BRIEF WRITE UP ON BOKARO STEEL PLANT

COMPANY PROFILE

Bokaro Steel Plant (BSL), is the symbol of country's efforts towards augmentation of steel production & indigenisation. It has made definite contribution to the economy of our country. Agreement was signed with USSR on 25th Jan. 1965 for establishing a 1.7 MT capacity steel plant at Bokaro to be expanded later to 4.0 MT capacity. Over the years, BSL has grown in strength reaching increased levels of production and quality.

Bokaro Steel Plant is an integrated Steel Plant which incorporates all the classical features of Iron & Steel making from Coke Ovens to Cold rolling Mills.

With a saleable steel production capacity of 3.78 million tones, the plant has been modernized with continuous casting facilities and a state-of-the-art Hot strip mill for producing quality steels of international standards. A range of special steel products like DMR 249A, E-460/500/550, IS-8500 Fe540B, SAILCOR, SAILPROP, SAILMEDSi, SAILRIM, API grade steel, HRNO, SAILMA, WTCR, BSL-46 for auto sector etc. have been introduced after modernization. All the units of the plant from steel making to the finished product are accredited to ISO:9002 QMS standard.

ENERGY CONSUMPTION

In the present scenario of global cost competitiveness in steel industry the challenge can be met by finding solutions to reduce energy consumption, which is one of the major cost factor. Energy consumption has reduced to an appreciable level of 7.094 Gcal/tcs in 2006-07 mainly through optimization and improvement in existing processes & equipment as well as introduction of new technologies. To achieve the international levels of energy consumption ie 4.5 to 5.5 Gcal/tcs attained by developed countries continuous efforts are made in this direction.

The basic energy input (purchased) to the steel plant are

- ✧ Coking coal (both low ash imported coal and indigenous coal) for producing coke in Coke Oven.
- ✧ Blast Furnace grade coke purchased to supplement shortage of BF coke generated in Coke Oven.
- ✧ Imported low ash non coking coal for injection in Blast furnace
- ✧ Power purchased from DVC and BPSCL.
- ✧ Steam purchased from BPSCL (both HP & LP) to meet requirement at various process.
- ✧ Diesel for mobile equipments, locos etc.

The basic energy input (purchased) to the steel plant and their contribution to energy bill with respect to cost of production is given in following table.

SN	Parameters	Unit	04-05	05-06	06-07
1.0	Consumption of basic energy				
1.1	Metallurgical coal.	Kg/T of crude steel	962.6	922.7	938.1
1.2	Coal for injection in Blast furnace	Kg/T of hot metal	9.6	7.3	8.7
1.4	Purchase Power	Kwh/T of crude steel	435.4	415.3	424.7
1.6	Total Energy Bill.	Rs. in crores	2423.08		
2.0	Total Manufacturing cost	- do -	5469.71		
3.0	***Contribution of Energy bill over production cost .***	***%***	***44.3***		

There has been an astronomical rise in the price of inputs . To circumvent this adverse situation, technologies need to be adopted like fuel injections & other energy reducing measures like waste heat utilization systems etc.

ENERGY CONSERVATION COMMITMENT , POLICY & SET UP

Energy Conservation is continuous and on-going process. It has been a top management priority since last two decades.

The structured approach to achieve Excellence in Energy Conservation and management is based on

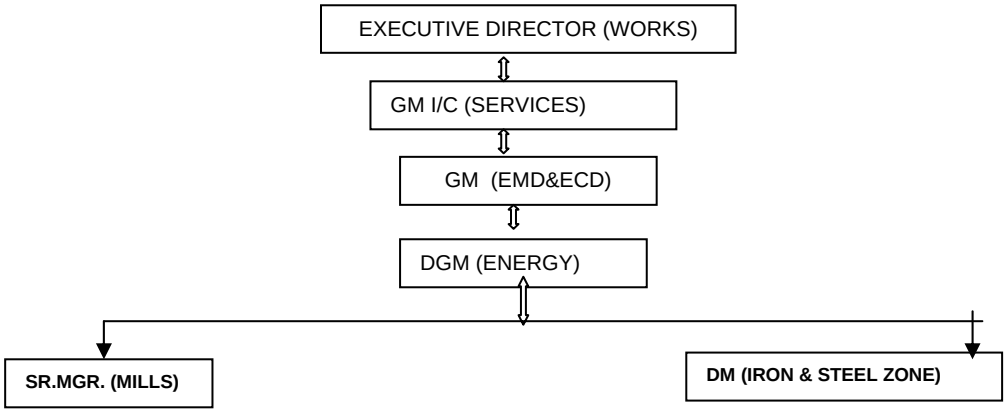
- Technological change to adopt energy efficient process
- Retrofitting and modification of existing process to make it more efficient.
- Minimize noise level through improved house keeping.
- Monitoring shop wise energy parameters at micro and macro level.

