

**JHARKHAND BIJLI VITRAN NIGAM LIMITED
(JBVNL)
Ranchi (Jharkhand)**

Profile

JBVNL (Jharkhand Bijli Vitran Nigam Limited) is a discom utility of Jharkhand State. It is directly connected to general consumers of energy availing bodies. Its creation took place on 06.01.2014 after unbundling of Jharkhand State Electricity Board; JBVNL came in existence as a company to maintain the power supply throughout the state as a distribution licensee.

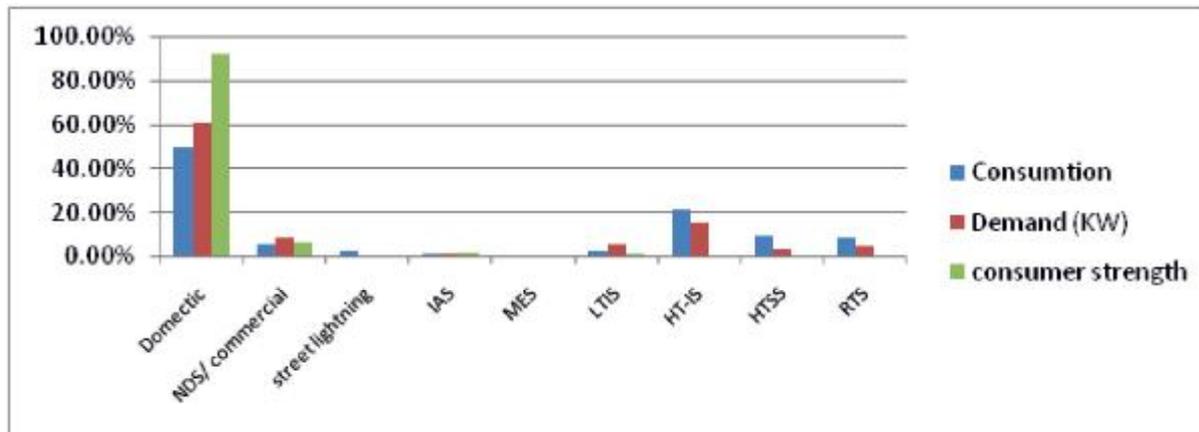
JBVNL has positively responded & accepted the reforms programs of Ministry of Power and currently it's witnessing massive change in renovation and modernizations in its system under these reforms. Over a year the state discom has seen an unfathomable growth of 30% in new consumer's additions and has put in every effort to fulfill the national target of supplying 24X 7 electric supplies in every nook and corner of the state.

The state utility serves over a 30 lakh of consumers and has an annual energy requirement of 8450 MU's with an average peak demand of 2100 MW. Out of the total pie of consumers profile domestic consumers alone holds the staggering lion share of 92 % in strength and captures over 50% of the state energy demands, and also a major contributor.



Energy Consumption

JBVNL Consumer Profile, Power Demand and Energy Consumption:



Energy Conservations Measures:

Project: UJALA (UNNAT JYOTI by AFFORDABLE LED for ALL)

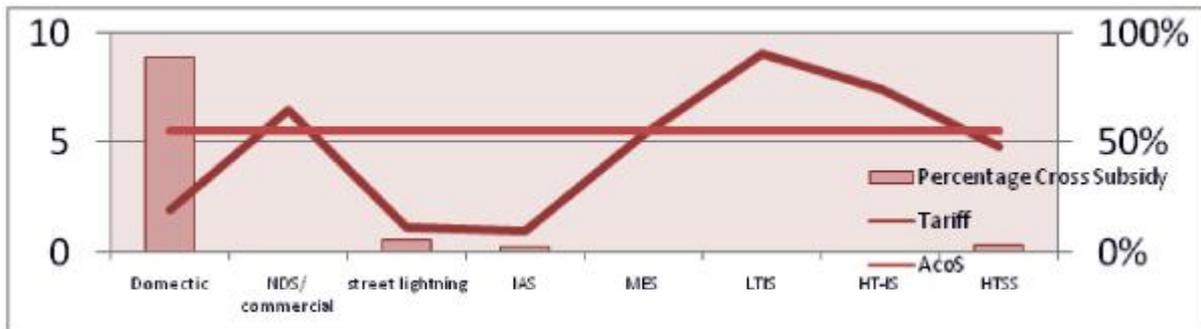
UJALA is a DSM initiative under national LED program that was launched in January 2015 with a mission in replacing the 77 crore of inefficient Incandescent Bulbs with high quality LED lamps. The program is jointly implemented by the state utilities in association of Energy Efficiency Services Limited (EESL), which is a JV's of four PSU's under Ministry of Power. EESL is also an national nodal agency for UJALA Program.

