

JSW CEMENT LIMITED

Kurnool (Andhra Pradesh)

Unit Profile

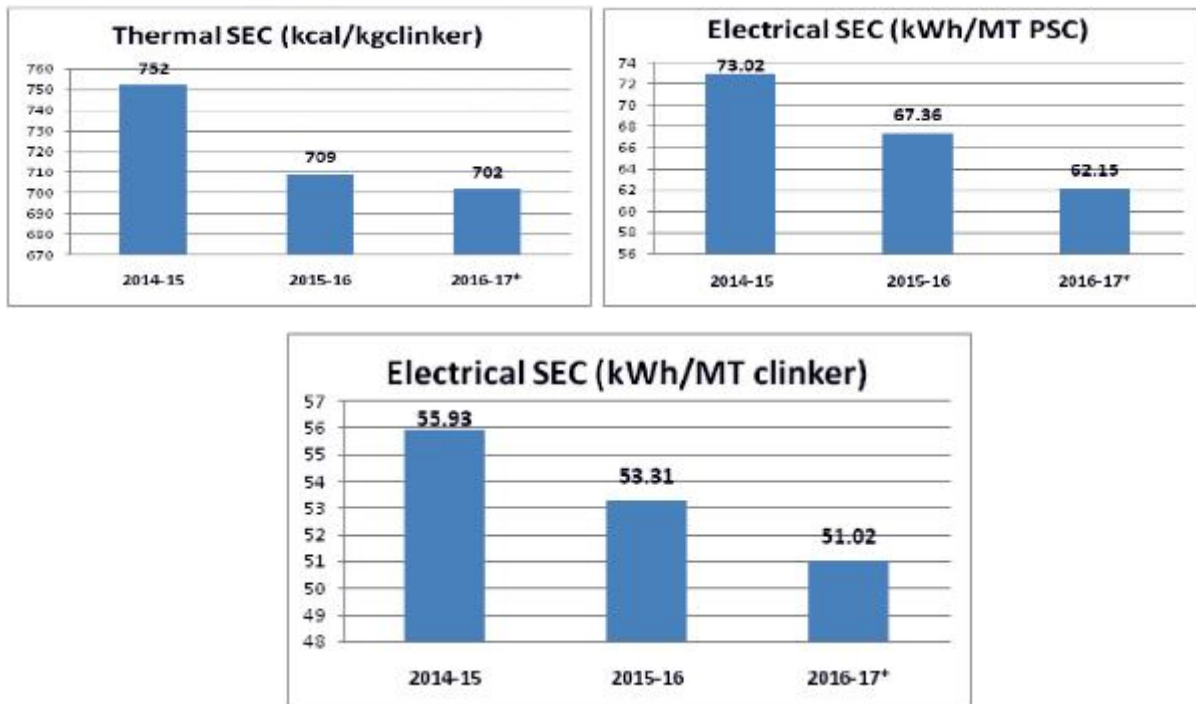
India, one of the fastest growing economies in the world, is witnessing an unprecedented growth in infrastructure. JSW Cement; believes that this growth needs to be sustainable and is consciously contributing to create a self-reliant India by manufacturing the building blocks of the Indian development story with its world-class cement.

JSW entered the cement market in 2009 with a vision to ensure a sustainable future for the country by producing eco-friendly cement, using industrial by-products such as slag. Its plants at Vijayanagar in Karnataka, Nandyal in Andhra Pradesh and Dolvi in Maharashtra utilize slag from the JSW Steel plants to produce green cement. By converting industrial by-product into a useful product, it has reduced the carbon footprint as well as ecological risk of industrial byproduct dumping. Though, JSW Cement is a relatively late entrant into the industry but with a capacity to produce over 7 million tons per year, it is fast becoming a force to reckon with.

Its flagship plant in Nandyal uses world-class technology (including the advanced Combi Finish Mode Roller Press Circuit and automated loading system) to manufacture cement. JSW Cement produces: Portland Slag Cement (PSC), Ordinary Portland Cement (OPC), and Ground Granulated Blast Furnace Slag (GGBS). JSW Cement has been delivering high-quality product to several prestigious and large infrastructural projects in the southern and western regions of the country.



Specific Energy Consumption Trend:



* 2016-17 figures up to Nov - 2016

Description of Energy Conservation Measures:

Various EnCon projects have been carried out to reduce specific energy consumption. The major projects are briefed below.

