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CLEAN & GREEN™

Long way to green

Investor scrutiny to drive environmental-law compliance

Faced with limited resources and competition, few Indian mining/metals companies have improved their green footprint. Regular violations of environmental laws and poor safety track records suggest that steelmakers have a long way to go to achieve best-in-class benchmarks. Stiff regulations, strict enforcement, resource constraints and competitive threats should drive better behaviour. Chandra Bhushan explains how increased investor scrutiny can help.

Steelmakers - Non-transparent and non-compliant

- The Centre for Science and Environment's Green Rating Project finds that Indian steelmakers are non-transparent and wasteful in resource usage.
- It also finds that none of them fully comply with all the existing air- and water-pollution standards.
- The Indian iron & steel sector's energy consumption at 6.6 gigacalories/tonne of crude steel is 50% higher than the global best practice. Water consumption is 3x.
- The industry also has a poor health-and-safety track record; 14 out of 21 plants dump solid waste outside their premises, severely affecting nearby communities.

Priority recommendations

- A move from concentration- to load-based standards so as to consider the environment's assimilative capacity as steel-industry production expands.
- Improve the accountability of the pollution-control inspector. All monitoring and inspection data should be made public.
- Raise the financial penalty for non-compliance, so management will take notice.
- Meet the national minimum standards for pollution.
- Periodic disclosure of environmental performance with accuracy and completeness.

Good news - Some exceptional practices

- After installing an ultra-filtration system, Vizag Steel reuses township wastewater to cool its rolling mills.
- Bhushan Steel's Sambalpur plant cleans its blast furnace off-gas dust using dry gas instead of water.
- Jindal uses a tailor-made system to control fugitive emission dust at the product-separation unit of its second coal direct reduced iron (DRI) plant in Raigarh.
- Essar's Hazira unit reuses slag waste from steel melting in different applications.
- JSW Steel's Bellary facility has a unit that removes sulphur from coke-oven gas.

Heavy red dust from electric arc furnace units at Usha Martin, Jamshedpur, 2011

Note: IFC, Washington, held an equity stake in the company. Source: CSE

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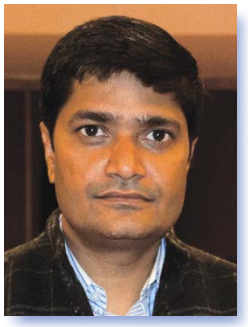


Chandra Bhushan

Chandra Bhushan is the deputy director general of the Centre for Science and Environment (CSE) and guided the research on the steel sector for its Green Rating Project (GRP). Bhushan has an undergraduate degree in civil engineering and a master's degree in environmental planning and technology. He has been working with CSE since 1997 and, among other responsibilities, heads its climate change and policy advocacy team; the Industry - Environment Unit; pollution-monitoring lab; and food safety and toxins team. He has a number of books and publications to his credit, including *Into the furnace: The life cycle of the Indian iron and steel industry*. Under the guidance of Bhushan, GRP senior programme manager S Umashankar led the GRP on the Indian steel industry.

Established in 1980, CSE is a non-profit public-interest research and advocacy organisation based in New Delhi. It researches, lobbies for and communicates the urgency of development that is both sustainable and equitable. CSE uses science and knowledge-based activism to create awareness about problems and propose sustainable solutions.

Over the years, CSE has successfully documented India's first-ever State of Environment reports to enable framing of environmental regulations, pushing for the cleaner compressed natural gas as a vehicular fuel in Delhi, advocating rainwater-harvesting measures and strengthening regulations on foods and pesticides. On industry, it works on environmental benchmarking studies through the Green Rating Project, providing community support and training citizens.

Foreword

Sustainability is no longer just a buzzword about socially responsible investing but has a serious bearing on investment performance. Environmental disasters due to industrial accidents and regulatory action in response to violations can be minefields for investors.

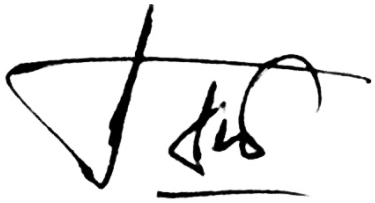
Over the past two years, India's Ministry of Environment & Forests (MOEF) has become stricter in the implementation of environmental laws and tribal rights, which have resulted in projects being stalled and/or delayed. Its overzealousness has drawn criticism from the corporate sector and its push for enforcement has impacted the investment plans and reputation of many companies, leading to a significant loss of investors' money. However, over a longer period of time, CSE believes the MOEF has become lax on pollution monitoring and on the aggregate has been fairly generous in giving approvals.

Against this backdrop, the Centre for Science and Environment's (CSE) study on the Indian steel sector as part of its Green Rating Project (GRP) could not have been timed better. The non-profit organisation conducted similar assessments previously for a few other industries, such as paper, cement, chloralkali (the electrolysis of brine) and automobiles.

While the findings about the steelmakers look grim, the encouraging part based on past rating experiences is that many companies take CSE's recommendations seriously and undertake corrective action within finite time limits. There are sound economic reasons behind it. Corporations today are aware of the significance of environmental and sustainability issues and, being part of the global corporate world, by and large they want to follow international best practices. In addition, frugal production processes and conservation add to the bottom line and shareholder value amid rising costs of resources - given the prevailing supply crunch - and other associated items.