JBVNL has been a very active participant in accepting and executing of UJALA program. The program was duly launched on 15th November, 2015 by the Honorable Chief Minister of Jharkhand, and since its launch the scheme has been widely accepted and appreciated by the electric consumers of the state.

Under the scheme 9W LED was made available as a replacement of 100 W Incandescent Bulbs, with each LED bulbs carrying a warranty period of 3 years.

Particulars	UJALA LED Bulbs	ICL
Wattage(W)	9 watt	100 Watt
Energy Efficiency	91%	0%
Lumen efficacy	100 lu/w	10-12 lu/w
Life Expectancy	25000 hrs	1200 hrs
Warranty	3 years	nil

As per ELCOMA report 2012 Rs 16 mn ICL's are sold annually in Jharkhand that has a potential of 1036 Mu's energy savings, which is 93 % of state domestic consumption for lightning. ✉ Roadmap for demand aggregation of LED lighting by PWC2012



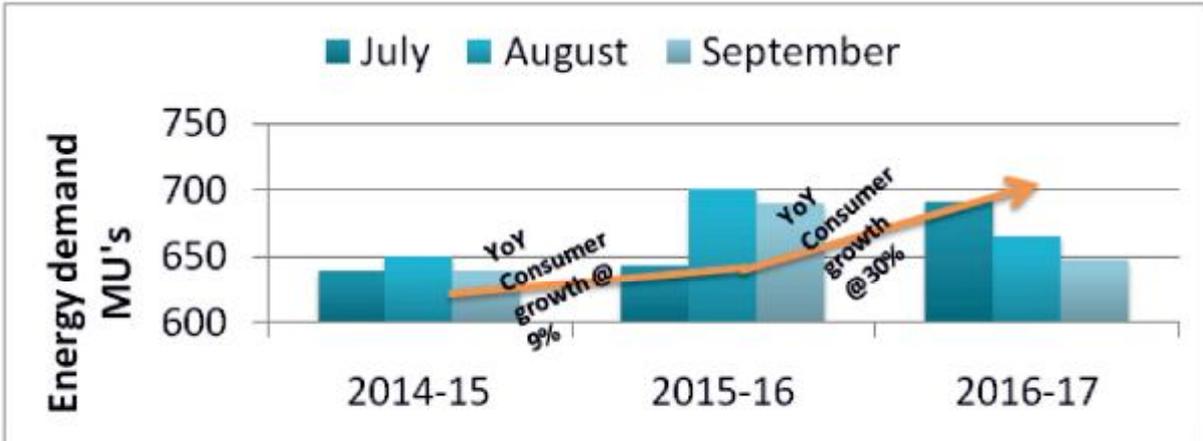
In purview National Electric Policy & Plan in tariff rationalization, it's very much crucial for the state utility in eliminating the cross subsidy from the tariff and upbringing in average deviation of 20% with respect to average cost of supply. As JBVNL has an un-rationalized tariff structure with over a 80 % cross subsidy requirement for domestic category, it's become very much important for them to take initiatives that can reduce the quantum of subsidy requirements by taking steps using energy efficiency & conservations. Henceforth UJALA proved a very handful tool for the JBVNL in reducing energy demand and subsidies as domestic lightning alones contributes 30-40% of total power demand

