

# ENVIRONMENTAL PERFORMANCE

## Defining Green

Indicator	Unit	2011-12	WSA average value.
Greenhouse gas emissions	Tonnes CO <sub>2</sub> /tonne crude steel cast	2.83	1.8
Energy intensity	GJ/tonne crude steel cast	28.7	20.7
Material efficiency	% of by-products re-used	96.52	94.4
Environmental management systems (EMS)	% of employees and contractors in EMS-registered production facilities	88.67	89.9

BSP, as a responsible corporate citizen is fully committed to safeguard, maintain and improve the quality of the environment and protecting human health. BSPs approach to environmental management has been guided by company's environmental & sustainability policies. and also UN Global Compact Principles. The Company is absolutely committed to providing a healthy working environment and to complying with all relevant environmental regulations in its operations; seeking to improve environmental performance well beyond norms and statutory duties wherever possible.

To ensure that policy is put into practice, key performance parameters have been identified, bench marked and are monitored and reported to various stakeholders in a transparent manner, addressing the requirements of GRI BSP has adopted an ISO 14001 based Environmental Management System to achieve excellence in environmental performance and ensure continual improvement. The divisional/departmental heads are responsible for implementation of the Environmental Management System in their respective areas. Top Management reviews the performance periodically and provides necessary guidance and resources for the implementation of improvement initiatives. Training and awareness is an integral part of the system and covers all the employees, contractors and others concerned. BSP is certified to ISO 14001:2004 by M/s. BIS Surveillance audits are conducted by BIS annually to ensure compliance to the prescribed standard. BSP recognises that climate change is one of the most important issues facing the world today. Recognising that the steel industry, as a sector, contributes 4-5% of all man-made CO<sub>2</sub> emissions (as estimated by the World Steel Association). The Company challenges it to reduce CO<sub>2</sub> emission from operations drastically to less than 2.4 tonnes of CO<sub>2</sub> per tonnes of liquid steel, by 2013-14 reflecting the Company's commitment to play its part in responding to the global concern for climate change.. BSP is also working on the opportunities for the future in energy conservation and carbon trading and is actively exploring these options.

## Environmental Strategies

Inline with the Company's vision to become “World Class Organization “ in all areas of its operation, BSP has framed a Sustainability Policy taking into account the Sustainability Goals & Objectives of World Steel Association (WSA) The prioritized sustainability issues are being addressed through

series of action plans, considering the national and international benchmarks. These action plans are integrated into the MODEX plan of Bhilai Steel Plant. The issues identified by BSP and the strategies & action plans to address these issues are given below.

Environment Performance Indicators	Achieved in 2011-12	Target Post modernization	International Benchmark
Particulate emission load (kg/TCS)	0.72	0.4	0.22 (POSCO)
Specific Effluent discharge(kg/TCS)	0.120	Zero Discharge	Zero Discharge (JSW)
Solid waste utilization (%)	90.5	98	99.9%(CORUS)
Specific Water consumption (m <sup>3</sup> /TCS)	2.994	2.8	2.97 (CORUS)
GHG emission (T/TCS)	2.83	2.4	1.8 (Rautraukki)
Energy consumption (Gcal/TCS)	6.85	5.92	4.5 (POSCO)

Environmental Improvement Areas	Action Plans (Many plans are integrated into MODEX Plan of BSP)
Reduction in Particulate emission Load	Phasing out of Ingot steel making route (SMS-I & BBM) and its replacement by continuous casting SMS-III, Process gas fired boilers in proposed new boilers under Power Plant. Design of all pollution control units of process stacks coming under expansion & augmentation/modification of existing units to meet new emission norm of 50 mg/Nm <sup>3</sup> .
Water Conservation and reduction of effluent discharge	Treatment & recycling of Plant & township effluents to achieve Zero Discharge
Enhancing Solid Waste Utilisation & Resource Conservation	2 MT cement plant in JV to achieve 100% BF slag usage. (Already commissioned) Promote usage of LD slag through innovative measures under R&D sponsored High impact projects. 1.0 MT/yr Pellet Plant at Tailings pond of Dalli Mines- Enrichment 49% Fe-Slime to 69% Fe rich pellets. Centralized sludge processing/recycling unit Up-gradation of Blast Furnaces & 100% granulation of BF Slag
Reduction of specific energy consumption and CO <sub>2</sub> emissions	Enhancement of Coal Dust injection in Blast furnaces. 6.5 MW Waste heat recovery turbine at Coke Dry Quenching system of new Battery#11. 14 MW Top Pressure Recovery Turbine at new BF-8. Walking beam furnaces at Rolling Mills. Phasing out of SMS-I and its replacement by SMS-III. Utilization of total process gases for generating steam/power
Opting for renewable energy sources	Installation of 2x100KW solar power plant at Bhilai Niwas in progress. Implementation of solar lighting systems for Office Buildings in phased manner Installation 5MW Solar Power Plant in vacant land of township / mines
Awareness Building on Sustainability Issues.	Partnership with leading professional & educational institutions for imparting training & workshops covering issues pertaining to Environmental Sustainability

BSP has no cases of Environmental non compliance registered by any legal authority till date. No fines/penalties were imposed during the year.

## Partnerships in Environment Management

BSP over the years entered into partnerships for successful management of environmental issues with aim of win-win situation for both BSP & partner agency. The partnerships in the area of environment management are given below

Agency	Area	Benefits
ACC	Hazardous Waste management	BSP has successfully established in partnership with ACC, co-processing (The latest & best way of waste disposal) of hazardous wastes in cements Kilns of ACC at Jamul. This process got the approval of the Pollution control board. It will help ACC in bringing in down its fuel/raw material costs and will help BSP in safe disposal of acid tar sludge.
JP Cements	Solid Waste management	A joint venture Cement Plant has been set-up for 100% utilization of BF-Granulated Slag. The commissioning of the plant will go long-way in achieving the target solid waste utilization of 98% after modernization.
NEERI	Air Pollution management	BSP has entered into partnership with NEERI for carrying out Source apportionment studies. These studies are being carried out using the latest software. This will help BSP in formulating a comprehensive air pollution management plan for minimizing air pollution in Plant & township This will help NEERI in generating enormous Air quality data , which can be utilized in advanced modeling studies & air pollution mapping,
CII	Sustainability	Conducting awareness programs & capacity building for employees., aimed at inculcating sustainability thought process in decision making
Chhattisgarh van Vikas Ltd	Tree plantation	BSP has contributed to more than 150 Km roadside plantation (about 13 lac trees) & also planning for river side plantation in future under its CSR initiatives. BSP has also planted more than 54 lac trees in its Plant, Township & Mines.