Bokaro Steel has established a well organized Energy Management Department since inception for sustained and systematic approach towards efficient utilization of energy.

A separate energy conservation cell comprising 4 executives, 21 skilled and 08 semi skilled workers is operating under Energy Management department for monitoring and controlling all energy parameters in close association with all units of the plant.

The energy cell is headed by Assist. General Manager exclusively for monitoring energy consumption of the plant.

The structure of the energy cell is given below.



Energy schemes completed in 2006-07

1. **COKE OVEN**

- Dry gunniting in 238 ovens to plug cross leakages and increase CO gas yield.
- Hydrojet cleaning of oven doors @ 200 nos ovens /day
- Use of steam in place of power driven exhauster.
- Movement of pusher car is optimized by 5-2 series charging in battery no. 6 & 7.

2. **SINTERING PLANT**

- Stopping of hammer crushers during idle hours.
- Front hearth beam of machine 3 changed to reduce specific heat consm.

3. **BLAST FURNACES**

- Use of mixed gas in stove heating and increase of blast temperature upto 1000 C.
- Increase of surface area of stove checker work by Hoogoven type design in stove 1 of BF 4 and stove 2 & 3 of Blast furnace no 3.

4. SLABBING MILL

- Complete cleaning of 13 nos. of metallic recuperators in pits of Slabbing Mill.
- Adjustment in setting of optimum air/gas ratio in all running pits round the clock.

5. COLD ROLLING MILL

- New HCl regeneration plant has been provided with all Energy efficient motors.
- Installation of 18 KW motors in place of 24 KW motors in 92 no. of bases in Annealing furnaces.

6. GENERAL & UTILITIES

- Reconditioning of 10 nos. of steam traps in ODPL.
- Commissioning of VSAT equipments at SLCC for bi-directional data transfer between BSL, EREB, DVC for effective power distribution.
- 7000 m2 of damaged insulation in steam lines have been changed during the year.
- Repair of 12.5 Km length of damaged water line.
- Modernisation of Gas control system with remote operation of some strategic throttles.

ENERGY CONSERVATION ACHIEVEMENTS

As a result of the above energy conservation measures taken and optimization of the operating & maintenance practices, there was a marked improvement in all the major energy parameters. The following table shows the major parameters of the last three years.

The status of energy parameters in the last three years

Sl. No	Parameters	Unit	Year		
			2004-05	2005-06	2006-07
1.0	Sp. Heat consumption				
	- Coke Oven	Gcal/T dry coal	0.591	0.592	0.583
	- Sinter Plant	Gcal/T gross sinter	0.024	0.024	0.025
	- Blast Furnace	Gcal/T hot metal	0.580	0.573	0.577
	- Hot Strip Mill	Gcal/T slab rolled	0.446	0.450	0.479
	- Cold Rolling Mill	Gcal/T annealed coil	0.332	0.333	0.367
2.0	Sp. Power Consumption				
	- Coke Oven	Kwh/t gross coke	26.9	27.8	27.5
	- Sinter Plant	Kwh/T gross sinter	48.5	45.6	46.6
	- Steel Melting shop	Kwh/T crude steel	23.1	30.8	31.2
	- Hot Strip Mill	Kwh/T coil + plate	82.7	82.0	80.4
	- Cold Rolling Mill	Kwh/T CR Product	153.2	156.2	150.5
3.0	Coke Rate	Kg/T hot metal	531	523	520
4.0	Coke Oven Gas yield	Nm3/T dry coal	321.4	314.4	324.6
5.0	**Overall Energy Consumption**	**Gcal/T of crude steel**	**7.233**	**7.098**	**7.094**

ENERGY CONSERVATION PLANS AND TARGETS

Future energy conservation plan are :

- ✓ Use of coal bed methane gas.
- ✓ Initiation of Clean Development Mechanism projects
- ✓ Provision of BF Gas line for Captive Power Plant.
- ✓ Upgradation of Gas mixing & boosting station with PLC based Control system & its linking with Gas control system.