Awareness and Distribution

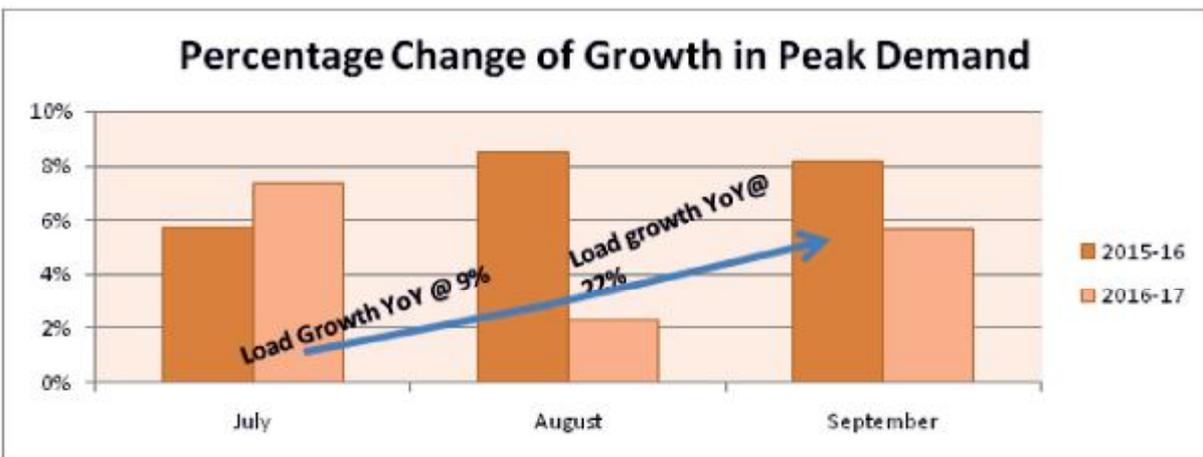
In aspect to cover the last mile a massive consumers awareness programs was launched jointly by JBVNL & EESL. Through the channels like newspaper, radio, mobile vans, etc were widely used in disseminating a substantial first hand information's on the benefits of LED usages. Special lucrative slogans were created in getting attentions from the rural consumers. Distributions of LED were done from all the electrical offices and billing centers, which was latterly clubbed with post offices, eyeing to cover the rural segment. To enhance the consumer interactions and contact surface area block and pachayat offices were too kept in loop, and also consumers were encourage for LED at targeted revenue collection camps of the state discoms.

List of Major Energy Conservation Initiatives taken in FY 2015-16:

1. Total Number of LED Bulb replaced	Total= 4464855 till 31 st March 2016
2. Energy Savings potential through replacement of Incandescent bulb with LED	91% per year
3. Incandescent Bulb power consumption (kW)	446455.5 $\{ (4464855 \text{ no.} \times 100 \text{ W}) / 1000 \}$
4. LED Bulb power consumption (kW)	40183.7 $\{ (4464855 \text{ no.} \times 9 \text{ W}) / 1000 \}$
5. Annual Energy Consumption with Incandescent Bulb (@ 3.5 hrs. of daily operation and 300 days/year) (Million Units)	468.81 $\{ (446485.5 \text{ kW} \times 3.5 \text{ hrs.} \times 300 \text{ days}) / 10^6 \}$
6. Annual Energy Consumption with LED Bulbs (@ 3.5 hrs. of daily operation and 300 days/year) (Million Units)	42.19 $\{ (40183.7 \text{ kW} \times 3.5 \text{ hrs.} \times 300 \text{ days}) / 10^6 \}$
7. Total annual energy saving (Million Units)	426.62
8. Project Duration	3 Years
9. Total Energy Savings in 3 years (Million Units)	1280 MU



Source: Quarterly report by ERLDC



Source: Quarterly report by ERLDC

**JAIPUR VIDYUT VITRAN NIGAM LIMITED
(JVVNL)
Jaipur (Rajasthan)**

Profile

JAIPUR VIDYUT VITRAN NIGAM LIMITED is engaged in distribution and supply of electricity in 12 districts of Rajasthan, namely Jaipur, Dausa, Alwar, Bharatpur, Dholpur, Kota, Bundi, Baran, Jhalawar, Sawaimadhopur, Tonk and Karauli.