1. Cooler Modification:

Frequent snow man formation occurred and cooler recuperation efficiency was less than 57% which resulted high specific heat consumption. The unit has modified the static grate horse shoe along with modification of cooler guide rollers from combination rollers design to single roller arrangement and improved cooler loading. The unit has upgraded first four cooler fans. After this modification cooler recuperation efficiency improved to 66% and specific heat consumption reduced by 33 kcal/kg clinker & 4700 MT coal per annum

2. Operation of cement mill roller press in finish mode:

Cement mill roller press was operated along with ball mill in semi finish mode and consumed more power to grind OPC at higher blaine. The unit implemented many modifications to run the roller press in finish mode at higher blaine. The unit modified roller press feed chute, separator reject chute to V-separator, installed distribution box inside the roller press prebin, installed cake breaker beam at the roller press discharge. Now cement mill roller press is being operated at finish mode with 350 m2/kg OPC blaine and saved 18.97 lacs units/annum

3. Raw mill separator reject bin modification:

Frequent material flow problem occurred in separator reject bin to roller press which led to unstable roller press operation. Also 4 aeration blowers operated instead of 3 blowers to avoid material flow problem which did not solve the problem. So, we modified the dynamic separator reject bin by lifting 175mm and reduced the dead zone material above the airslide cloth which gives uniform material flow and improved roller press operation. One additional aeration blower operation also stopped and saved 1.89 lacs units/annum.

Major Energy Conservation Projects Carried Out During 2015-16:

Year of Commissioning of the projects	Project description	Achievement of Annual energy savings in 2015-16				Investment incurred on the project Rs. (Lakhs)
		Electricity (Lakh kWh)	Fuels*		Total savings (Rs. Lakhs)	
			Coal (tons)	Total fuel (MTOE)		
2015-2016	Cooler modification		4706	3134.67	293.98	47.50
	Pyro section false air arresting work	7.98	1426	1205.86	140.95	1.50
	Cement mill RP finish mode operation	18.97		608.56	123.31	10.00
	Modification of rawmill bagfilters discharge to final product airslide	3.78		121.26	24.57	1.60
	Installation of HT capacitor bank	3.22		103.30	20.93	8.50
	Rawmill separator reject bin modification	1.89		60.63	12.29	1.00
	Coal mill false air arresting work	1.78		57.10	11.57	0.8
	RM/Kiln Baghouse false air arresting work	1.73		55.50	11.25	1.10
	VFD installation for kiln feed bin aeration blower	0.53		17.00	3.45	5.00
	Raw mill separator reject pipe chute modification	0.31		9.94	2.02	5.00
	Coal mill reject chute pendulum flap installation	0.27		8.66	1.76	0.10
	Installation of LED lamps	0.26		8.34	1.69	5.00
	Total	40.72	6132	5390.82	647.75	87.10

PENNA CEMENT INDUSTRIES LIMITED
Ganeshpahad, Wadpally (Telangana)

Unit Profile

Penna Cement Industries Limited (PCIL) is one of the largest privately held cement companies in India, with an installed cement capacity of 7 Million Tonnes Per Annum.

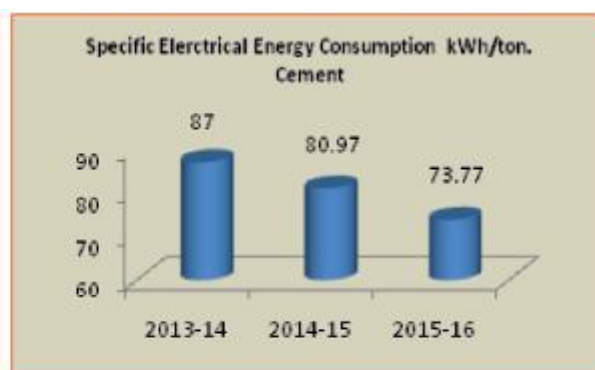
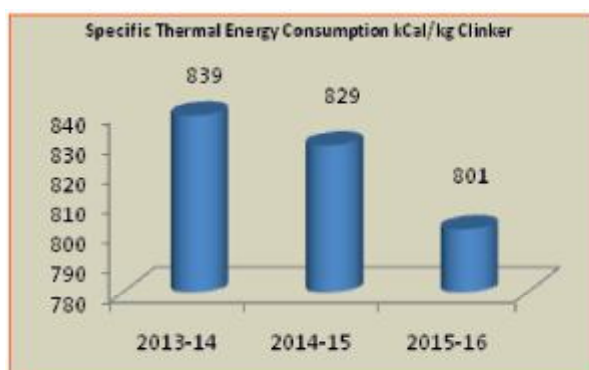
Founded in 1991, Penna Cement has established itself as one of the most trusted cement brands, with significant footprints in southern and western India. Over the last two decades, PCIL grown organically by developing in-house expertise and capabilities, across the entire value chain in the cement industry.

Ganeshpahad Cement Plant is the second cement manufacturing unit of PCIL & is located at Ganeshpahad village, Damarcherla Mandal of Nalgonda District in Telangana State. Established with an initial capacity of 0.8 MTPA in 2002, the capacity was increased over years, resulting in installed capacity of 1.24 MTPA. This has started in 2002 with capacities of Cement 1.24 MTPA & Clinker 1.0 MTPA and types of Cement produced are OPC, PPC & PSC.



