

Jojobera Cement Plant
Lafarge India Pvt Ltd.

Organization Profile : ENERGY MANAGEMENT AT JOJOBERA CEMENT PLANT

Unit Profile:

Lafarge India Pvt Ltd a subsidiary of Lafarge with its head quarters in Paris in France, which is leader in construction materials. It is spread in 75 countries with more than 85,000 employees and having a sales of 12.2 Billion Euro in 2000.

Lafarge has it leading positions in following divisions:

Division	World Ranking
Cement	No.1
Aggregates	No.3
Concrete	No.3
Roofing	No.1
Gypsum	No.4

The Jojobera Cement Plant, Lafarge India Pvt Limited (Formerly Jojobera Cement Plant, a part of Cement Division, The Tata Iron and Steel Company Limited) was primarily set up with a view to utilize the Slag being generated as a waste from the Steel Works of Tata Iron and Steel Company, Jamshedpur. Currently the production capacity of plant is 1.6 Million Tonne per Annum PSC and 1.4 Million Tonne per annum of PPC.

70% of the Clinker produced at our two sister units Sonadih Cement Plant and Arasmeta Cement Plant is transported to Jamshedpur by Rail and Ground along with Slag to produce Portland Slag Cement (PSC) and Fly Ash to produce PPC (Portland Pozzolana Cement). The plant has been set up with the primary objective of utilizing the waste product of Steel manufacturing slag and Fly Ash produced by Tata Power Limited which was being thrown out in the past and was an environmental hazard.

As a part of expansion of Lafarge operations in South East Asian Markets, it has acquired Jojobera Cement Plant in November 1999.

The 1.6 Million Tonne per Annum PSC and 1.4 Million Tonne per annum of PPC at Jojobera Cement Plant incorporates the latest state of the art technology comprising cement grinding system consists of a ball mill attached to roller press and classifier in hybrid circuit. The plant employs latest concept in instrumentation, which is fully automatic and centralized process control for operating the equipment.

Energy Consumption:

Jobobera Cement Plant is committed for Energy conservation. The trends of energy consumptions figures as mentioned below:

Parameter	Unit	Year		
		2001	2002	2003
Cement Production	Lakh MT	18.63	24.11	23.15
Total Electrical Energy	Lakh kWh	764	941	863
Sp.Electrical Energy Consp Cement	kWh/T- cement	40.91	35.78	34.42
Power Cost % of Manufacturing cost	%	15.1	14.6	13.5

Energy conservation commitment, policy and set up:

Lafarge India is committed for conservation of energy and same is reflected in the formulation of Corporate Environmental Policy and Integrated Management System Policy (inclusive of Quality Management System, Environmental Management System and occupational Health and Safety Assessment Series) subjected to annual audits by external agencies. The energy consumptions in the plant is monitored in daily and reviewed under regular intervals. At the beginning of every calender year targets are fixed for both electrical and thermal energy consumptions. The same parameters are closely monitored by concern Section Incharge as follows:

- Shift wise monitoring of specific power consumption for major units
- Monitoring of energy MCC wise based upon major drives
- Review of specific power consumption on daily basis and initiating necessary corrective actions as required

Jobobera Cement Plant has the advantage of having access to global knowledge base for innovation and improvement plant performance in terms of Energy Conservation. A well defined system exists to ascertain at all levels. Performance audits are carried out by qualified professionals from CTI, Lafarge, Lyon and plants are suggested for performance improvements in the respective areas. Projects are drawn from the identified improvements and validated for the returns. Accordingly the action plans are drawn upto commissioning and performance study. There was a remarkable improvement in terms of specific power consumption after acquisition by Lafarge. It has reduced from 50.4 kWh / tonne of cement in 1999 to 34.42 kWh/tonne of cement in 2003.

Energy Conservation Achievements:

As a result of implementation of Energy conservation measures there has been a steady decrease in Energy consumption over the period. The following measures have been taken:

- Use of variable speed control fan by v/f, for energy conservation. (Please see [Annexure – 1](#))
- Optimisation of Compressors

Energy saving Project in Year 2003:

- Replacement of old dryers by refrigerant type in existing compressor. (Refer [Annexure – 1.1](#) for details)
- Installation of V/F Drive in 3 nos bag filter de-dusting fan (Pl. refer [Annexure – 1.1](#)

Energy Saving Projects in Year 2002 .