JVVNL (Jaipur Discom) has been established under the Companies Act, 1956 by Govt. of Rajasthan, Jaipur Discom has been created with the principal object of engaging in the business of distribution and supply of electricity in 12 districts of Rajasthan are shown in the below map.



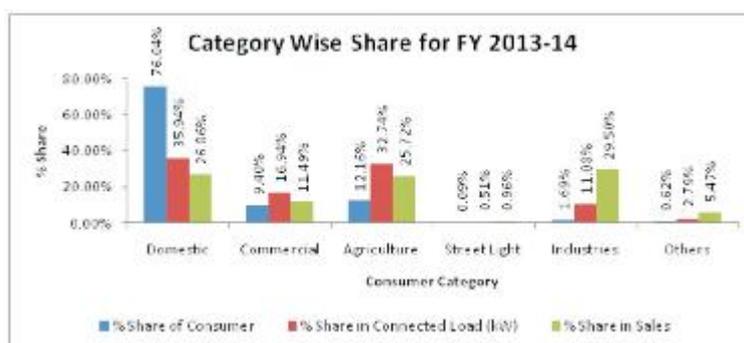
Energy Balance

Energy Balance for FY 2014-15 and FY 2015-16

Based on the provisional and projected energy sales, distribution loss reduction plan, power purchase based on the drawl ratio and the consequent inter-state sales, the energy balance of JVVNL for FY 2014-15 and for FY 2015-16 has been summarized in following table.

Energy balance for FY 2014-15 and FY 2015-16

Particulars	Units	FY 15	FY 16
Estimated sales	MU	17493.86	19295.72
Distribution Losses	%	30.90%	26.50%
Energy Requirement	MU	25,316.73	26,252.68
Energy availability at DISCOM periphery	MU	25,047.92	27,562.03
Energy surplus/ (deficit)	MU	(268.81)	1309.34



Ongoing Schemes:

1. CM's Electricity for all
2. GPVY (Gram Panchayat Vidyut Vitaran Yojana)
3. Electrification of villages
4. RAPDRP (The Restructured Accelerated Power Development and Reforms Program)
5. RGGVY (Rajiv Gandhi Grameen Vidyutikaran Yojana)
6. IDPS (Integrated Power Development Scheme)
7. DDUGJY (Deen Dayal Upadhyay Gram Jyoti Yojana)
8. UJALA (Unnat Jyoti Affordable LED's for All)

Demand Side Management (DSM)

Demand Side Management (DSM) is described as the planning, implementation and monitoring of utility's activities (beyond the consumer meter) designed to encourage customers to amend their electricity consumption patterns, both with respect to timing and level of electricity demand so as to help the customers, to use electricity more efficiently. Various factors such as increasing economic activity and population growth are resulting in additional pressure on ever increasing power demand, when the country is already facing power shortage.

Under DSM Initiatives various program are going on in JVVNL:

1. UJALA (LED).
2. AGDSM (EEPS).
3. Energy Efficient Ceiling Fan Program & LED Tube Light Program.

Under JVVNL "UJALA Scheme", successful completion of LED programme(Earlier DELP), inaugurated on May'14, 7W LED bulbs with a total Number Of LED's Distributed in Rajasthan: 1,12,79,224 under DSM activities has been done and expected energy savings per year is 321 MU approximately.

**SETTLING PUMP HOUSE
CENTRAL RAILWAY
Wadi (Karnataka)**

Station Profile

At Wadi station initially water was pumped into two stages:-

1. From river bed at 8 Km distance from Wadi station to water treatment plant.
2. From water treatment plant to over head tank for utilization of water by gravity.

For this 02 nos. of 90HP coupled monoblock pump set with oil filled transformer were installed. Both the pumps were operated in cyclic order around 09 hrs. each daily. Due to this operation a lot of electrical energy was consumed and also wasted in auto transformer starter.