Energy Consumption

Description	Unit	2014-15	2015-16
Total Thermal Energy Consumption (Fuel)	Million kCal	470736.53	557217.23
Specific Energy Consumption (Thermal)	kCal/kg Clinker	829.03	801.75
Total Electrical Consumption	Lakh kWh	564.45	613.77
Specific Energy Consumption (Electrical)	kWh/Ton of Cement	80.97	73.77



Energy Conservation Measures

1. Project : Waste Heat Recovery Power Plant at Ganeshphad cement plant

The Major Energy Conservation project is Waste heat recovery Power plant. In Cement Industry, generally fossil fuel (Coal and Pet coke) is used for firing the Rotary Kiln and Pre-Calculator for producing the Clinker from the raw meal. In this process, large quantities of hot flue gases are being vented out to the atmosphere. The sources of these waste flue gases are from the Pre-heater and Clinker Cooler. The heat energy available in these flue gases can be recovered effectively to produce significant amount of electricity.



Installed Waste Heat Recovery power plant - Ganeshpahad cement plant:

S. No.	Description	Unit	Value
1	Kiln Capacity	TPD	3100
2	Installed Waste Heat Recovery Plant Capacity	MW	7
3	Gross Generation Units	kWh	22072000
4	Consider Avg. Captive Power Plant Heat rate in Cement Sector	kCal/kWh	3208
5	Total Thermal Energy Required and same energy is saved by using WHR Power Plant (Gross Generation X Heat Rate)	Million Kcal	70806.98
6	Avg. GCV Considered for Coal	Kcal/kg	5387.8
7	Equivalent Coal Savings through WHR Power Plant	Tonnes	13142.09
8	Total Project Investment	Rs. Lakhs	6522
9	Power generation Cost per Unit	Rs.	0.5
10	Total Amount Saved @ Rs.5.65/kWh	Rs. Lakhs	1247.068
11	Savings in TOE	TOE	7080.7

Other ENCON Initiatives

1. Optimization of Compressed air:

Compressed air line leakages are arrested, Replaced the faulty solenoid valves and hose pipes and reduced the usage of Compressed to for cleaning purpose.

Annual Savings: 1.78 Lakhs

Monetary Savings: Rs. 10.0 Lakhs

Investment: Rs. 3.0 Lakhs

2. Optimize the blower operation:

The existing pulley has been replaced to Optimum size pulley as per operation requirement

Annual Savings: 0.30 Lakhs KWh

Monetary Savings: Rs. 1.69 Lakhs

Investment: Rs. 0.30 Lakhs

3. Speed reduction to bagfilter fans:

A Pulley driven system had been installed for Tertiary crusher bag filter fan to reduce the speed of the fan.

Annual Savings: 0.30 Lakhs Kwh
Monetary Savings: Rs. 1.66 Lakhs
Investment: Rs. 0.30 Lakhs

Energy Policy

- PENNA CEMENT INDUSTRIES LTD is committed to all applicable legislation and other requirements related to Energy Management System. We are committed to improve energy efficiency as a continuous improvement process in all our business processes and ensuring the availability of information and resources to meet the energy objectives and targets.
- We are committed to incorporate energy efficiency as a key component for new equipment, major innovation, new design and to promote energy saving awareness to our staff and stake holders.