- Reduction in idle run of motor by reprogramming interlock
- Installation of V/F in 571FN1 fan
- Automation of process circuit
- Optimization of drives
- Close circuiting of ballmill & removal of Deagglomerator & installation of V- Separator
- Automation in plant lighting
- Improvement of plant power factor by installing capacitor bank
- Computerization of packing plant CCR

Energy Saving Projects taken in Year 2001 .

- Replacement of air lift by belt bucket elevator.

Energy Conservation Plans and Targets:

The following measures have been planned for further reduction in specific energy consumption:

- Use of energy saving light fittings .
- Installing low watt loss tube lights
- Use of Furnace oil for fuel efficiency of HAG.
- Replacement of Rotary feeder for feeding cement in packer machine by Flow control gate

Targets are mentioned at Section 20 (b) of questionnaire

Safety:

Safety has been an area of major concern in the day-to-day life of our plant since day one of acquisition, ie, Nov. 1, 1999. Safety was identified as one of the areas of vital importance and due diligence were exercised to align our safety management system in line with the one being followed by Lafarge plants world over during Integration Phase. Adopting safety best practices in all our activities has by now become our way of life aimed at achieving total safety and accident-free working at our plant.

To summarize in brief the various safety activities undertaken at Jojobera and also the significant improvements made in our plant's safety performance, taking the following measures:

- Unit is Certified against an International standard OHSAS:18001:1999 .
- Constituted Safety-first committees both at plant & deptt. levels in Dec. 99. These committees meet once a month and discuss the safety issues and review the progress made for execution of safety activities.
- Institutionalized the system of plant safety inspections jointly by the safety officer & area in-charges at pre-defined intervals and introduced safety checklist indicating hazard class of each inspection results.
- Safety audit-cum-training was conducted by Lafarge CTI (Centre Technique Inter-units), France every year. The recommendations made in his audit report for further improvement in our safety standards are implemented in phased manner.
- 25 employees (> 5% of total manpower deployed) were imparted training on “FIRST-AID TECHNIQUE” in July 2000 by St. John Ambulance Association and provided with personal first-aid kits & distinguished hard hats for better management of injuries,if any.
- Occupational Health services were strengthened. Personnel working in health hazardous areas,viz-high noise-level areas, dust & toxic fumes emanating areas, were identified and subjected to specialized medical examinations (Audiometry, Spirometry) to assess any adverse effects of their occupations on their general health. One of our doctors was sponsored to undergo 3 months’ diploma course in occupational health at CLI, Mumbai to further our efforts in this direction.
- On contractors’ workers front, we made it mandatory for all contractors; who require to bring their people inside the plant, to get them safety induction training before they are taken to work. All contractors being insisted to follow the safety standards for their employees at par with LAFARGE employees.
- In order to ensure safe execution of Project works, we have made a system of requiring the contractors to deploy a dedicated supervisor for each project site: who will only look after safety aspects and co-ordinate with Lafarge safety officer.
- We recorded 3.36 Million accident-free working hours in Plant.
- Safety performance are linked with KPI of individuals and it is a part of appraisal system for ensuring commitment from all concern.

Environment:

The following actions have been taken for effective control of major environmental aspects:

Air :

- Provision of 52 Nos. bagfilters in minor stacks and the transfer points in plant

The pollution auto control equipment's are always maintained in healthy condition and are run as an integral part of production process. As a result, the pollution levels are maintained well below the limits prescribed by the Pollution Control Board.

Water :

Water, the other important component of environment used for domestic purpose is released after satisfying its potability parameters. Satisfying all the requirements of Pollution Control Board, is completely used for watering the saplings.

Plantation:

A gesture shown in a small way towards protection of environment and nature care for coming generations, Jojobera Cement Plant has planted 35,000 saplings of different species of fast growing varieties were planted which have high survival rate.

DISPOSAL OF WASTES :

- Waste Oil Emulsions

All Waste oil emulsions generated in the plant are consumed internally by incineration in the HAG to save fuel as well as to maintain good practice of disposal of wastes within the premises.

Sonadih Cement Plant

Lafarge India Pvt Ltd.