The target for Energy consumption for 2007-08 is 6.88 Gcal/Tcs

SAFETY

Bokaro Steel Plant accords first and foremost priority to safety and health of its human resource. A full fledged Safety Engineering Department headed by General Manager (Safety& fire) is operating in the plant to inspect, monitor and ensure implementation of safe working of various plant units with trained safety officers. Regular medical check up of employees is being done.

A separate gas safety section working under energy management department provide gas safety assistance to all gas hazardous jobs. Round the clock monitoring of safe working is done during capital repair, shutdown and special repair jobs.

5 Star Health & Safety Management System was first introduced in the year 96-97 and spread within the various units of plant. It has been implemented in Battery 1 & 2 , Benzol recovery plant and desulphurisation unit of Energy management department in the year 1999, Steel Melting Shop no. 1(Pit Side) in 2000 , Slabbing Mill (soaking Pit area) in 2001 and Blast furnace Gas cleaning plant no 3 &4 in 2002. BSL has a safety policy under the signature of MD and it serves as a management's commitment to safety.

Designated departmental safety officers(DSO) of all the departments are made responsible for monitoring the safety activities in the dept. who also co-ordinates with safety Engineering Dept. in various activities linked to safe working.

AWARDS:

Bokaro Steel Plant has bagged the following awards:

- ☛ **Second National Energy Conservation award 2006 for excellence in Energy Conservation & Management in 05-06.**
- ☛ **ISO 9001.2000 Quality Management System certification for the whole of Bokaro Steel plant.**

ENVIRONMENT MANAGEMENT

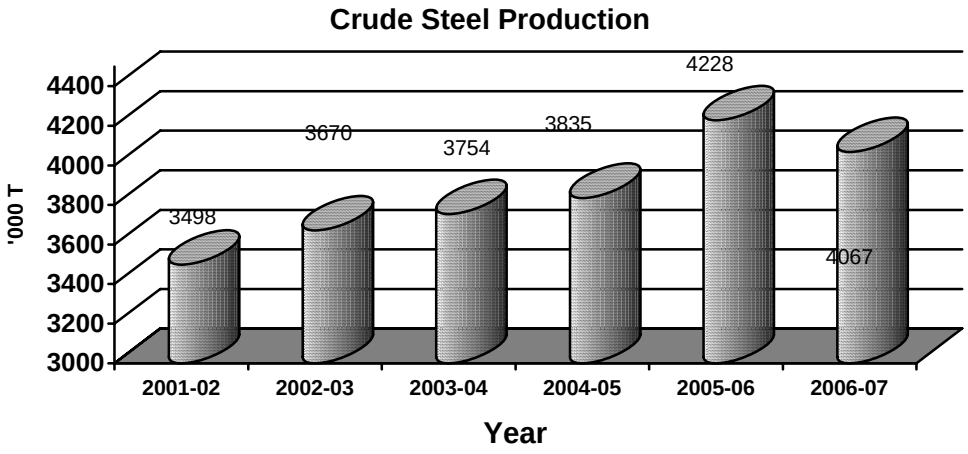
The concern for Environment at Bokaro Steel Plant is of paramount importance since the construction of the plant. All process equipments are provided with pollution control systems. Bokaro Steel has spent Rs. 335 crores in the last decade on pollution control projects. The plant environment is monitored by an independent Environment Control Department manned by qualified & trained people in the field. The plant has been provided with the latest environmental protection system as regards to air, water, noise and solid waste pollution with state of art laboratory functioning round the clock. The measures taken for improvements of environment are as follows:

- ✦ Effluent discharges from all three outlets of the Plant are maintained within stipulated norms.
- ✦ Emissions from all the stacks except from Sinter exhaust are within stipulated norms. Battery cyclones are going to be replaced by ESP.
- ✦ Ambient Air quality in & around the township remained within the stipulated norms.
- ✦ 100% use of processed LD slag as rail ballast for Internal Railway Track replacing stone ballast.
- ✦ Use of LD slag in fly ash dykes.