**OCL INDIA LTD
BENGAL CEMENT WORK
Dist. Paschim Midnapore (West Bengal)**

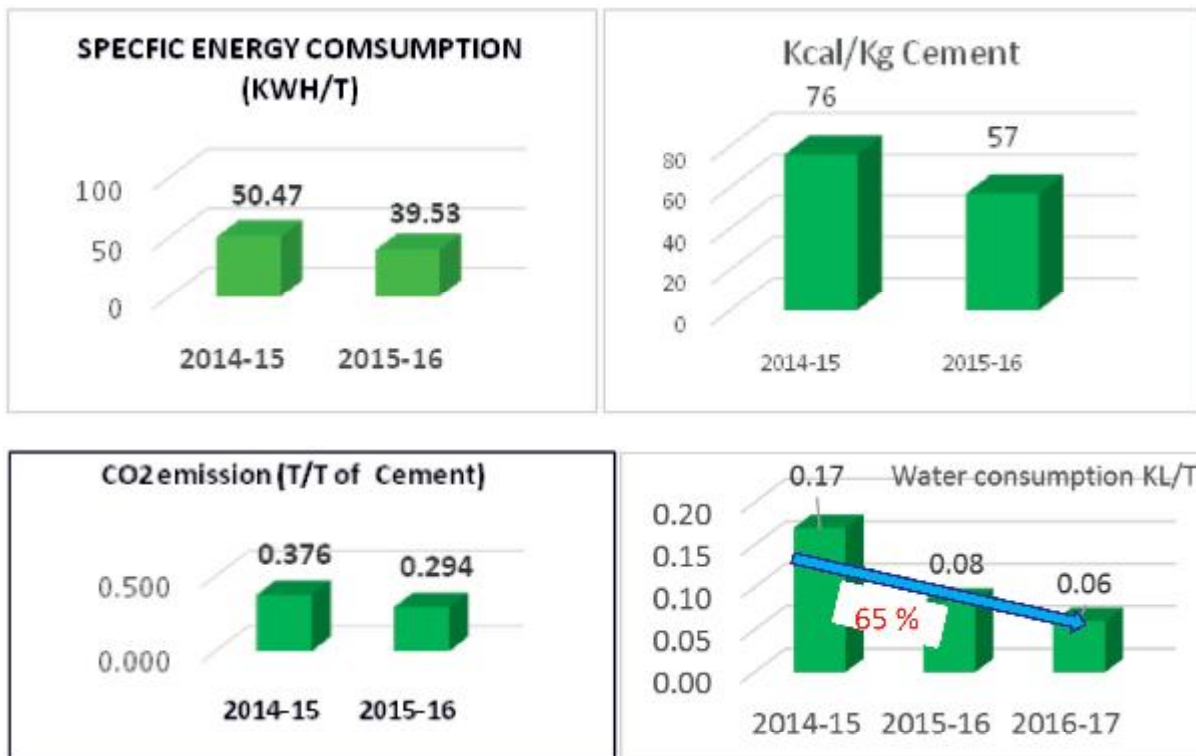
Unit Profile

OCL INDIA LIMITED, formerly named as "Orissa Cement Limited" and known as "OCL" was established in the year 1949, which started producing cement through wet process technology under the brand name of "Konark", is a part of the Dalmia Bharat group . In the east part of India, with more than 60 years of presence & capacity of 6.7 MTPA ,OCL Ind Ltd is now leaping into leadership position

OCL India Limited Bengal Cement Works is operating a 1.35 MTPA capacity Cement Grinding unit (VRM based) at village: Kulapachuria, P.S. Salboni, Dist.: Paschim Medinipur in West Bengal which was commissioned on 27th March 2014. (EC issued vide letter no : EN/1982/T-II-1/138/2007 dated 27th July, 2009).



Specific Energy Consumption



Major Electrical / Thermal Energy Saving Projects:

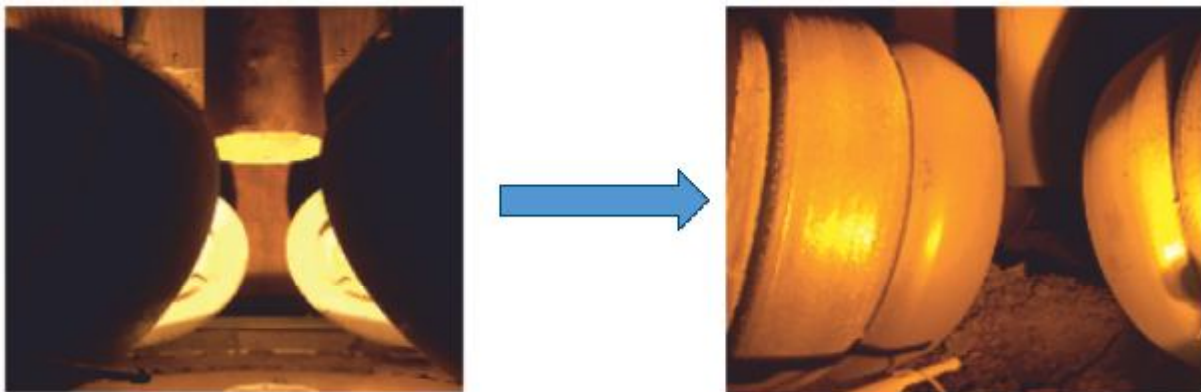
Throughout the year 2015-16, The energy committee of OCL BCW has brainstormed & executed many major energy saving projects. The projects are mostly of without investment. The project with investments are also considered in such a manner that the payback period comes out of less than 1.5 year. Key projects are:

SN	Energy saving actions	Year	Annual Lakh KWH Saving	Annual INR saving (Lakh)
1	Optimization of CVRM dam ring height & internal air circulation	2015-16	21	138.6
2	Minimization of compressed air power consumption by several process optimization activities.	2015-16	4.28	28.25
3	Power saving by minimization of idle running of many equipments through brainstorming of energy committee members	2015-16	0.91	6.02
4	RFID system installation to increase packing plant through put	2015-16	2.02	13.33
5	Power factor improvement by installing 1500 KVAR HT capacitor	2015-16	5	33
6	VFD installation at packing plant bag filter fan & HAG fuel firing burner	2015-16	1.6	10.56
7	Hag optimisation & capacity utilisation to reduce F.oil & coal consumption	2015-16		123.33
TOTAL			34.81	353.09