The above system has been replaced by energy efficient submersible monoblock pumps of 30HP (02nos.). Also 10 KVA power capacitor has been provided for power factor improvement. This has reduced loss of head due to bends, elbow in the suction line.

Energy Consumption Calculation:

Sr. No	Details	Before Modification (Replacement)	After Modification (Replacement)
1	HP	90 HP	30 HP
2	KW	72 KW	24 KW
3	Pumping Hours	17 hrs	17 hrs
4	Approx Consumption per day	1224 KWH	408 KWH

Energy Conservation Initiatives:

After conducting the study it was decided to replace existing pump by energy efficient mono submersible pump with solid starter with below mention scope of work-

- (i) Replacement of 02 Nos. Mono block non star rated pump sets (90HP) with energy efficient 30HP pumps two nos. at Settling Pump House/Wadi (Solapur Division)
- (ii) Provision of 10 KVAR power capacitor bank for power factor improvement.
- (ii) Reduction in Bend, Elbow and old suction pipe for optimization.

Pump before modification



Old 90 HP Centrifugal Pump

Pump after modification

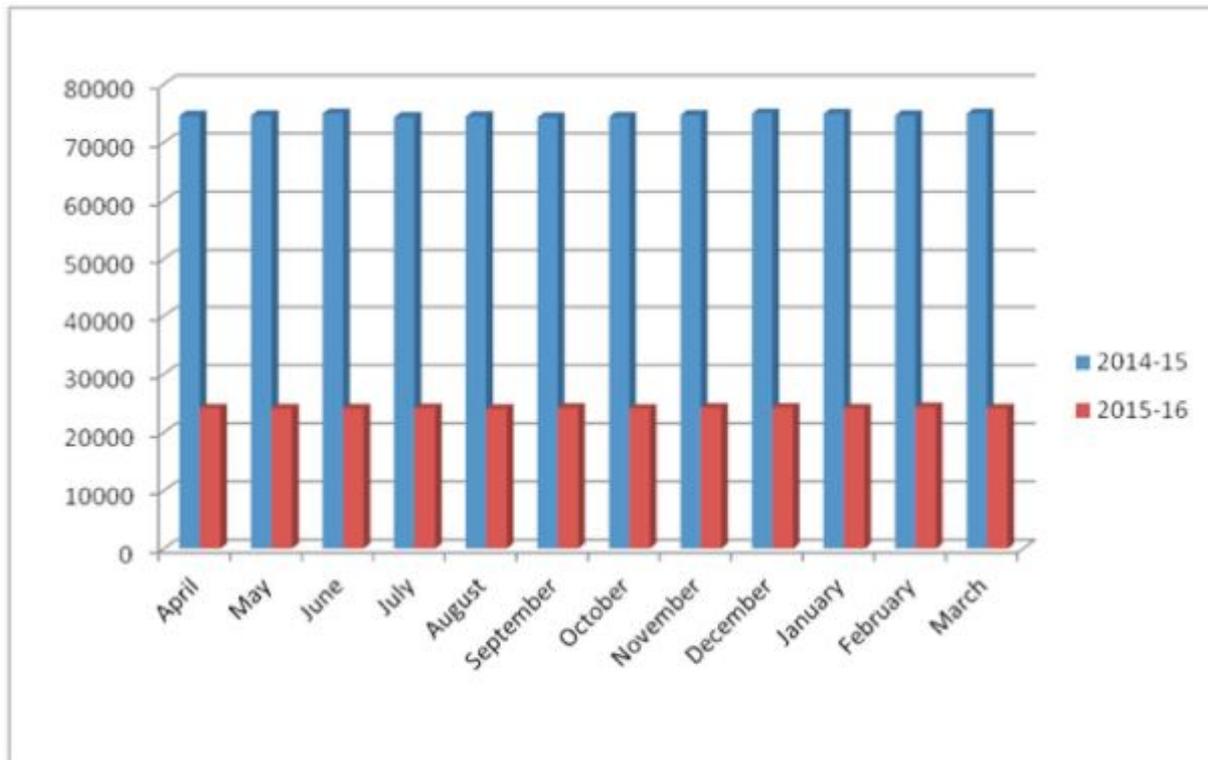


New 30 HP Submersible monoblock Pump

Energy Consumption Profile for the year 2014-15 and 2015-16

Month	Unit Consumption in KWH	
	2014-15	2015-16
April	74583	24083
May	74655	24063
June	74963	24052
July	74352	24153
August	74456	24008
September	74296	24156
October	74387	24037
November	74687	24184
December	74985	24194
January	74935	24079
February	74657	24275
March	74953	24087