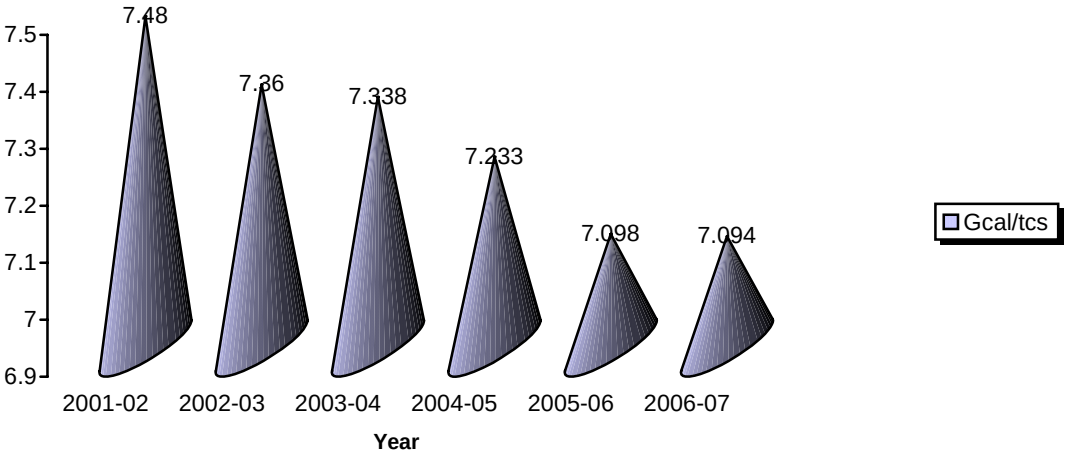
- ✦ Fugitive emission (PLD, PLL & PLO) in all batteries are well below the stipulated norm except PLD of battery no. 1.
- ✦ Coke oven battery # 6 commissioned after cold repair.

- Heating started after re-building of Coke oven battery #5 with latest on line Pollution control equipments.
- Commissioning of continuous stack monitoring system in coke oven battery no. 3 & 5.
- Ammonia in BOD plant outlet has come within norm.
- Water consumption has been reduced to 4.83 cu. M / tcs
- Hazardous waste pit completed & started functioning.
- On line CHSGP in BF4 commissioned.

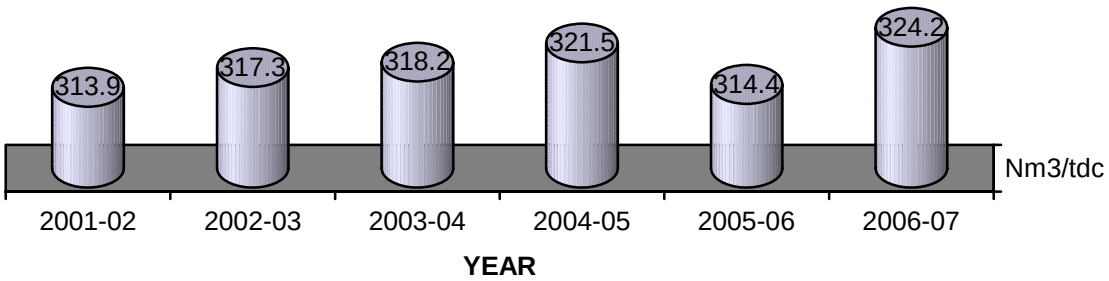
The major energy parameters of Bokaro Steel Plant are depicted in the graphs attached.