Details of Projects Executed:

Project 1: Optimization of CVRM damring height & internal air circulation:

- **Objective** : To reduce mill drive SPC at desired output & fineness of product
- ✓ **Action taken** :
 - As Mill reject was observed very less , it was evident that mill table material retention is higher. So from existing dam ring height 192 mm , gradual reduction of height is executed.
 - The reject feeding chute is also enlarged for central and uniform distribution to all rollers.
 - The air circulation is optimized by providing angular channel guard to avoid air profile below rollers
 - Under systematic tracking & inspection of energy committee & process department, 150 mm dam ring height is found optimum for maximum output with safe vibration.
- ✓ **Benefits:**
 - Around 30 TPH enhancement of output
 - Power saving of 400 KW/Hr
 - Energy cost savings: 138 Lakh.
 - SEC (kwh/T) saving : 2.8

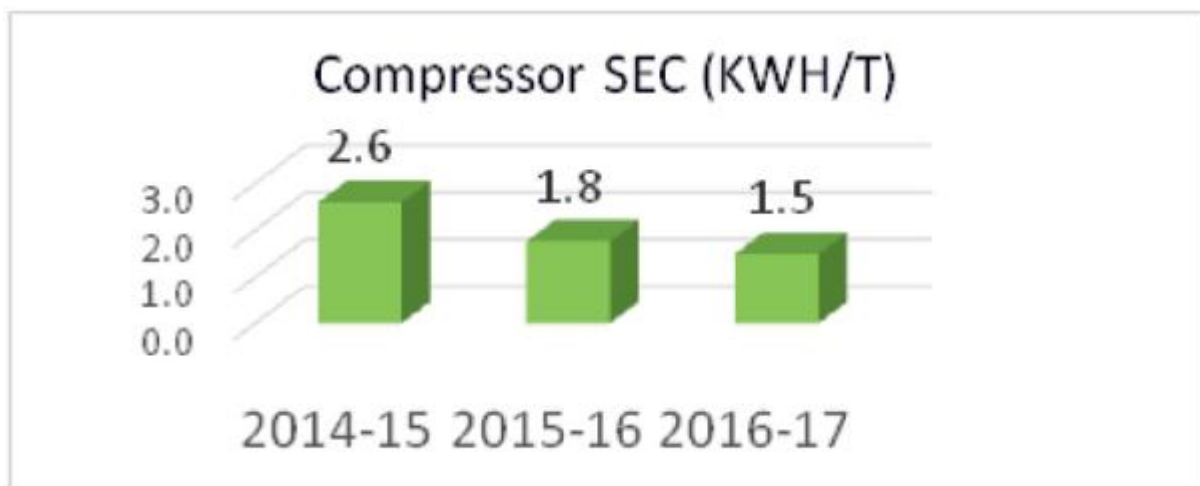
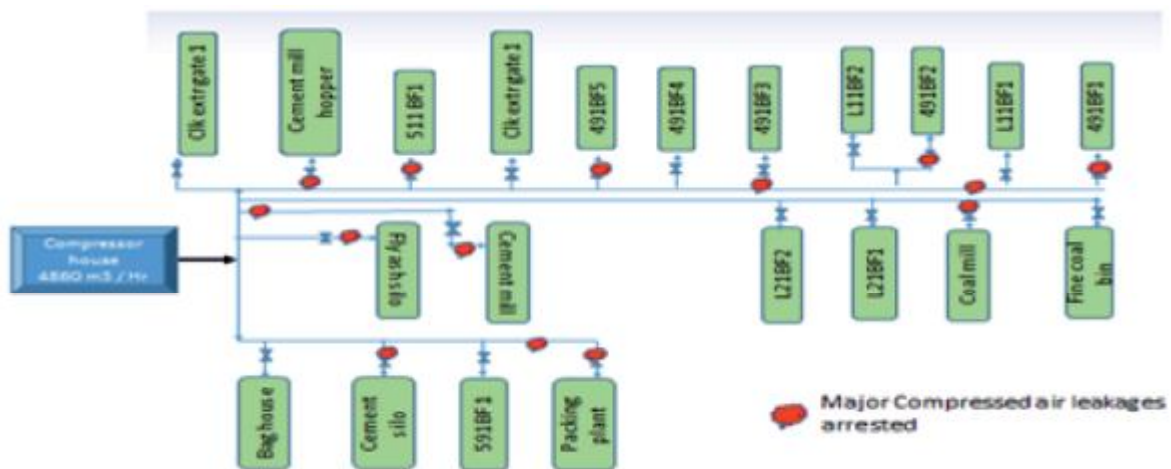


Project 2: Minimization of compressed air power consumption by several process optimization activities.