## Materials

The single most important indicator for material consumption is specific raw material consumption in producing one tonne of crude steel. This is calculated by adding all kinds of rawmaterials used in iron and steel making divided by crude steel production. Special attention is being given to optimally utilise the raw materials. Internal scrap is recycled. Associated process materials (i.e., materials that are needed for the manufacturing process but are not part of the final product) are Refractories, Oxygen, Nitrogen, Argon, Acetylene, Compressed air, Propane, Sodium Hydroxide, Sulfuric Acid, Petroleum Coke, Aluminum, Bentonite, Fire clay, Kyanite, Casting powder, electrodes, molasses, synthetic slag, Graphite powder. Lubricants, Petro-fuels, Materials for packaging, wooden sleepers, metal strips, wire ropes etc.





## Material Consumption

Raw materials consumed (Tonnes)	2009-10	2010-11	2011-12
Iron Ore	8434877	8805591	8163045
Boiler Coal	202477	229558	299464
Coking coal	4894570	4955295	4040191
Other Coal	200589	207170	207610
Limestone	1030185	1153499	1188528
Dolomite	999478	1067089	962325
Mn Ore	7119	25656	34924
Ferro Manganese	44395	48553.87	42963.93
Ferro Silicon	5927	6740	5945.38
Silico Manganese	49071	50985	47480.14
Sulphur	13684	12531	10796
Quartz/Si-Sand	32285	31206	24936
LSHS	13034	13463	28932
Others	1612	1772	1639
Total	15929303	16609109	15058779
Crude steel production (MT)	5.109	5.329	4.901086
Sp. Raw mat. Consumption (t/tcs)	3.117	3.116	3.075

### Materials used that are recycled input materials

Steel is a recyclable material and iron/steel scraps are used in Steel Melting Shops as an input material. No scrap was purchased from external sources. In addition to iron/steel scrap, other wastes such as slag, sludge, fines, flux dust, etc. amounting to 10.34% of the total input material are reused in the Steel Works,

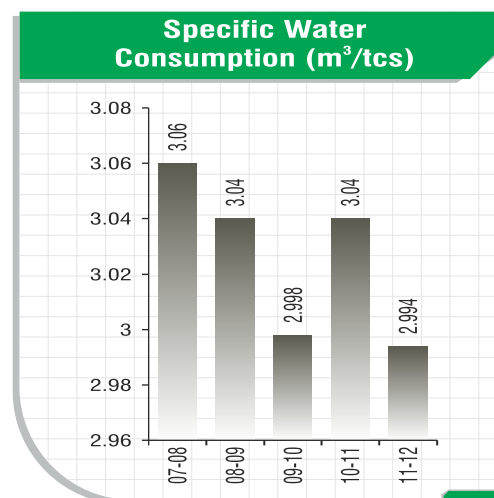
Scrap	2009-10	2010-11	2011-12
Total scrap recycled (t)	654687	606329	664617
Other recycled input material	629971	897050	846490
Material used (t)	15929303	16609109	15058779
% of recycled materials used	8.1	9.1	10.34
Savings (Lacs)	81835	75791	81535



## Water

### Water Quality

The water quality through the plant outlets has been maintained well within the statutory norms. The thrust was on conservation of water through implementation of recycling schemes at various stages of water use. The implementation of various water conservation & recycling schemes has resulted in bringing down the specific water consumption to 2.994 m<sup>3</sup>/TCS in 11-12, from more than 12 m<sup>3</sup>/TCS, 10 years ago. The level achieved by BSP in water consumption is amongst the best in the world steel industry.



### Water conservation & water pollution prevention schemes

- State of the art Sewage Water recycling system for recycling of 30 MLD sewage water of township has been completed. This has substantially reduced BSP's raw water requirement. This is largest sewage water recycling plant installed in Central India.
- The effluent from plant outlet-A is being recycled. Schemes are being formulated for recycling of effluents from other two plant outlets.
- Oxidation pond has been built at Hirri, one of the BSP's captive dolomite mines.
- Construction of water recycling system in Merchant Mill has resulted in saving of fresh industrial water @ 660 NM3 per hour.
- 5 nos. of Tube Type Oil Skimmer were installed in BRP-1, BRP-2, PETP & PSTP to improve the quality of phenol water and recycling of the separated wash oil there by saving Rs. 6 lakhs per annum approx.

#### Rain water harvesting schemes:

- Roof rainwater harvesting implemented at Plate Mill & Machine shops conserving about 35,000 M3 rain water. In Township the system implemented at 3 schools & 3 office buildings.
- A tank of 120000 m3 capacity has been completed in the township for rainwater harvesting.
- Study to harvest rain water & improve the recharging capacity at different location of Township has been completed. – based on the study Rainwater harvesting pits ( 5 nos) of more than 5000 m3 each installed in Township. This has resulted increasing the ground water level in the Township & adjoining villages.

## Water conservation - 30 Million Liter/Day Sewage Recycling Plant

A 30 million litre/day (MLD) State-of-the-Art waste water recycling plant has been commissioned during the year with following benefits:

- Water conservation: The treated waste- water will be used as industrial make-up water in Maroda-I reservoir of Bhilai Steel Plant.
- This will be a step towards achieving the concept of “Zero Discharge” which is BSP’s commitment towards cleaner environment.
- Treated water recycled from 30 MLD plant to Maroda-I will be able to reduce BSP’ dependence on the state Water Resource Department for makeup water.



