

Energy Conservation Measures at Binani Cement

Introduction

First of all On behalf of Binani Cement Ltd & also personally, I am thankful to Bureau of energy efficiency for organising Cement Sector Task force programme on energy conservation. We are also thankful to the Management of M/S Shree cement for making necessary arrangements. I am confident this programme will help the industry in general for setting-up new targets & encourage for accepting new challenges in the field of energy conservation.

Planning of setting-up a Cement plant in Binani group started in 93/94 & Civil excavation work was started in 95 for setting-up 1.4 MT cement plant. After installation of different equipment plant was commissioned in 1997 ahead of schedule. Right from inception of plant it was made a principle that equipment selection, operation & maintenance of the plant should be carried-out based on best engineering practices, energy efficient & environment friendly with no compromise in the quality of final product. I am proud to inform that since inception there is no compromise in basic philosophy along with the commitment for future to adhere to basics. With the help of these guiding factors we have not only improved our performance in energy consumption but also increased our production. Details of the same are as given under.

Year	1998-99	1999-2000	2000-01	2001-02	2002-03 (April 02 to Aug 02)
Production in tons (Clinker)	1303670	1528230	1715053	1816335	761150
Production in tons (Cement)	1400138	1650288	1821713	1921087	866148
Kwh/of Cement	93.63	84.54	80.07	79.63	78.42
Kcal/kg of clinker	737	714	706	701	698

This involved continuous monitoring of equipment parameters both from process & engineering point of view for increasing the output & bringing down the energy consumption for overall optimization of the plant. Also to keep pace with the developments taking place internationally HRD activities are regular process in the plant. This has not only drastically improved the knowledge, skills & analytical ability of Binani cement team but also helped in bringing in new ideas which leads the way for modifications, adoption of latest developments in engineering & technology for overall improvement in efficiency of the plant & improvement in work-culture. Team of Binani Cement Ltd is committed not only to continue the practices but also improve further where-ever gaps are found.

To demonstrate the strength of existing systems plant has obtained ISO certification from KPMG for QMS & EMS. Plant is also awarded by NCBM & Ministry of industry in the field of energy conservation.

Here are results of some of the modifications, which are a part of list of measures taken to reduce the energy consumption. Details of the same are given in the paper.

TECHNOLOGY INNOVATION MEASURES UNDERTAKEN IN THE PLANT

Year	Technology Innovation undertaken	Saving achieved in		Investment (Rs. In Lacs)
		Energy value (Kwh/Ton of Cement)	Rs Lacs/year	
1998-99	Aeration system of Cement Silos changed to open type air slides and made controlled by Solenoid Valves operating in sequence	0.032	1.53	26.5
1999-2000	Primary Air Fan Speed controlled by V/F Panel instead of fan damper	0.062	3.52	5.5
-do-	SPRS Provided for Cooler Vent Fan	0.125	7.10	6.0
-do-	Energy Saving panels provided in all load centers	0.01	0.57	2.1
-do-	F.R.P. blades Impeller provided in all Shell Cooling Fans in place of C. J. Blades impeller	0.05	2.84	1.82
2000-2001	Water spray System installed for cooling Preheater Exhaust Gases (Cooling of gases by 50 Deg.C.) to enhance production rate	0.62	38.74	43.5
2001-2002	Installation of Pulse blocking controller in Power Plant ESP Rectifier panel	0.2	10.73	3.30
-do-	Installation of Pulse blocking controller in Cooler ESP Rectifier panel	0.05	2.07	3.01
-do-	Reduction of down time of the packer nozzle by replacing hardware system with PLC thereby improving cement dispatch	0.07	4.13	4.50
-do-	Reduction of fan speed by use of slipring motor in place of damper control in packing plant	0.02	0.95	1.0
-do-	Use of FRP impellers in place of casted Aluminium impellers in HT motors cooling circuit blowers	0.05	3.18	1.7

IN HOUSE R&D MEASURES UNDERTAKEN IN THE PLANT

Year	In House R&D efforts undertaken	Saving achieved in		Investment (Rs. Lacs)
		Energy Value (kWh/ton of Cement)	Rs. Lacs per Year	
1999-2000	Dust concentration at Mill Outlet has been increased from 584 to 684 gms/m ³ by optimising the amount of air through Mill.	0.5	28.38	NIL
-do-	Mill feed rate and grinding pressure has been optimised at 409 TPH and 155 bar, which resulted in the saving of main motor power	0.5	28.38	NIL
-do-	Operation of Jet Pulse Filter was done on DP basis	0.02	1.14	NIL
-do-	In Raw mill material feeding system reversible belt conveyor was replaced with modified chute	0.02	1.14	0.85
-do-	Pulley diameter of coal firing FK pump blowers reduced	0.03	1.70	0.2
-do-	Optimisation of grinding media & increasing the circulation factor of mill resulted in the increase of throughput	1.00	56.77	NIL
-do-	Isolation of One JPF from cement transport group of CMI & CM2	0.05	2.84	0.37
2000-2001	Button Welding practice adopted for roller/table to enhance the production and stability of the mill	0.11	7.00	0.2
-do-	In Cement Mills Intermediate Diaphragm shifted by 1.25 Mtrs. towards Mills Inlet	1.0	62.48	10.0
-do-	Removal of Fan Damper and Venturi from Raw Mill Circuit (Pressure Drop reduced by 40 mmWG)	0.27	16.80	0.4
-do-	Raw Mill Dam Ring Height reduced from 170 mm. to 153 mm.	0.23	14.10	NIL
-do-	Removal of Cooler Fans Damper (Pressure Drop reduced by 50 mmWG)	0.39	24.30	NIL