Organization Profile : ENERGY MANAGEMENT AT SONADIH CEMENT PLANT

Unit Profile:

Lafarge India Pvt Ltd a subsidiary of Lafarge with its head quarters in Paris in France, which is leader in construction materials. It is spread in 75 countries with more than 85,000 employees and having a sales of 12.2 Billion Euro in 2000.

Lafarge has it leading positions in following divisions:

Division	World Ranking
Cement	No.1
Aggregates	No.3
Concrete	No.3
Roofing	No.1
Gypsum	No.4

The Sonadih Cement Plant, Lafarge India Pvt Limited (Formerly Sonadih Cement Works, a part of Cement Division, The Tata Iron and Steel Company Limited) was primarily set up with a view to utilize the Slag being generated as a waste from the Steel Works of Tata Iron and Steel Company, Jamshedpur. Currently the production capacity of plant is 1.0 Million Tonne per Annum clinker and 0.3 Million Tonne per annum of OPC.

70% of the Clinker produced at Sonadih is transported to Jamshedpur by Rail and Ground along with Slag to produce Portland Slag Cement (PSC). The plant has been set up with the primary objective of utilizing the waste product of Steel manufacturing slag, which was being thrown out in the past and was an environmental hazard.

As a part of expansion of Lafarge operations in South East Asian Markets, it has acquired Sonadih Cement Plant in November 1999.

The 1.0 Million MT per annum clinkerisation and 0.3 MTPA 43 grade OPC grinding unit at Sonadih incorporates the latest state of the art technology comprising a five stage preheater with in-line precalciner and Vertical Roller Mills for raw material and coal grinding. The cement grinding system consists of a ball mill attached to roller press and classifier in hybrid circuit. The plant employs latest concept in instrumentation, which is fully automatic and centralized process control for operating the equipment.

Energy Consumption:

Sonadih Cement Plant is committed for Energy conservation. The trends of energy consumptions figures as mentioned below:

Parameter	Unit	Year		
		2001	2002	2003
Cement Production	Lakh MT	8.64	12.83	10.21
Clinker Production	Lakh MT	4.22	4.16	4.66
Total Electrical Energy	Lakh kWh	717.75	942.93	787.68
Sp.Electrical Energy Consp Clinkerization	kWh/T-clk	61.29	60.00	59.78
Sp.Electrical Energy Consp Cement	kWh/T-cement	90.70	88.21	87.77
Sp Thermal Energy Consumption	Kcal/kg - clinker	730.387	720.71	721.11
(Net) Coal Consumption	MT	152468	234361	187996
Fuel Cost % of Manufacturing cost	%	19.46	22.57	22.69

Power Cost % of Manufacturing cost	%	36.57	36.46	36.80
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Energy conservation commitment, policy and set up:

Lafarge India is committed for conservation of energy and same is reflected in the formulation of Quality and Environmental Policies subjected to annual audits by external agencies. The energy consumptions in the plant is monitored in daily and reviewed under regular intervals. At the beginning of every calender year targets are fixed for both electrical and thermal energy consumptions. The same parameters are closely monitored by concern Section Incaharge as follows:

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Sonadih Cement Plant has the advantage of having access to global knowledge base for innovation and improvement plant performance in terms of Energy Conservation. A well defined system exists to ascertain at all levels. Performance audits are carried out by qualified professionals from CTI, Lafarge, Lyon and plants are suggested for performance improvements in the respective areas. Projects are drawn from the identified improvements and validated for the returns. Accordingly the action plans are drawn upto commissioning and performance study. There was a remarkable improvement in terms of specific power consumption after acquisition by Lafarge. It has reduced from 71.8 KWH/tonne of clinker in 1998-99 to 60.285 KWH/tonne in 2002-2003.

Energy Conservation Achievements:

As a result of implementation of Energy conservation measures there has been a steady decrease in Energy consumption over the period. The following measures have been taken:

- Selection of proper composition of Raw mix for suitable grindability and better burnability
- Optimization of Coal mix
- Monitoring of process parameters and false air leakage & optimization of process
- Replacement of table liner & roller tyres of Raw Mill and Coal Mill at optimum wear
- Elimination of dampers from DC drive fans
- Use of variable speed control fan & Belt Drives by v/f, Slip Power Recovery System (SPRS), Thyristor Control Devices for energy conservation.
- Replacement of refractory at optimum wears to avoid radiation losses.
- Uninterrupted Power Supply to plant by running main grid & DG Power grid in auto parallel control
- Raw Mill reject recirculation intermittent running
- Optimisation of Compressors
- Replacement of LJKS classifier with LV technology classifier in the Raw Mill

Energy saving Project in Year 2003:

- Otimization of Lighting enrgy conservation by replacing conventional light fittings with energy efficient light fittings. (Refer annexure – 1 for details)

Energy Saving Projects in Year 2002 .