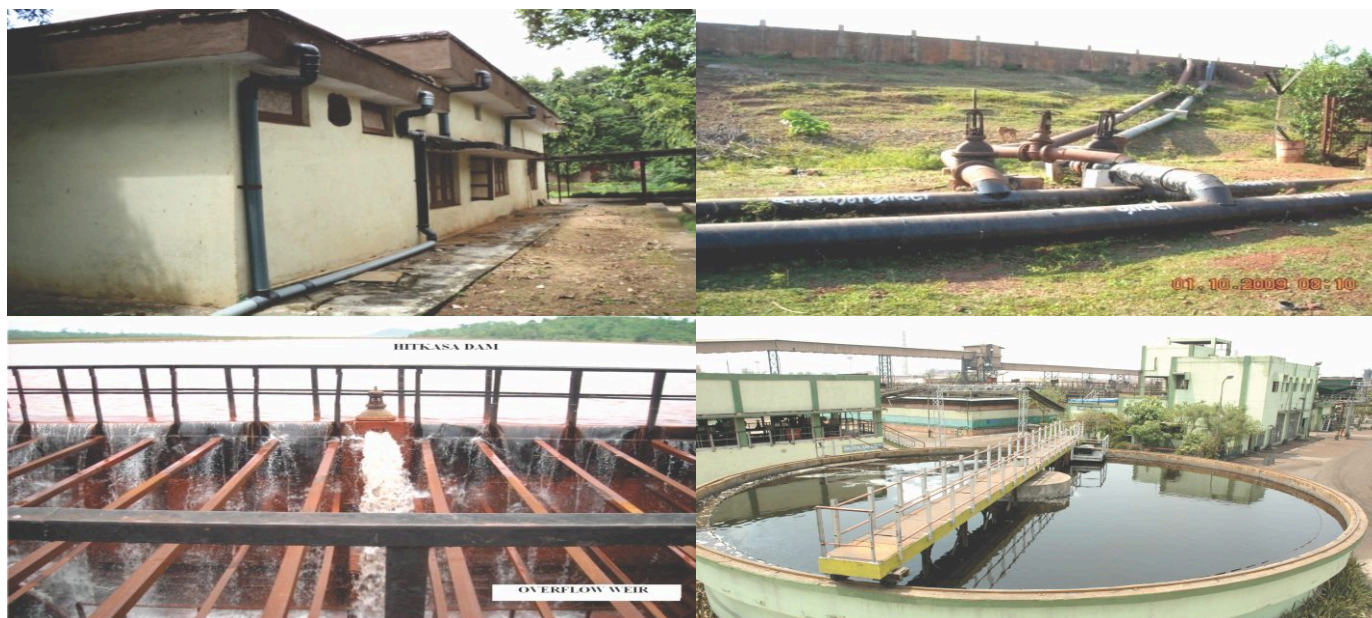
### Water Consumption at Bhilai Steel Plant

Source	2009-10	2010-11	2011-12
Make-up water from canal/River to plant (Mm <sup>3</sup> )	25.44	25.14	23.11
Drinking water Supply to Plant	16.55	16.03	15.05
Drinking water Supply to Township	35.75	35.2	35.68
Total water drawn from Canal	83.15	96.47	81.67
Rain water collected (Mm <sup>3</sup> )	10.02	10.56	10.60

No water source is significantly affected by withdrawal by the company.

### Percentage and total volume of water recycled and reused.

Source	Maroda-I to Plant for industrial make up (Mm <sup>3</sup> )	Industrial Water Recycled to Maroda-I (Mm <sup>3</sup> )	Total Industrial Makeup water (Mm <sup>3</sup> )	Makeup water % of total	Recycled water % of total
2009-10	25.44	44.36	69.8	36.45	63.55
2010-11	25.14	39.42	64.56	38.94	61.06
2011-12	23.11	39.48	62.59	36.93	63.07



## Water Consumption at Mines (M<sup>3</sup>)

Mines	Description	2009-10	2010-11	2011-12
IOC	Domestic	3085788	2535658	2700022
	Industrial Use (Cooling/Dust Suppression)	1733076	1863268	1968565
	Industrial Use (Processing/washing)	3415255	2258537	2069830
	Total	8234119	6657463	6738417
NANDINI	Domestic	687558	647457	635136
	Industrial Use (Cooling/Dust Suppression)	271440	284535	270004
	Industrial Use (Processing/washing)	0	0	67491
	Total	958998	931992	972631
HIRRI	Domestic	131400	131400	137160
	Industrial Use (Cooling/Dust Suppression)	6220	7300	13335
	Industrial Use (Processing/washing)/ Mine Discharge	276250	320500	330800
	Total	413870	459200	481295

### Water conservation efforts in Mines:

- Recycling of 70% water used in washing at Dalli Mechanized Mines
- Water Harvesting has been adopted to conserve rain water in office buildings





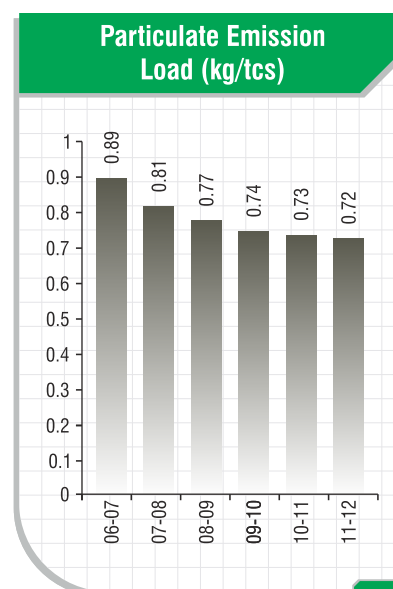
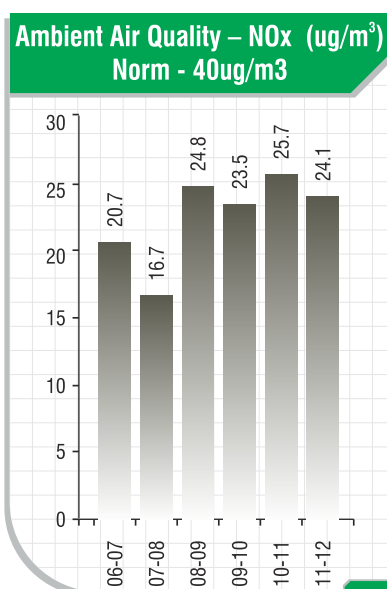
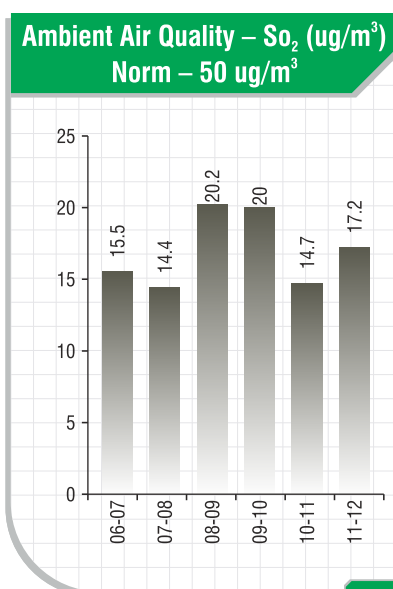
## Emissions, Effluents & Wastes

### Air Quality

Over the years BSP has been systematically maintaining and ensuring effective functioning of pollution control systems for improving its environmental performance and for complying with statutory norms. The pollution control systems comprises of Electrostatic precipitators, Gas cleaning plants, Bag filters, effluent treatment facilities and noise control systems.