Settling Pump comparative Energy Consumption for the year 2014-15 and 2015-16



L&T MHPS TURBINE GENERATORS PVT. LTD.

Hazira, Surat (Gujarat)

Unit Profile

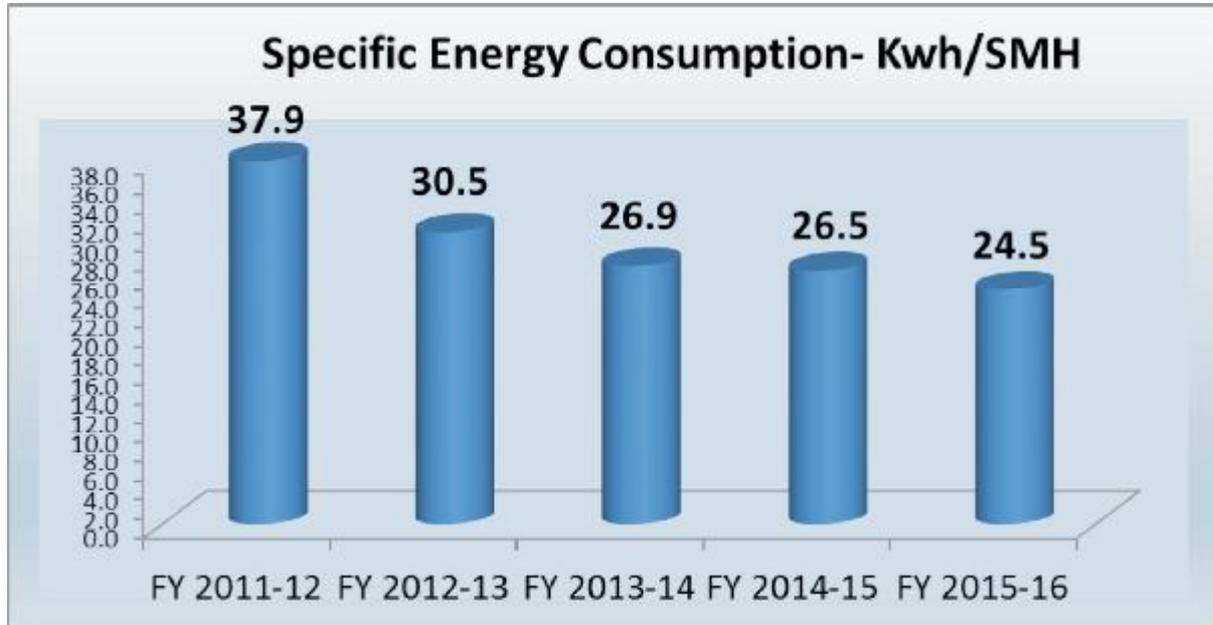
Ten years back in 2006, Government of India unveiled its grand plans to meet the burgeoning demand of power, thanks to the steady growth rate gifted by the successful economic reforms but a major stumbling block to the power infrastructure dreams of a nation was the lack of capacity to manufacture equipment which was the key factor to meet project schedules.

With a single source of supply of power equipment, country was struggling to meet the demand. To mitigate the constraints, Larsen & Toubro Limited collaborated with the Mitsubishi Heavy Industries of Japan and Mitsubishi Electric Corporation, Japan to manufacture high technology super-critical and ultra-super-critical Turbine & Generators in India for domestic market.

A joint venture was signed on 5th November 2007 with shareholding of L&T 51%, MHI 39 % and MELCO 10%. Technology Licencing Agreement was signed between MHI for Turbine and MELCO for Generator.