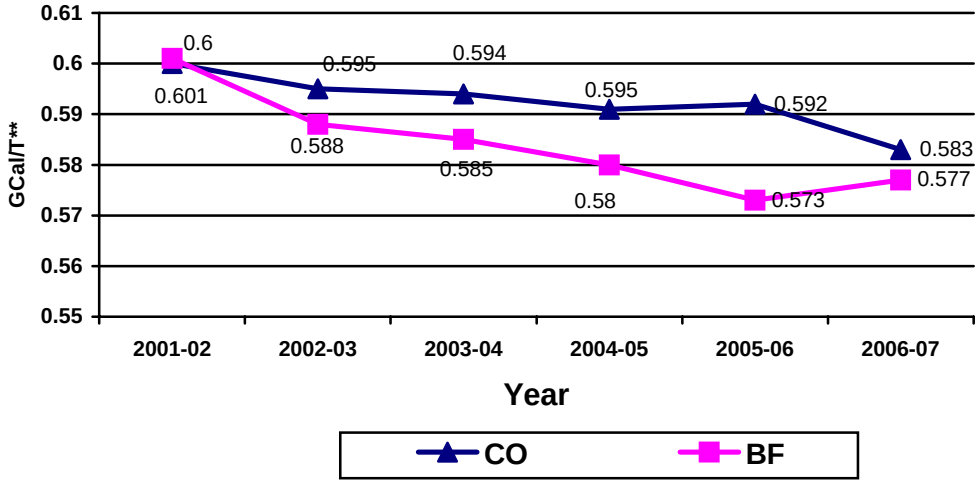
Specific Energy Consumption



CO GAS YIELD

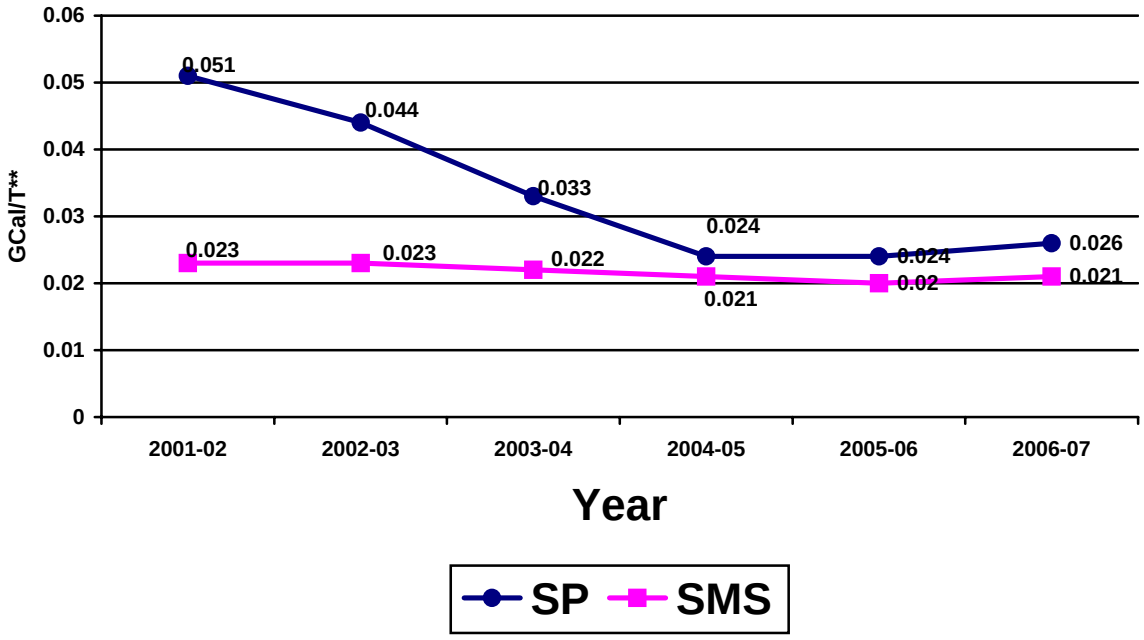


Sp. heat consumption in Coke Oven & Blast Furnace



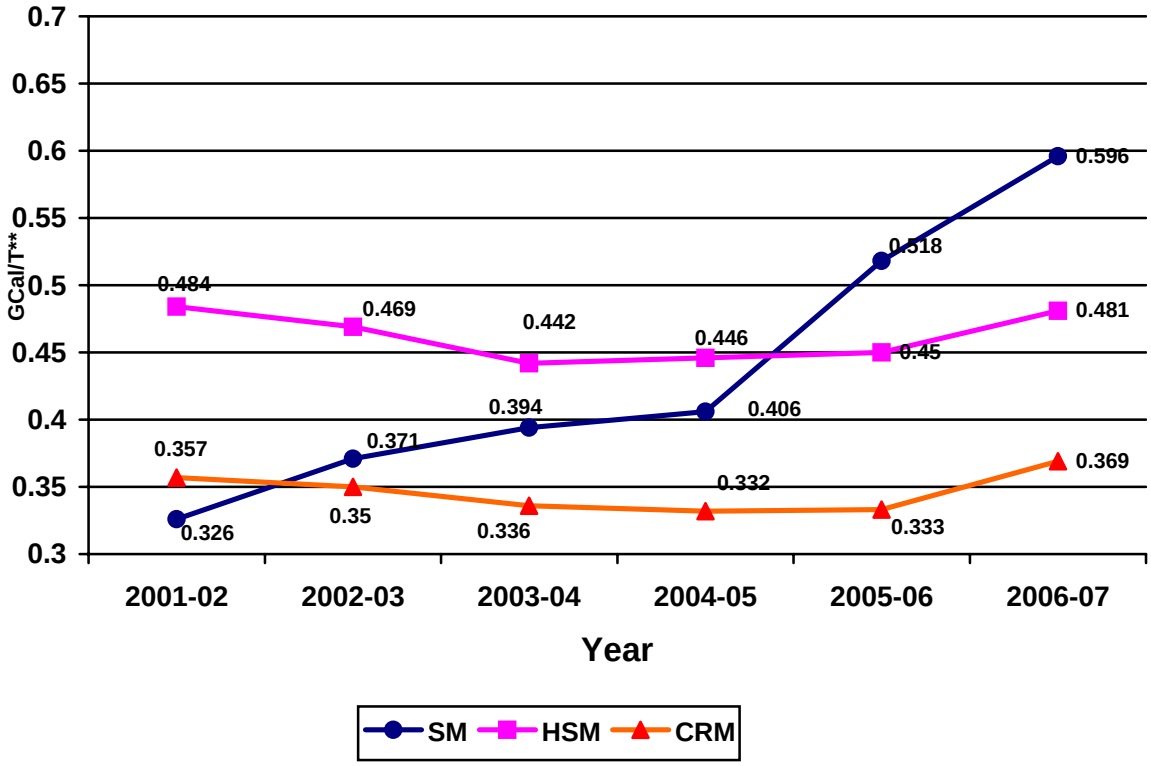
** CO – GCal / Tonne dry coal BF – GCal/ Tonne Hot Metal

Sp. heat consumption in Sinter Plant & Steel Melting Shop



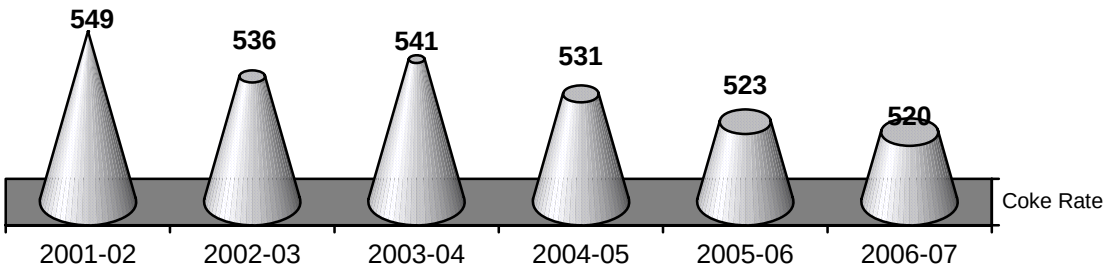
** SP – GCal / Tonne of Gross Sinter SMS – GCal / Tonne of Crude Steel

Sp. heat consm. in Slabbing Mill, Hot Strip Mill & Cold Rolling Mill



** SM – GCal/Tonne ingot rolled HSM – GCal/Tonne Slab rolled CRM – GCal/Tonne Annealed Coil

COKE RATE (KG/THM)



MODERNISATION OF GAS CONTROL COMPUTER SYSTEM

COAL DUST INJECTION IN BLAST FURNACE # 4

5-2 PUSHING SERIES IN BATTERIES OF COKE OVEN

CURTAIN TYPE FLAME OF MULTI SLIT BURNER IN SINTER PLANT

HOOGOVEN TYPE REFRACTORY IN STOVES OF BLAST FURNACES

REPAIR OF SOAKING PITS IN SLABBING MILL

CERAMIC FIBRE LINING & MODIFICATION FROM ARCH ROOF TO FLAT ROOF IN ANNEALING FURNACES OF COLD ROLLING MILL

WATER COOLED REFRACTORY LINED DISCHARGE DOORS OF REHEATING FURNACES IN HOT STRIP MILL

HOARDING FOR DIAL 100 SYSTEM OF LEAKAGE RECTIFICATION

DISPLAY OF ENERGY POLICY SIGNED BY MD / BSL

CELEBRATION OF ENERGY CONSERVATION WEEK

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ENERGY CONSERVATION TIPS PUBLISHED FOR ENHANCING ENERGY AWARENESS AMONG THE WORKFORCE ON THE OCCASION OF ENERGY CONSERVATION WEEK

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