Consequently the environmental performance of Bhilai Steel Plant remains one of the best in Indian steel Industry. Impact of air pollution control measures and green belt developed in and around the plant has helped in maintaining the ambient air quality of Bhilai.

Earlier, process stacks were designed to 150 mg/Nm<sup>3</sup>. However, to achieve the international bench mark in stack emission load, BSP has decided to design process stacks for 50 mg/Nm<sup>3</sup> for both existing as well as the future projects.



## Air Pollution Control Measures

### Fugitive Emission Control

- Water Sprinklers and Dust Suppression Systems at Raw Material Handling Plant (OHP).
- Water Sprinkler in Coal Yards of Coke Ovens.
- On main charging in coke oven batteries
- Door & door frame cleaning systems in coke oven batteries
- Dust Extraction Systems (bag filters, scrubbers & cyclones) at material handling points of Blast Furnace, Coke Ovens, Sinter Plants, RMPs, Steel Melting Shop, Power Plants
- Electrostatic Precipitators at Sinter Plant-2 & 3.
- Mobile Industrial Vacuum Cleaners

### Flue Gas Cleaning systems (Stack Emission Control)

- Wet scrubbers for Gas Cleaning Plants at Blast Furnace, Steel Melting Shop, Refractory Material Plant-I
- Multi-Cyclones for flue gas cleaning at Sinter Plant- 2.
- Electrostatic Precipitators (ESPs) for flue gas cleaning at Power Plants and Sinter Plant-III.
- Bag house at RMP-2.
- Mist arrester at DCDA Sulphuric Acid Plant.

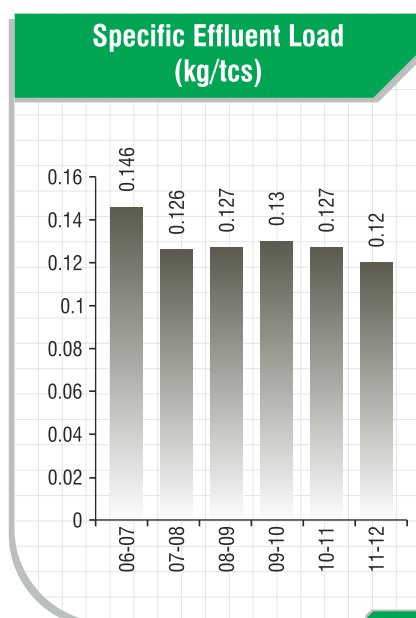
## Effluents

### Water Quality:

category wise consumption of water during the year

- (i) Category A = 14.774 Million Cubic metre  
(Water used for industrial cooling, spraying, boiler feed etc.)

- (ii) Category C = 7.314 Million Cubic metre  
(Water used for process operations whereby water gets polluted and the pollutants are easily biodegradable)
- (iii) Category D = 1.028 Million Cubic metre  
(Water used for process operations whereby water gets polluted and the pollutants are not easily biodegradable are toxic )
- (iv) List of exclusion and their quantity  
Water consumption at Power Plant (s)  
= 8.444 Million Cubic metre



BSP has three outlets Outlet-A consist effluent from BF, Foundry, OP-I, RMP-I, & storm water, Outlet-B consists effluents from MSDS-I, RTS, Diesel shed R&SM & storm water and Outlet-C consists effluent from COBPP, SP-I, SP-II & storm water etc. Only treated water is discharged through these outlets and effluent quality is meeting the norms .The water is discharged to the rivers Sheonath & Kharun through the 3 outlets namely A, B & C. There is no impact on water sources and related ecosystems/habitats by discharges of water and runoff. No significant spills were observed during the year.

Total quantity of effluent discharged from plant outlets into the rivers during the year:

River Kharun : 7121880 m<sup>3</sup>, River Sironath: 1059960 m<sup>3</sup> which was regularly monitored & found well within the regulatory norms.

## Solid Waste

### Waste Generation, Utilization and Disposal.

#### Solid Waste generation & Utilization in 2011-12

Unit: Tonnes

Solid Wastes	Generation	Recycling	Sold	% Utilisation
BF Slag Total	2064914	255000	1789708	99.0
BF Flue Dust	51842	0	43925	84.7
LD Slag	296570	319188	0	107.6
LD Sludge	25787	5694.8	0	22.1
Other Sludges (SP, BF & THF)	88901	0	0	0
Lime Fines	108705	108705	0	100.0
Mill Scale	99247	98942	305	100.0
Cinder	3648	0	3433.4	94.1
Used/Rejected Refractory Bricks	30316.1	11060	13353.5	80.5
Lime Sludge	103.7	0	0	0
THF Slag	141655	0	0	0
Total Ash	68061	47900	0	70.4
Total	2979749.8	846490	1850725	90.5

## Wastes from Pollution Control Equipment

Unit: Tonnes

Solid By-Product	Generation	Recycled	Sold
SP Sludge / Dust	19548	0	-
BF Flue Dust	51842	-	43925
BF Sludge	46131	-	-
OHF / THF Dust	23222	-	-
LD Sludge / Dust	25787	5695	-
RMP Sludge / dust (from PC Equip.)	108705	108705	-
Acetylene Sludge	103.7	-	-
Fly Ash	68061	-	-
Any other wastes (Specify name wise)	-	-	-
TOTAL	343399.7	114400	43925