- ❖ **Objective** : The compressed air power for the plant was assessed very high (7000 KWH/day) by energy committee. Main objective of the project was to save compressor energy by all possible actions.

✓ **Action taken :**

- The CVRM bag house compressed air purging is modified to DP mode from timer mode . On an avg of 40 KW/hr is saved by this action. .
- As the air demand of the packing plant compressor is low, the initially installed 160 KW compressor is replaced by another 90 KW compressor to save the unload/idle run power consumption . Around 42 Kw/Hr is saved .
- Other nuisance bag filters are also modified from timer mode to DP mode purging.
- Several compressed air leakages are arrested through out circuit by performing compressed air leakage audit



Project 3: Power saving by minimization of idle running of several equipment

- ❖ **Objective :** To avoid idle running of equipment throughout the entire plant circuit by elimination or interlock modifications

✓ **Action taken :**

- Analysis of run hrs. of all equipment's section wise by energy cell & study of start/ stop interlocks .
- Modification of many interlocks for major belt conveyors
- Starvation switch installation at raw material handling circuits.
- Reduction of WTP cooling tower fan power consumption by interlock with temperature sensor
- Stopping of raw material handling circuit bag filters in case of high moisture slag, gypsum transport in rainy season
- optimum running of coal crusher as per received materials size analysis

✓ **Benefits :**

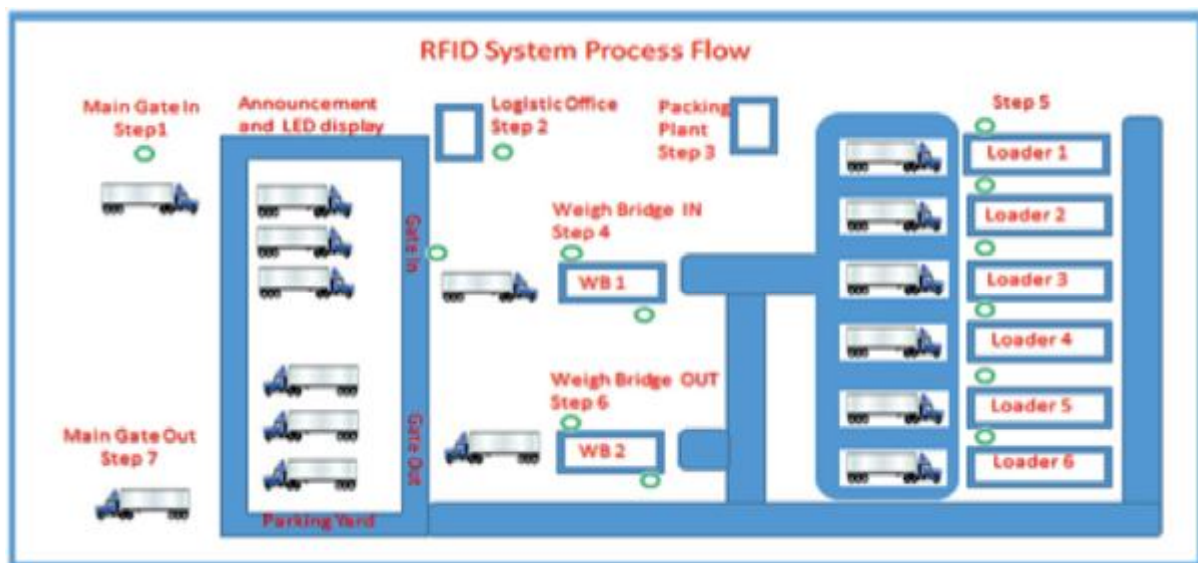
- Energy saved : 91350 KWH in FY 2015-16
- SEC Saved : 0.15 KWH/T

Project 4: RFID system installation to increase packing plant through put

- ❖ **Objective :** To reduce turnaround time of vehicles & increase packing plant efficiency

✓ **Benefits :**

- Real time monitoring of loaded & empty vehicle movement
- Man less weighbridge operation
- Auto MRP command for cement bags
- Auto cement bag counting
- Integration with SAP
- UHF card system implementation



RFID benefits (Plant in to Plant out hours v/s Despatch (KT))



Total investment: 25 Lakh

First year energy cost savings: 13.3 Lakh

Project 5: **VFD installation at packing plant bag filter fan & HAG fuel firing Burner**

❖ **Objective :** Power consumption reduction at identified fans by installation of VFD

✓ **Action taken :**

- Detailed study & measurement of dust collector flow (m³/Hr) requirement VS actual to find out excess fan energy consumption due to damper operation.
- Saving estimation & payback analysis for VFD installation
- Procurement & installation of VFD at 5 nos of fans (2X 37 KW & 2X 75 KW, 1x 110 KW)

