.92	2280	172	28380	247788	276168
March	1436600	2416	0.92	2246	170	28050	247777	275827
Feb	1282600	2384	0.92	2217	167	27555	230868	258423
Jan	1480800	2392	0.93	2224	168	27720	266544	294264
Dec	1424900	2356	0.93	2191	165	27225	256482	283707
Nov	1373700	2374	0.93	2207	167	27555	247610	275165
Oct	1399200	2356	0.93	2191	165	27225	241856	279081
Sept	1026300	2440	0.93	2269	171	28215	258462	286677
Aug	1435400	2472	0.93	2299	173	28545	258372	286917

Jul	1423800	2388	0.93	2221	167	27555	256284	283839
Jun	1367000	2362	0.93	2196	165	27225	246060	273285
May	1440000	2456	0.93	2284	172	28380	259200	287580
TOTAL	16466900			24545		308630	3017303	3360933

IV. RESULT

RECOMMENDATION & EXPECTED SAVING:-

4.1-Recommendation for pump & motor

Investment grad	Recommended Measure	No of Fittings	Energy saving (KVA)	Savings in Rs./ year	Capital Investment in Rs	Pay Back Period
Low cost	Replacement of magnetic Ballast and tub-light with electronics tub light	119	14700	51750	47600	11 month
	Power factor improvement by installing capacitor bank	2400 KVA (Connected Load)	153.38KVA reduction in demand	39 lac	15 lac	5 month

Power factor improvement by installing capacitor bank which increase the power factor (0.99) and gives 153.38 KVA reduction in demand at a load of 2400 KVA(Connected Load) that saves 39 lack per annum.
Properly size to the load for optimum efficiency. (High efficiency motors offer of 4 - 5% higher efficiency than standard motors)
Repair seals and packing to minimize water waste.
Use siphon effect to advantage: don't waste pumping head with a free-fall (gravity) return.
Use energy-efficient motors where economical & synchronous motors to improve power factor.
Check for under-voltage and over-voltage conditions.

4.2-Recommendation for lighting

The main recommendation is to replace the recessed fluorescent lighting system in the general area and maintenance office.
By Replacement of magnetic Ballast with electronics in existing tub light s i.e. 119 fittings having potential saving of 14700 kWh that save 51750 Rs/Year.
Select ballasts and lamps carefully with high power factor and long-term efficiency in mind.
Use task lighting and reduce background illumination.

4.3-Recommendation for Water & Wastewater

- Recycle water, particularly for uses with less-critical quality requirements.
- Recycle water, especially if sewer costs are based on water consumption.
- Test for underground water leaks. (It's easy to do over a holiday shutdown.)
- Check water overflow pipes for proper operating level.
- Provide proper tools for wash down -- especially self-closing nozzles.

V. CONCLUSION

With the help of this paper, we have concluded, An Energy audit increases the productivity of organization. Energy audit helps to increase output of any industry and decreases input power. Energy audit provides batter stability to the industry or organization then the other audits. We also addressed several problem areas which can result in over-optimistic savings projections, and suggested ways to prevent mistakes. Finally, several areas where additional research, analysis, and data collection are needed were identified. Once this additional information is obtained, we can all produce better and more accurate energy audit results.

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