## Hazardous Waste Management :

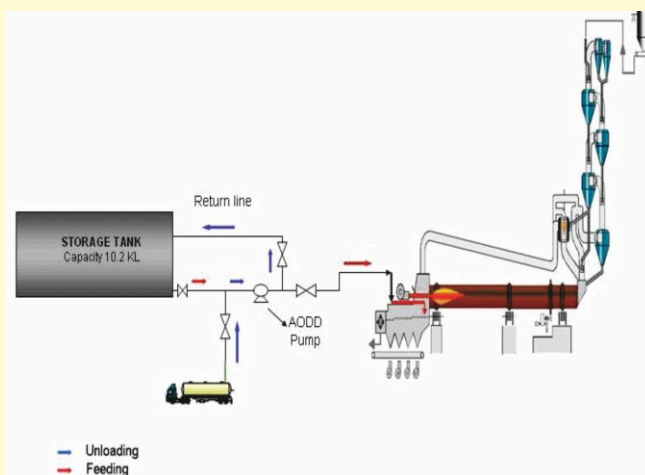
Hazardous waste & Category	Quantity/Annum	Method of Disposal, Transportation and any other information sought by Pollution Control Board
Cat. 13.4 Tarry Waste	3235.06MT	Sold
Cat. 13.5 Tar storage tank residue	251.99 MT	Sold
Cat. 13.3 Acid Tar sludge	1505.00T	Co-processing at ACC & Neutralization and solidification
Cat. 34.4 ETP sludge Skimmed oil	2330.17MT 63.998KL	Recycled Sold
Cat. 20.2 Spent solvent oil Type-I, II	105.61 KL	Sold
Cat. 17.1 Filter cake	182 MT	Recycled
Cat. 33.3 Discarded containers of hazardous chemical	200 Nos.	Recycled (Used as flower pot)
Cat. B-21 Asbestos waste	8.66MT	Stored
Cat A -6 Mercury arc Rectifier Tanks	NA	-
Lead & Lead compounds	NA	-
Cat 5.1 used Oil Waste oil	185.85 KL 136.40 KL	Sold/ used as fuel
Copper compounds & cables	207.64MT	Recycled



Case Study

## Sustainable Waste Disposal – Co processing of Hazardous Waste

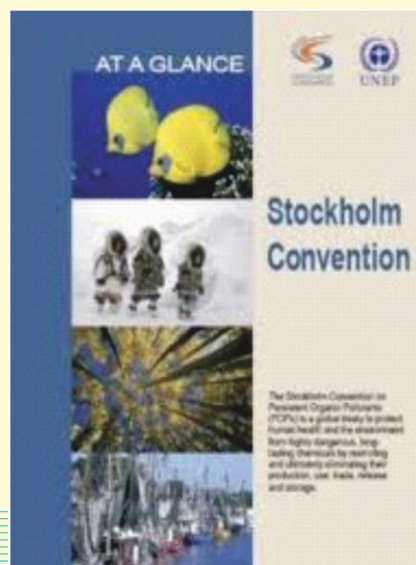
- BSP in partnership with M/s.ACC has successfully conducted trials for Co-processing of Acid Tarsludge in Cement Kilns.
- BSP is the first unit in SAIL to undertake this green initiative.



Case Study

## Environmentally Sound Management and Final Disposal of PCBs in India

- This is a Project of National importance, for destruction of PCBs which are categorized as Persistent Organic Pollutants (POPs) under Stockholm Convention.
- The Project is being implement by BSP in partnership with MoEF & United Nations Industrial Development Organization (UNIDO).





Case Study

## Sustainable Development Projects

### Product carbon footprint studies:

The study will help in developing GHG model, which will allow the identification of hot spots concerning the energy consumption of the whole steel works.

The energy efficiency of the steel plant can be analyzed effectively. In addition, the model shall enable simulations of existing and future scenarios for energy and mass flows.

### Water footprint studies :

The intended study will take views on all water issues holistically following a broad philosophy of sustainability approach i.e. 3R (Reduce, Reuse & Recycle).

Develop water recycling/reduction strategy road map and prepare short term, medium term and long term plan with potential emission reduction targets.

The above two projects are implemented in partnership with IIT-Bombay using state of the art models/software.





## Defining green.... the IT way.

Case Study

The IT initiatives taken by BSP have resulted not only in improved employee services but also in resource conservation in the form of reduced fuel & paper consumption. Some such initiatives are listed below.

Name of application	PAPER SAVING (PAGES / YEAR)	FUEL SAVING (LITRES/YEAR)
ONLINE MEDICAL TOKEN BOOKING	-	78000
DIET CHARGES MODULE	21000	-
NATIONAL OCCUPATIONAL HEALTH & SAFETY DEPARTMENT	400000	-
COMMON LOANS AND ADVANCES SYSTEM	12000	-
E-PAYMENT SYSTEM	12000	-
ONLINE LEAVE ENCASHMENT	10000	-
ONLINE VPF APPLICATION	21186	-
ONLINE QUARTER APPLICATION	12000	3000
ONLINE QUARTER VACATION	3000	750
HOUSE MAINTENANCE	4581	1150
THIRD PARTY RECOVERIES	10000	-
ONLINE SAFETY MONITORING	35000	-
E-VIDYA	2500	-
TRAINING SYSTEM HRD	18000	-
CONTRACT LABOUR SYSTEM (Works Area)	94000	-
CISF GATEPASS SYSTEM	62400	-
IT COMMAND CONTROL	36000	-

total paper saved = 753667 Nos.  
total fuel saved = 82900 L

## Generation and mode of disposal of Bio-medical Wastes

Type of waste	Generation (Ton/annum)	No. of beds in the hospital	Present mode of treatment and ultimate disposal
Cat-1,3,5 & 6	50.5	896	Outsourced to M/s Etech Pvt. Ltd.
Cat: 4,7	6.08		

## Management of Municipal Solid Wastes at Township

Generation (tonnes/annum) : 12775 T

Method of collection & transportation: Door to door collection of Garbage is done in all Sectors.

Mode of disposal: land filling as MSW Rules-2000

## Noise Environment

To reduce the impact of noise, measures taken at BSP are given below:

- Bellow-type tuyers at all Blast Furnaces and Snort Valve Silencers at Blast Furnaces
- Sound-proof Acoustic Cabins at Power Plants, Oxygen Plants, and Pump Houses, etc.

- Blast by-pass silencers at Power Plant-I & Acoustic Silencers of Exhausters/ID Fans
- Replacement of conventional GCP at BF 7 with low noise GCP
- State of the art acoustic enclosure in pulpit of Wire Rod Mill & 6 nos of blow off silencers in compressor plant III have been commissioned
- State of the art air compressors were installed in new Compressed air station-4. They are designed for noise level of 85 dB(A), which is much below the industrial norm of 90 dBA)

## Noise levels – Plant area



Work Area	dB(A)	
	Day Time	
	Norm as per Factory's act	Actual
Coke ovens	90 dB(A)	62-75
Blast Furnace	90 dB(A)	70-86
Steel melting Shop	90 dB(A)	67-74
Plate Mill	90 dB(A)	57-72
Wire rod Mill	90 dB(A)	59-77
Rail Mill	90 dB(A)	55-72