✓ **Benefits :**

- Power saving of 20 KW/ Hr
- SEC savings : 0.1 KWH/T
- Total saving in 2015-16 : 160000 KWH
- Payback period : 1.25 years.(packing plant)& 2 months (HAG blower)
- Investment : 1.72 MINR
- Savings: 10.56 Lakh



Project 7: **Hag optimization & capacity utilization to reduce F.oil & coal Consumption**

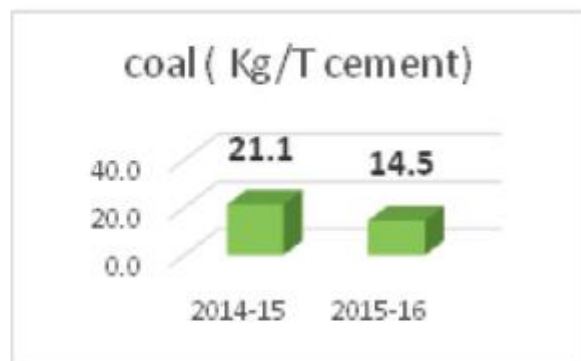
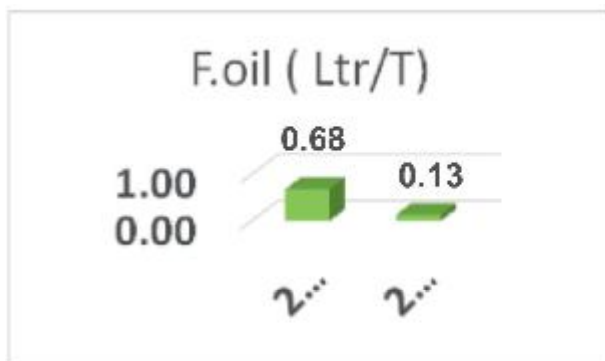
❖ **Objective :** To reduce F.Oil & coal consumption

✓ **Action taken :**

- Capacity utilization (100%) within first full financial year of operation after commissioning.
- Wind box air optimization by proper combination of dilution & combustion air optimization.
- HAG lightup hour & oil feeding reduction by adhering to process optimized SOP.

✓ **Benefits:**

- 25% specific thermal energy (Kcal/Kg ceent)reduction.
- MTOE reduction by 1349 units



DALMIA CEMENT EAST LIMITED
Bokaro (Jharkhand)

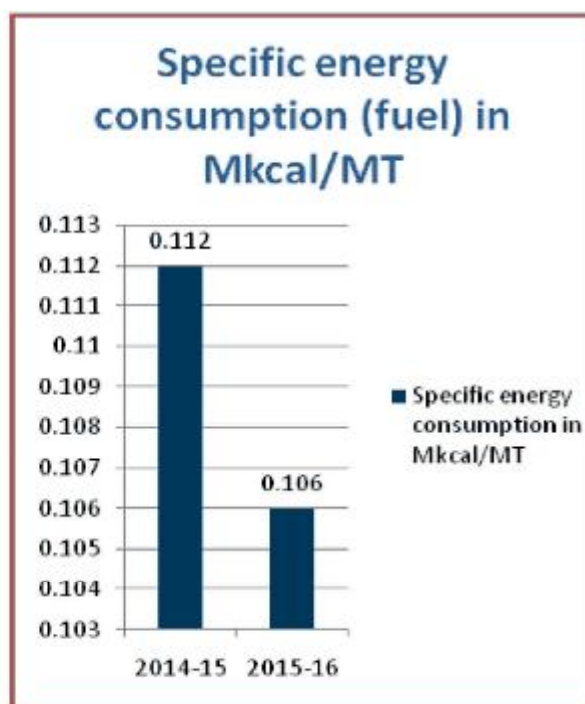
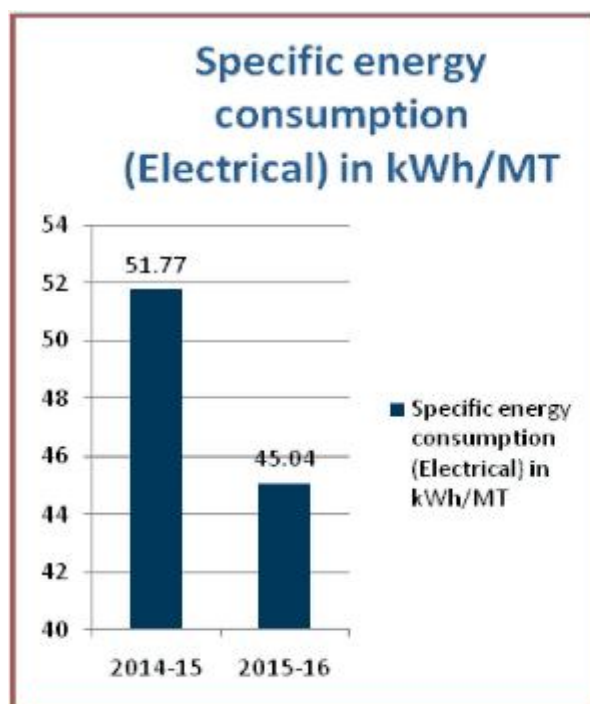
Unit Profile