- Raw mill table water spray control by using V/F drive.

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- Retrofitting of higher efficiency fan impeller for Raw Mill ESP fan.
- Re-routing of Blending Silo Top Bag Filter Duct.
- Addition of two packer spouts in Packing Machine.

Energy Saving Projects taken in Year 2001 .

- Optimization of Raw mill operation.
- Modification of Raw meal & Kiln feed transport system.
- Reduction of gas temperature passing through Pre-heater Fan.
- Upgradation of Clinker Cooler.
- Development of Clinker Loading from Cooler reject hopper i.e. before the storage the silo.
- Up-gradation of Deep pan Conveyor of Clinker transport.
- Reduction of ESP fan speed when Raw mill is not in operation.
- Modification of panel Conventional Indication System.
- Modification in Roller press for Energy Conservation.

Energy Conservation Plans and Targets:

The following measures have been planned for further reduction in specific energy consumption:

- Use of energy saving light fittings .
- Installing low watt loss tube lights
- Raw mix optimization.
- Use of Emulsion oil for fuel efficiency of heavy earth equipment.
- Cooler & Preheater modification for thermal energy & Electrical Energy Conversion.
- Low NOx conversion of DG sets for the conservation of fuel & Lub and Low Nox emission.
- Conversion of Product – Manufacture of PPC in place OPC.

Targets are mentioned at Section 20 (b) of questionnaire

Safety:

Safety has been an area of major concern in the day-to-day life of our plant since day one of acquisition, ie, Nov. 1, 1999. Safety was identified as one of the areas of vital importance and due diligence were exercised to align our safety management system in line with the one being followed by Lafarge plants world over during Integration Phase. Adopting safety best practices in all our activities has by now become our way of life aimed at achieving total safety and accident-free working at our plant.

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- 25 employees (> 5% of total manpower deployed) were imparted training on "FIRST-AID TECHNIQUE" in July 2000 by St. John Ambulance Association and provided with personal first-aid kits & distinguished hard hats for better management of injuries,if any.
- Occupational Health services were strengthened. Personnel working in health hazardous areas,viz-high noise-level areas, dust & toxic fumes emanating areas, were identified and subjected to specialized medical examinations (Audiometry, Spirometry) to assess any adverse effects of their occupations on their general health. One of our doctors was sponsored to undergo 3 months' diploma course in occupational health at CLI,Mumbai to further our efforts in this direction.
- On contractors' workers front, we made it mandatory for all contractors; who require to bring their people inside the plant, to get them safety induction training before they are taken to work. All contractors being insisted to follow the safety standards for their employees at par with LAFARGE employees.

- In order to ensure safe execution of Project works, we have made a system of requiring the contractors to deploy a dedicated supervisor for each project site: who will only look after safety aspects and co-ordinate with Lafarge safety officer.
- We recorded accident-free working in Mines and hope to maintain at Plant also.
- Safety performance are linked with KPI of individuals and it is a part of appraisal system for ensuring commitment from all concern.

Environment:

The following actions have been taken for effective control of major environmental aspects:

Air :

- Wet drilling in limestone mine
- Installation of continuous water spraying system on the haul road from Mine's Lime Stone Pit to Crusher plant
- Atomized water spray system at Limestone & Coal dump hoppers
- Provision of 3 Nos. ESP's in major stacks of plant
- Provision of 50 Nos. bagfilters in minor stacks and the transfer points in plant

The pollution auto control equipment's are always maintained in healthy condition and are run as an integral part of production process. As a result, the pollution levels are maintained well below the limits prescribed by the Pollution Control Board.

Water :

Water, the other important component of environment used for domestic purpose is released after satisfying its potability parameters. The domestic sewage generated is treated in Sewage Treatment Plant and crystal clear treated water, satisfying all the requirements of Pollution Control Board, is completely used for watering the saplings.