## Noise Level in the Township

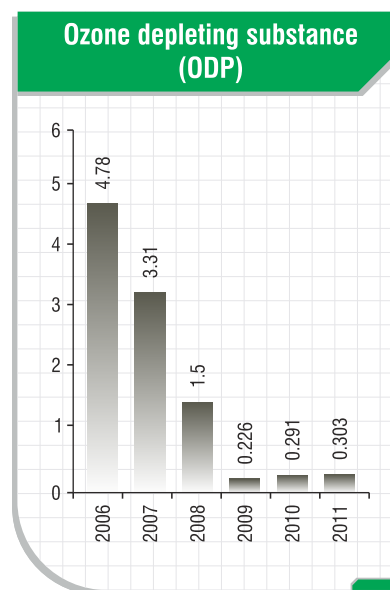
Location	Leq levels (dB(A))			
	Max.	Min.	Avg.	Norm
Civic Centre	77.3	54.5	63.0	65.0
Near Sec.-7 & 8 Sqr.	79.6	60.5	67.7	65.0
JLN Hospital	72.6	52.1	63.9	40.0

Efforts are being taken to reduce noise levels in township through awareness campaigns, hoardings etc.

## Ozone depleting substance

Under Montreal Protocol, as a part of phasing out ozone depleting substances, BSP has eliminated use of CFC-11 by replacing it Li- Br based chiller unit, way before the target date of 1.1.2010. Procurement of Carbon Tetra Chloride (CTC) has been stopped and use of Trichloroethylene has been started. This project is being implemented under the UNDP aid. 100 % of Halon based fire extinguishers has been replaced by FM 200 based units. Replacement of all industrial package air conditioners using CFC-12 using CFC free refrigerant already done.

Considerable reduction in the Ozone Depleting Substance has been achieved due to various efforts made during the year, as depicted.



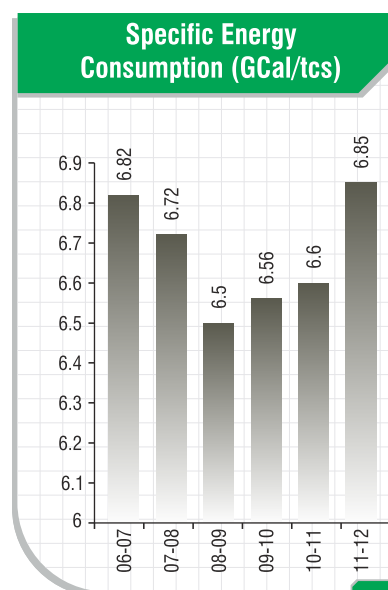
## Consumption of Ozone Depleting Substances

ODS Substances	Ozone Depleting Potential (ODP)	Year wise consumption in Tons		
		2009	2010	2011
CFC 11	1	0	0	0
CFC 12	1	0	0	0
Halon-1211	3	0	0	0
CTC	1.1	0	0	0
HCFC-21	0.04	2.989	5.307	4.432
HCFC 22	0.055	1.026	0	0
HCFC 142	0.06	0	0	1
HCFC 124	0.0125	4.015	5.307	5.432
Total ODS consumed	Total ODP in Tons	0.226	0.291	0.303



## ENERGY

Energy conservation has been given prime importance in the organization. BSP has declared its energy policy and standard operating procedures are being followed to minimize the energy consumption. BSP is the only steel plant that produces 48.5% of its steel through energy intensive route of ingot casting followed by Blooming & Billet Mill. In 2011-12, Sp. Energy consumption of BSP was 6.85 Gcal/TCS. An increase of about 3.6% in energy rate over previous year, Owing to the failing health of the ageing Coke Oven Batteries, BSP faced an acute shortage of two of its in-house primary fuel resources, namely, the calorie-rich Coke Oven gas, and Coke, the seed fuel for hot metal production. This resulted in an increased dependence on purchased fuels, like BF coke for use in the Blast Furnaces, and Furnace Oil for firing the Plate Mill furnaces. Despite the adverse conditions, the energy rate of BSP in 2011-12 could be contained, by undertaking a slew of energy saving measures.



## Energy Statistics

Energy Purchased	Quantity (T)			Heat Content (TJ)		
	2009-10	2010-11	2011-12	2009-10	2010-11	2011-12
Boiler Coal (Ton)dry	180361	202303	274452	3030	3234	4621
Coking coal(Ton)dry	4458229	4511453	3690082	121148	132320	109372
BF injection Coal/CDI Coal	184643	188881	189941	5017	5539.86	5630
LSHS (KL)	13034	13463	28932	494	508.6	1097
Diesel (KL)	14079	7437	7323	557	293	289
Power Purchased(mwh)	2027029	2174350	2146790	20432	21834	21639
<b>Total purchased</b>				<b>150678</b>	<b>163729.5</b>	<b>142648</b>
<b>Energy Sold</b>						
Coke	68170	9674	15110	1852	263	731
Tar products (t)	41651	30150	5068	1532	1109	186
Benzol Products (t)	18367	17803	26876	754	731	620
<b>Total energy sold</b>				<b>4138</b>	<b>2103</b>	<b>1537</b>
<b>Net Energy Consumption</b>				<b>146540</b>	<b>161626.5</b>	<b>141111</b>

Percentage contribution (in terms of energy) of various following resources towards the total energy consumption of the plant.

Coking Coal	=	78.84 %
Electricity (Including purchased)	=	15.83 %
Steam	=	4.19 %
Furnace oil & Petro-fuel	=	0.74 %
Others	=	0.38 %





## Energy Conservation

Some of the Energy conservation projects commissioned during 2011-12 is mentioned below.

Projects	Achievements of energy saving per year basis			Investment incurred (in lakhs)
	Power (MWH)	Heat (Gcal)	Total Savings (Rs. in lakhs)	
Replacement of Mixed Gas firing with FO firing in PM		13522	133.8	IN-HOUSE
Energy saving due to increased LD gas recovery after in-house repair of LD gas holder		23205	229.73	IN-HOUSE
Rebuilding of COB#6		11408	112.9	19120
Development and installation of one no. of metallic recuperator in RSM		9726	96.3	IN-HOUSE
Installation & Commissioning of 14 Nos Variable Frequency Drives in different areas of RSM (Rail & Structural Mill)	2268		113.4	77
VVVF drives were commissioned for energy conservation and reduction of torque jerks at 5 nos. Roller Table sections and for disc rotation motor and tilting motor in Merchant Mill	261		13.05	35
Optimum capacity utilization of Machines of Compressed Air Station (CAS-4) by modification in IPPL network and redistribution of consumer load helped in switching off of 2 Nos. Compressors at CAS-3	17280		864	IN-HOUSE
Optimum capacity utilization of equipments at CO&CCD, SPs, SMS-1, BF, CCS, WMD	9432		471.6	IN-HOUSE