-do- 2001-2002	In Coal Mill Cyclone, Dip Tube height reduced by 1 Mtr	0.04	2.20	0.08
	Use of roots blower air in place of 2.5 kg/cm ² pressure compressed air for Cement silo aeration	0.10	6.05	3.37
-do-	In Packing plant JPF Fan's motor replaced from 90 KW, 1500 RPM with 37 KW, 1000 RPM & accordingly vent volume optimised	0.12	7.26	0.4
-do-	Elimination of one no. cooling tower fan (14.5 KW) by auto temp. control	0.02	1.35	NIL
-do-	Reduction of the compressed air consumption of the Packing plant bag filter by installing DP based purging system	0.02	1.38	0.50
-do-	Conversion from delta to star for underloaded motors	0.02	1.38	NIL
-do-	Power factor control scheme	--	27.00	0.37
-do-	Replacement of rotary feeder in packing plant by rotary stop valve	0.008	0.54	3.50
-do-	Replacement of blowers of over capacity in air slides from Cement Silos to Packing plant	0.040	2.84	1.40

ANNEXURE 2

ENERGY EFFICIENCY IMPROVEMENT

Year of Commissioning – 1997	Project Description	Achievement of energy saving par year basis			Total (Rs. Lakhs)	Investment Incurred on the project (Rs.Lakhs)
		Power	Fuels			
		Lakhs (Kwh)	Coal (Tons)	Total (Fuel) In Mkal.		
1999-2000	Primary Air Temperature increased from 40 Deg. C to 200 Deg. C by taking Hot Air from Cooler ESP Stack	0.092	477.1	3056.5	11.06	3.01
-do-	Coal transport air reduced in Kiln/Calciner firing circuit.	0.069	357.8	2292.3	8.30	0.06
-do-	Preheater exit temperature reduced from 301 Deg. C. to 295 Deg. C. (average) resulting in reduction of heat losses	0.124	644.1	4126.2	15.15	NIL
2000-2001	Kiln inlet & outlet seal repaired/replaced which resulted in the reduction of false air entry into the system	0.239	1236.4	8112.2	34.38	10
-do-	Percent production increased by cooling down the gases of preheater downcomer by installing water spray system & subsequently thermal energy reduction	0.157	813.0	5333.8	22.6	43.5
-do-	Optimise the size of reject plant screen & subsequently Silica sand addition decreased from 1.68% to 0.86%, resulting in better burnability of the raw meal	0.152	784.2	5145.2	21.81	NIL
2001-2002	T.A Duct dia increased from 2.65 to 3.0 mtrs					
-do-	Kiln outlet cone replaced with straight piece					
-do-	Impeller of both Kiln & Calciner Smoke Gas Fan changed for more gas volume handling	--	2540.0	1524.0	1033.0	1950.0
-do-	Calciner height increased by 6.5 mtr					

Benefits from modification			
S.No.	Equipment	Modification	Benefits
1	Cement Mill	Boltless liners used in place of bolted liners in first chamber	more life reduction in slippage of grinding media
2	Kiln feed bucket elevator	Speed increased from 1.77 m/s to 2m/s keeping motor and gearbox same	TPH capacity increased from 380 to 420
3	Cement recirculation bucket elevator	Speed increased from 1.45 m/s to 1.67 m/s keeping motor and gearbox same also height reduced from 16.75 m to 15.5 m	TPH capacity increased from 370 to 400
4	Cement silo feed elevator	Height reduced from 56.2 m to 53.2 m	Marginal saving in power
5	Phylite crusher	Speed reduced from 600 rpm to 476 rpm	1.3 Kw power saved
6	Gypsum crusher	Speed reduced to 70%	Marginal saving in power
7	Hammer crusher	Speed reduced to 95%	Marginal saving in power
8	Air conditioning (4.33 tons x 8 units)	Idle running during after office hours avoided by timer controlled circuit	400 Kwh saving per day

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Sr. Vice President, Binani Cement Ltd,
IIPEC Programme on
22nd September 2002 at
M/s Shree Cement, Beawar