Plantation:

A gesture shown in a small way towards protection of environment and nature care for coming generations, Sonadih Cement Plant has planted 4.30 lakh saplings of different species of fast growing varieties were planted which have high survival rate. It is planned to plant 10,000 trees per annum for next five years.

DISPOSAL OF WASTES :

- Bio-degradable Waste

A waste dump bund was prepared for biodegradable wastes generated in the plant & mines and the same will be utilized as manure for plantation purpose.

- Waste Oil Emulsions

All Waste oil emulsions generated in the plant & mines are consumed internally by incineration in the kiln to save fuel as well as to maintain good practice of disposal of wastes within the premises.

Following innovative measures are taken in our plant for energy conservation :

A. ELECTRICAL SIDE :

i) Power Factor Improvement :

Installation of Capacitor Banks to improve power factor

ii) Lighting

- Automatic switching ON & OFF of Plant Lighting during day & night
- Fixing transparent sheetings wherever required
- Replacing 1000 watt Halogens by 400 W floodlight luminaries
- Replacing conventional chokes with electronic chokes

iii) Optimization of drives

- Reducing the installed kW of motor if load is less
- Replacing high RPM of motor with low RPM wherever high RPM is not required
- Reducing speed of drive by fixing suitable sizes of pulleys
- Installation of V/F control for controlling the speed.

B. OPERATION SIDE:

i) Increasing the Automation :

- Automatic start, stop of Compressors from control room according to the requirement of the plant
- Changing the required logic to reduce idle run time of equipments

ii) Upgradation of Equipments :

- Belt Bucket Elevator
- High efficiency impeller fans

iii) Saving of Compressed Air:

- Stopping the leakages
- Shut-Off gates in Compressed Air line for different sections

Note: With the commissioning of a particular project/measure, annual energy savings indicated in one year should not be shown again in the second or third year, as recurring energy saving.

Year of Commissioning	Project description	Achievement of energy savings per year basis					Total (Rs.lakhs)	Investment incurred on the project (Rs. Lakhs)
		Power	Fuels *					
		(Lakhs KWh)	Coal (tonnes)	F.Oil (KL)	Gas (lakhs m ³)	Total(fuel) in MkCal		
2001	Replacement of air lift by belt bucket elevator	13.043					48	98.66
	Sub Total	13.043					48	98.66
2002	Reduction in idle run of motor by reprogramming interlocks.	24.11					11.76	
	Installation of V/F control in 571 FN1 (ball mill vent fan).	12.05					29.40	2.5
	Reduction in RPM of fans by changing pulleys (571 FN2, 664 FN1, 665FN1).	9.64					47.04	0.75
	Automation of Process circuits	24.11					11.00	
	Optimization of drives	12.05					5.5	
	Optimization of compressed air						1.2	
	Improvement in cooling system of HT motors						2.75	
	Optimum utilization of water	6.03						
	Close circuiting of ball mill and removal of de-agglomerator and installation of V – separator.	48.22					160	503.00
	Automation of plant lighting	9.64					48	7.48
Improvement of plant power factor by installing capacitor banks.	4.82					86.4	20.0	

Year of Commissioning	Project description	Achievement of energy savings per year basis					Total (Rs.lakhs)	Investment incurred on the project (Rs. Lakhs)
		Power	Fuels *			Total(fuel) in MkCal		
		(Lakhs KWh)	Coal (tonnes)	F.Oil (KL)	Gas (lakhs m ³)			
2003	Computerization of Packing Plant CCR	2.41					12	15.42
	Sub Total	153.08					415.05	549.15
	Replacement of old dryers of the existing central compressor by refrigerant type dryer	5.18					7.2	14.64
	Installation of variable frequency drive control in bag filter fan 550FN4-Slag circuit De-dusting	2.5					7	3.62
	Installation of variable frequency drive control in bag filter fan 551FN4-Slag circuit De-dusting	2.3					7	4.16
	Installation of variable frequency drive control in bag filter fan 480FN1-Wagon tippler circuit De-dusting	2.36					9.2	7.38
	Sub Total	12.34					30.2	29.8
	Grand total of 3 years	178.463					493.25	677.61