## Modernisation for Energy Efficiency

BSP has benchmarked its energy consumption in line with WSA (IISI) model for a model plant. Modernization of BSP by the year 2014 is already on the anvil, where all energy efficient technologies will be adopted. It is anticipated that after modernization, the present gap with international level will be eliminated and BSP will be one of the front-runner for energy conservation in steel industry. The projects conceived are expected to achieve target Energy Rate of 5.92 Gcal/TCS by the year 2014





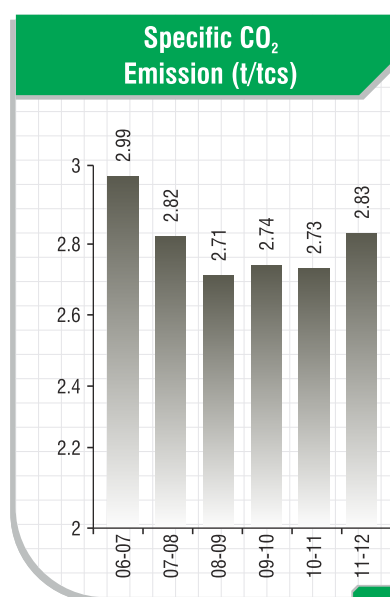
## Abatement of Green House Gases. & Clean Development Mechanism

The absolute GHG emissions during the year were 13848451 tonnes of CO<sub>2</sub> e. The scope -1 (direct), scope -2 (Purchased electricity) & scope-3 (Credits & other up-stream downstream emissions on which organization has no control) emissions were 13481644, 1224170 & (-) 857363 tonnes of CO<sub>2</sub> e. Specific GHG emissions were 2.83 t/tcs. An increase of about 3.53% mainly due to the reduction in Coke oven gas yield & increase in purchased coke due to failing health of ageing coke oven batteries. Right since inception BSP has implemented several energy efficiency projects with an aim to bring down the green house gas emissions & cost of energy, which contributes to about 30 to 40% of the cost of steel making in an integrated steel plant. Bhilai Steel Plant has identified 23 Clean Development Projects(CDM) which have already been completed or will be taken-up under BSP, 7.0 MT expansion plan.

The validation & verification of the three completed projects, namely "SP-3 waste heat recovery, BF-Gas utilization in Boiler-6 of Power Plant-1 and Thyristorisation of Blast Furnace # 3&4 skip hoist electric supply" was done by independent agency M/s.RINA-Italy. These three projects of BSP, have been certified under Voluntary Emission Reduction (VER). The certification of these three projects by the independent validation/verification agency M/s.RINA-Italy, will enable BSP to claim revenues for about

2,50,000 Tons of CO<sub>2</sub> emission reductions from the international VER market. every year till the completion of 10 year cycle period.

The details of CDM / VER projects perused by BSP are given below. The successful certification/registration of the projects will yield about 1 Million CERs / VERs every year.



Completed Projects	Envisaged Projects
<ul style="list-style-type: none"> <li>Heat recovery from Sinter Cooler of Sinter Plant #3.</li> <li>Coal Dust Injection (CDI) in Blast Furnace 1,5,7.</li> <li>Blast Furnace gas utilization at Boiler #6 of Power Plant-1.</li> <li>Thyristorisation of Blast Furnace #3&amp;4 skip hoist electric supply for better operation efficiency and energy conservation.</li> <li>Additional BOF gas evacuation scheme for increased gas recovery.</li> <li>Resizing and improvement in design of impeller of Gas Cleaning Plant (GCP) in Steel Melting Shop #1.</li> <li>Independent Exhaust system for slab casters #2,3,4.</li> <li>Commissioning of Variable Voltage Variable Frequency (VVVF) drive ID fan motor at Steel Melting Shop #2.</li> <li>Modification in furnace of Rail &amp; Structural Mill.</li> <li>Micro-processor control system at Reheating Furnace of Plate Mill.</li> <li>Replacement of CFC #11 by Li-Br based chilled water plant.</li> <li>Recycling of BOF slag through Sinter Plant.</li> <li>Installation of VVVF drive at BOF converter # 1, 2 and booster Fan **</li> </ul>	<ul style="list-style-type: none"> <li>Coke Dry Quenching (CDQ) in New Battery #10.</li> <li>Installation of Top gas Recovery Turbine (TRT) at Blast Furnace 8.</li> <li>Installation of gas fired boiler for power generation from gas of New Blast Furnace #8.</li> <li>Waste heat recovery from new Sinter machine.</li> <li>Hot stove waste heat recovery for Coal Dust Injection unit of new Blast Furnace #8.</li> <li>Replacement of Twin Hearth Furnace (THF) with BOF converters.</li> <li>Installation of energy efficient compressors in oxygen plant.</li> <li>Replacement of existing motors with energy efficient motors in Mills.</li> <li>Walking beam furnace at Mills</li> <li>Energy efficient shaft kilns at new Refractory Material Plant # 3</li> </ul>

## Environmental Expenditure (2011-12)

### Total Environment protection expenditures and investments by type

Area	Revenue expenditure in Crores	Capital Expenditure in Crores
Pollution prevention	86.83	
Global Environment Protection		17.48
Resource Circulation	29.56	
Environment management activities	0.052	
Research & development	6.101	
Social activities	11.06	
Others	0.65	
Total	134.31	17.48

## Biodiversity:

### Land Use Pattern at Bhilai Steel Plant

Units	Revenue area in Hectares	Forest area in lease in Hectares	Non-forest area in Hectares
Bhilai Steel Plant (Works)	3248.9	Nil	3248.9
Bhilai Township	2939.9	Nil	2939.9

Out of the land under Steel Plant 1100 hectares is used for water reservoirs Marada-1 & II

## Land use pattern at Mines

Name of the Mine	Leased Area in Hectares	Forest Land in Hectares	Revenue Land in Hectares
Rajhara Mechanized Iron ore Mines	220.42	100.76	119.66
Dalli Mechanized Iron ore Mines	719.6	283.6	436
Dalli Forest range Manual Iron ore mines	100	100	Nil
Mahamaya dulki Iron Ore Mines	1522.67	1522.67	Nil
Kalwar Nagur iron ore Mines	938.06	938.06	Nil
Nandini Mechanised Lime stone Mines	526.34	Nil	526.34
Hirri Dolomite Mines	128.77	Nil	128.77

## Habitat changes due to operations. Amount of habitat protected or restored

Bhilai Steel Plant does not fall in protected or sensitive area. Areas of operation of the company do not have any World Heritage sites or Biosphere Reserves/ Protected areas. Environmental Impact Assessment study indicates that no reportable changes to natural habitats have occurred from the company's products, services and activities.