Specific Energy Consumption



Major Energy Conservation Measures Implemented

Project-1 - 306 Kwp Ground Mounted Grid Synchronized Solar Power Plant

L&T MHPS Turbine generators Pvt. Ltd is aware about its Carbon foot print and consequences to Environment. As part of going green strategy, unit has Installed 306Kwp Ground mounted grid synchronized power plant in FY 2015-16.

Specification: Capacity- 306 KWp

Nos. of PV modules : 1020nos.(Rating - 300 W each)

Nos. of solar inverters : 5 nos.(60 KW each)

Expected Average Yearly Generation - 3,90,000 kWh Per annum

Solar power plant is designed and executed by professional in house team.



Benefits:

1. Carbon foot print reduction
2. Energy Security

Challenges : In-house design and Engineering with an aim to utilise the Project left over steel for solar structure.

Project-2 - Installation of Ultraviolet Germicidal Irradiation (UVGI) in HVAC system of Administration building

Ultra Violet Germicidal Irradiation (UVGI) is the use of ultraviolet (UV) energy to kill or inactivate microbes (viral, bacterial, and fungal species).

UVGI System installed in Air Handling Units of HVAC. The reason for installing UVGI is to overcome the following usual problems encountered with Air conditioning and Refrigeration Systems, commissioned without any UVGI like :

- a) Increasing Electricity Consumption due to the condensation of moisture around the cooling coils creates growth of algae, mold, bacteria and viruses. Thus reducing the heat transfer efficiency and air flow of the AHU which in turn increases the power consumption.
- b) Deteriorating Indoor Air Quality (IAQ)
- c) Increased Operation & Maintenance Cost



Before UVGI



After UVGI Installed in AHU

**Benefits : Energy saving- 34243 kWh (Pay back less than 1 year)
Improved air quality
Less maintenance**

Project-3 - Lighting voltage reduction from 235 V to 220 V in Plant & Area Lighting

During design of the plant power systems and execution Lighting feeders are separated by dedicated feeders and distribution network. Metal halides Lights and CFL were used during design stage of the plant.

Lighting Energy Consumption constitutes of 10% of Overall Plant Consumption, therefore it is significant. Unit identified various projects and implemented to reduce the overall Plant Lighting Consumption. Lighting feeder's voltage is reduced from 240 Volts to 220 Volts there by reducing the Energy Consumption of total plant lighting.

Benefits:

1. Reduce the total Lighting Electricity consumption of the plant.- Actual Savings- 61000 kWh
2. Increase the life of Lamps due to optimum voltage.

Project-4 - Reduction In Specific Energy Consumption of fabrication Shop

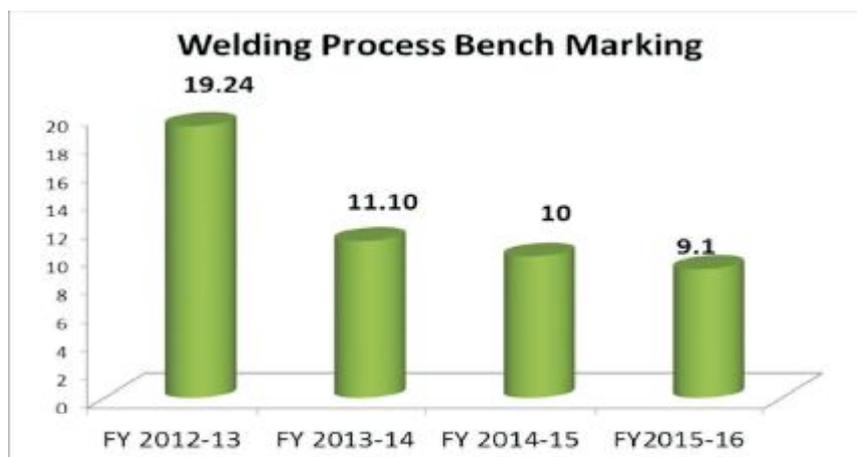
Fabrication Shops has the following process- Plate cutting, bending, Welding , grinding, Stress relieving, Shot blasting and Painting.