Dalmia Cement East Ltd, Bokaro (formerly known as Bokaro Jaypee Cement) is having 2.1 MTPA capacity and is known for best in PSC quality. This entity is also having one of the lowest grinding powers amongst Slag cement producing company (within the enterprise). Dalmia Bharat Limited (DBL) is one of the key cement player in India and a leader in cement manufacturing since 1939. The Company is well respected for its project execution capabilities and is a multi-spectrum player with double digit market share in its primary markets. The Group now has augmented its presence and gained greater traction in its effort to acquire a pan India footprint with total installed capacity of 25 MTPA.



Energy Conservation and Production

DESCRIPTION	UNIT	FY 2014-15	FY 2015-16
Annual Production	MT	932385	1416804
Total electrical energy consumption/ annum	MkWh	48272	63819
Specific energy consumption (electrical)	kWh/MT	51.77	45.04
Total Thermal energy consumption	Mkcal	104649	150888
Specific energy consumption (fuel)	MKcal/MT	0.112	0.106



Energy Conservation Measures Implemented

Various projects were undertaken to reduce specific power consumption in Cement Grinding unit. The major projects are listed below:-

Project 1: SPRS installation for both Cement Mills’ ID Fan led to saving of 11.8 lakh measured kWh of electricity. Previously both ID Fan were running (at 90% approx.) in GRR mode due to which power loss was taking place. By installing SPRS the power which was getting lost through GRR mode, was recovered through SPRS.

Project 2: Both Cement Mills’ dam ring height was reduced gradually from 140mm to 95mm. This led to reduction in bed height and subsequent reduction of Main drive load. Consequently, 18.41 lakh kWh of electricity was saved.

Project 3: Optimization of ID fan speed, reduction in Raw-material moisture (i.e Slag) and arresting of system false air led to saving of 41.78 lakh kWh of electricity. ID Fan speed was reduced from 88% to 80% by optimizing the nozzle ring velocity of Cement Mill. Slag moisture was reduced from 15% to 12% by properly managing the feeding yard. False air were checked and arrested and was brought down to 16% from 20%.

Project 4: Reduction in Utility power by optimum loading of Plant equipment and by logic optimization led to saving of 14.84 lakh kWh of electricity. Compressor running was also optimized via making a common header.

Project 5: Reduction in fuel consumption was achieved by arresting system false air, feeding of low moisture raw material into the system and by using high grade coal. Also, same was achieved by continuous running of plant for longer period through reduction in unplanned stoppages. In FY15-16 specific energy consumption (fuel) was brought down to 0.106 Mkcal/MT from 0.112MKcal/MT of FY14-15.

Major Energy Conservation Initiates taken in FY 2015-16

S. No.	Project Description	Total saved Electricity (kWh in Lakhs)	Total savings (Rs. Lakhs) @Rs 5kWh	Investment incurred on the project Rs. (Lakhs)
1	SPRS installation at Mill -1 ID fan	7.71	38.58	70
2	SPRS installation at both Mill-2ID fan	4.09	20.47	70
3	Lighting transformer installed for plant lighting to save power	0.18	0.9	4

4	Both mills dam ring height optimized so mill power consumption reduced	18.41	92.05	Nil
5	Optimization of bag house fan speed	28.33	141.65	Nil
6	Slag moisture reduced	9.91	49.58	Nil
7	False air reduction	3.54	17.71	Nil
8	GRR Fan power saving after SPRS Commissioning	0.637	3.18	Nil
9	Optimisation of auxillary drives	7.7	38.5	Nil
10	Reduction of utility power & losses reduction due to optimum loading of plant equipment as well as logic optimization	14.84	74.23	Nil

Energy Policy:

WE, AT DALMIA CEMENT EAST LIMITED, ARE COMMITTED TO CONTINUALLY IMPROVE SUSTAINABLE ENERGY PERFORMANCE IN ALL OUR ACTIVITIES, PRODUCTS AND SERVICE SO AS TO REDUCE GREEN HOUSE GAS EMISSIONS RESULTING FROM CONSUMPTION OF ENERGY.

To accomplish this, we shall:

- ❖ Identify areas for improvement through internal and or external energy audits and take measures to improve specific energy consumption.
- ❖ Monitor and control consumption of various forms of energy through energy management system.
- ❖ Adopt energy efficient technology in new project(s).
- ❖ Promote energy conservation awareness amongst stake holders to nurture and sustain energy efficient practices.

DALMIA CEMENT EAST LIMITED
1ST April 2015

(Mukesh Kumar Garg)
Assistant Executive Director