## Objectives, programmes, and targets for protecting and restoring native ecosystems and species

In Bhilai Steel plant as well in the Township, various types of species are planted. Most of them have economical importance and medicinal value.

Bhilai Steel plant has made major efforts in improving green belt areas inside the plant premises as well as in the township. For developing green belt area, conditions of soil have been kept in view. Another most important criterion, which, BSP has kept in view, while implementing the scheme, includes the selection of the species. The plant species have been selected according to local climate, soil type, environmental requirement, survival of the species, longevity of the particular species, oxygen bearing capacity, improve the aesthetic purpose, to improve lush patches of greenery and offset the effect of the industrial pollution.

- Systematic plantation of suitable species in the identified locations
- To Study relative exposure vs. dust capturing capacity of various identified plant species through natural and controlled exposure.
- To evaluate rate of dust deposition/capture capacity of different plants species (Herbs, Shrubs & Trees)
- To identify the Plant species with high potential for Control of Dust/Suspended Particulate Matter in Ambient Air.
- To prepare checklist of Plant species for Phyto-remediation of particulate matter from ambient environment.

- Conserve the various species planted in the plant and township area
- Perform Mixed type of plantation upto 90% of survival rate.
- Promote plantation for bio-diesel, 60,000 Jatropha plantation has been done in the plant & township.
- Evolve process of collection of seed from Karanj tree and facilitation for production of bio-diesel from Karanj seed.

In order to extend the greening efforts, road side plantation along 150 kms of state highways is done.

## Impacts on protected areas

The complete owned area is well managed by the management of Bhilai Steel Plant with sustainable development. There is no waste land in Township as well as in Plant premises. There is proper provisions for the green belt area development in both the areas and the activity is on going process. There was no forest cover in the project site. However, a variety of plants and trees are found near village settlements. The important among them are mango (*Mangifera indica*), Imli (*Tamarindus indica*), Pipal (*Ficus religiosa*) and neem (*Melia azadirac*). There is no adverse effect in the existing land use pattern in the area and also in surrounding on account of the present project. The greening efforts have improved the soil condition in the area.

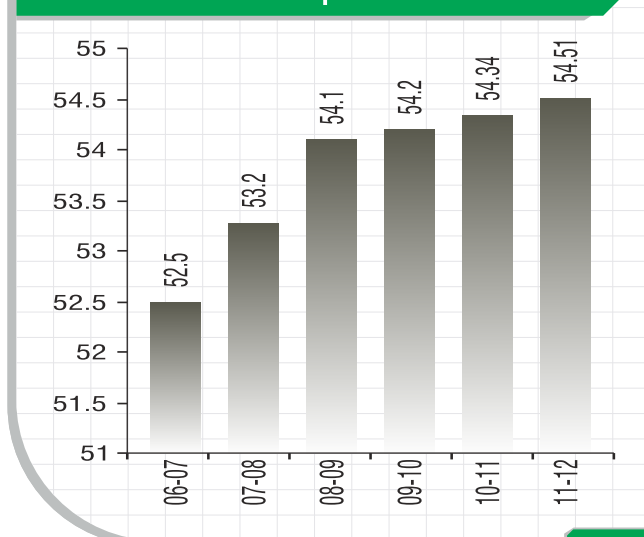
## Green Belt Development

Bhilai Steel Plant is committed to its environmental policy in which afforestation finds a pre-dominant place. BSP has put in a major effort to promote greenery in and around Bhilai. This includes organized tree plantation on large scale; development of gardens and parks in Mines, Works area and Township; rehabilitation of slag dumps; seed broadcasting and encouraging employees/citizens / students to take up green belt development.

Today Bhilai and its mines has an estimated population of 54.5 lakh trees. This comprises of 30.5 lakh trees inside the plant, and township and 23.5 lakh trees in the mines



### Greenary efforts of BSP - In Plant, Township & Mines



#### Inside Plant

15 gardens over 30 acres inside the plant

3 nurseries with 25000 plants of 125 flora varieties.

#### BSP Township

6 major gardens including 'Maitri Bagh' the best garden in Chhattisgarh in 125 acres with zoo & Musical fountain.



### Greenery efforts during the year:

- Plantation done in township = 11,679 & 4.5 Hectares Area covered
- Total area covered = 33 % w.r.t. Land Holding area (%)
- Road side plantation = 1 Lakh & 50 KM length of road covered
- Cost incurred during the year for road side plantation = 3.95 Crores

### Development of gardens inside & outside the plant

The plant and township are replete with gardens and trees. Some of the gardens developed inside the plant & township are:

### Aforestation in Mines

Name of the Mines	Description	2011-12	Total
IOC	Area in Ha	3	594.5
	No. of Plants	7105	1475885
NANDINI	Area in Ha	NIL	418.5
	No. of Plants	NIL	871477
HIRRI	Area in Ha	1	126.4
	No. of Plants	2000	328525



## Environmental awareness & Eco clubs



- Mass tree Plantation
- Essays, Slogans & Poem competitions
- Field Trips to Observe surrounding industries (ACC)
- Organizing Lectures & Demonstration of Scientific Experiments
- Working Models
- Rallies
- Development of 'Vermi-composting practices'

These awareness programmes were attended by more than 20000 school children of various BSP & private schools.

Activities and enhance awareness in the township and commercial areas by taking out rallies and door to door interaction.

BSP has accorded top priority for environmental awareness amongst its employees, School children & general public. Several environmental improvement schemes have been taken up under quality circles by the employees, which has resulted overall environment improvement, energy & resource conservation. A Six sigma project for fugitive emission control was also implemented in coke ovens.

43 eco-clubs registered with MOEF are functioning in BSP schools under the National Green Corps (NGC) programme of Ministry of Environment & Forests (MOEF). The students participate in the various environmental activities and awareness programmes in the township and commercial areas as listed below:

- World Environment Day – 5th Jun.
- International ozone layer protection day - 16th Sept
- National Environment Day – 25th Nov.
- National Pollution Prevention Day – 2nd Dec.
- National Pollution Prevention Day – 2nd Dec.