Out of all the above processes Welding is major Energy Consumer, following initiatives were taken to reduce the Specific energy consumption:

- Evaluation of Performance of every process
- Improve performance year on year
- Bench marking of welding Process with similar industries
- Awareness on Energy to Contract workmen (456 person approx.)
- Replacing of Old rectifier type welding Machines to Inverter based machines for both LMTG and Contractors.
- Change in process wherever possible based on energy Efficiency Analysis done based on Opportunity
- Welding machine auxiliary pumps -Control Circuit modified
- Checking and maximizing usage of GMAW machines in place of SMAW machines both in-house and by sub-contractors
- Monitoring stub length of electrodes after consumption for better utilization
- Minimizing loses due to loose connection by regular monitoring
- Innovative interlock to prevent over heating of Torches- Patent applied No 3558/MUM/2015
- Training by OEM to Workmen for optimum parameters setting (M/s Fornious, Ms L&T etc.)

Benefits:

1. Specific Energy consumption reduced by 6%
2. Awareness of the Employees Improved.
3. Maintenance reduced and availability of machines improved.



List of Energy Conservation Initiatives taken in FY 2015-16

L&T MHPS TURBINE GENERATORS PVT.LTD						
Summary of Energy savings during Financial Year 2015-2016						
Sr.no	Description	Electricity savings in KWH	Fuel Savings		Savings in Lac Rs	Investment in Lac Rs
			Natural Gas (SCM)	HSD (KL)		
1	Savings in Admin building(HVAC+UPS+Light) - Installation of UVGI	34,243	-	-	3	4
2	Savings due to Power factor Improvement	100,763	-	-	8	-
3	Energy savings in Area and Plant Lighting due to reduction in Lighting Voltage	100369	-	-	8	6
4	Energy Conservartion at canteen- Behavioural Changes	79,600	-	-	6	-
5	Solar Water Heater installation at canteen	11946	-	-	1	4
6	Machine Shop T-2 & T-4	10,781	-	-	1	-
8	AIR co Saver Installation	3,665	-	-	0.3	1
9	Installation of Descaler at Coil Shop	15,000	-	-	1	3
10	Blade shop	121,896	-	-	9	5
11	Fabrication Shop	101,903	-	-	8	-
12	Energy Conservation Due to LED Lamp relacements	2,415	-	-	0.2	1
13	Installation of 306Kwp ground Mounted Solar Power plant	-	-	-	9.8	180
14	Reduction in Thermal Energy Consumption by Improving power quality through online UPS and installation of Harmonic Filters	-	-	267	160	180
Total Energy savings in KWH		582,581		Total Cost Savings in Lac Rs	214	382
Total Electricity consumption(Kwh) of FY 2014-15		10,519,700		Total Cost Savings in Lac Rs	214	
Energy Savings of FY 2015-16 in Percentage(%)		5.54				

Energy Management Policy



L&T-MHPS Turbine Generators Pvt. Ltd.

MANAGEMENT POLICY

(Quality, Environment, Occupational Health & Safety and Energy)

We dedicate ourselves to achieve progressive excellence in performance of the integrated management system, encompassing all activities related to manufacture and supply of Steam Turbines & Generators of contemporary global Quality standards to enhance customer satisfaction.

We aim to demonstrate our corporate citizenship by exercising judicious balance and control by leveraging leadership to achieve Quality, Energy performance, Environmental aspects, identified hazards affecting Occupational Health and Safety of all present at our workplace, in compliance with applicable legal & other requirements.

Starting from Design, Procurement, Manufacturing, Supply of our products and services, we shall be committed to Quality, timely Delivery, Cost, Enhancing Energy and Environmental performance, prevention of Injuries and Ill health through risk based thinking, Knowledge and Change management.

We are fully committed to make appropriate provision of resources to deploy our policy for continual improvement.

15th Oct, 2016



Aloke Sarkar
Vice President & Head - Operations