Increased investor scrutiny will drive further improvement in corporate behaviour. Our conversation with CSE deputy director general, Chandra Bhushan, should give investors a better understanding of the GRP and its robustness and reveal where Indian firms do well and where they score poorly. It should also help them ask companies the right questions.

We hope you find this report useful and look forward to your feedback.



Anirudha Dutta
Head of Research, India

Long way to green

CLSA **What is the Green Rating Project (GRP) and what is the idea behind it? How is it relevant for a country like India?**

Chandra Bhushan The Green Rating Project or GRP is a civil society driven intervention effort instituted with the triple aim of making Indian industry more accountable and responsible for the pollution it generates; enabling policy and regulatory changes; and pushing for environmental due diligence in the financial and capital-market sector.

GRP has been run by the Centre for Science and Environment (CSE), a Delhi-based non-profit organisation, since 1997. The project is supported by the United Nations Development Programme (UNDP) and the Union Ministry of Environment and Forests of the government of India.

GRP adopts a public disclosure exercise and ranks environmental performance of industries in a particular sector. Industry players are invited to voluntarily disclose information through a detailed technical questionnaire. The response is then cross-checked with regulatory compliance, community interviews and site surveillance. Plants that do not participate are also assessed using secondary information collected. All these data are then used to objectively grade companies on more than 150 parameters spanning pollution, resource-use efficiency, health and safety and community perception to arrive at the final ranking for each player.

To date, five industry sectors have been rated: pulp and paper (twice: 1999 and 2004); automobile (2001); caustic-soda-chlorine (2002); cement (2005); and iron and steel (2012). Findings about the steel industry study were published in a book titled *Into the furnace*.

As the method is rigorous, independent, participatory and widely publicised, industries are forced to take serious note of the findings and embark on accelerated voluntary improvements. And unlike other green awards, GRP identifies the bad players in a sector, which helps the public and investors to put pressure on them to act.

The idea behind GRP was conceived in the mid-1990s when the late Anil Agarwal (founder-director of CSE) visited the United States. He appreciated the work of the Council on Economic Priorities (CEP), a non-governmental organisation (NGO), which rated the social and environmental performance of industries in the USA. This information was subsequently provided to investors who wanted to invest only in environmentally and socially responsible businesses. Anil Agarwal was pleasantly surprised to learn that despite no government and legal support, these ratings were pushing industry towards more socially and environmentally conscious business practices. GRP was thereafter introduced in India after extensive consultation with economists, industry experts and civil society. There is no coordination with CEP though for disseminating the information of GRP studies. CEP has now evolved into Social Accountability Standard SA8000 for corporates.

In the Indian context, the scale of pollution has increased manifold as the country liberalised and economic growth led to a rise of the natural resource-intensive industry. It was also found that government and regulatory bodies are unable to grow in tandem to control industrial pollution. Moreover, transparency record of Indian industries continues to be poor on the

environmental front. Hence, GRP provides an alternative form of governance to control pollution in India. It essentially acts as a reputational tool to industry players, where good performers can take advantage in the market and poor players are motivated and pushed to improve.

CLSA

What are the key conclusions from the GRP on the steel sector? What are the major recommendations for the sector?

Chandra Bhushan

The iron and steel sector in India was found to be non-transparent, has a high degree of non-compliance to pollution norms, is wasteful in resource consumption and has poor health and safety performance. In terms of numbers, this is what we found: The Indian iron and steel sector's energy consumption of 6.6GCal/tonne crude steel is about 50% higher than the global best practice; and none of the plants were found to be fully compliant to all existing air and water pollution standards.

Every company has scope for significant improvement

Figure 1

Violations by different companies, 2007-10

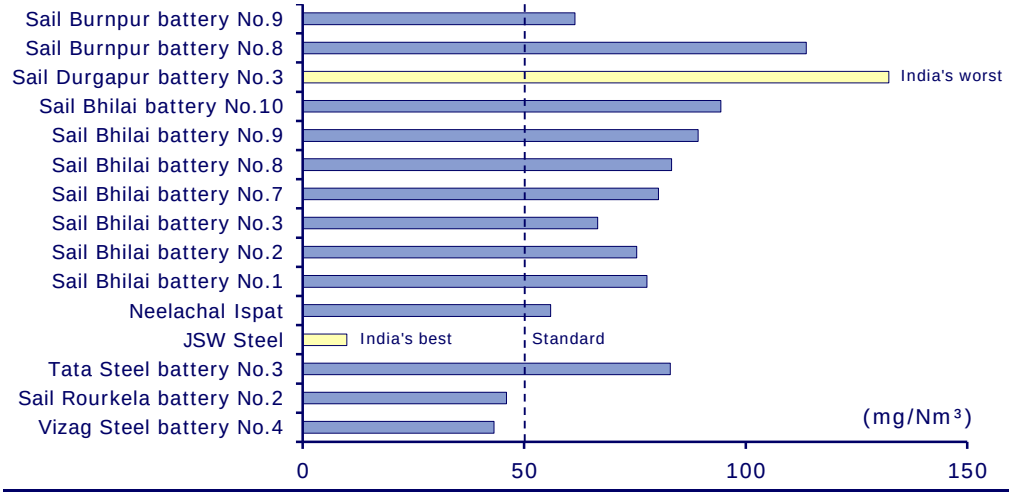
Company	Violations noted from regulatory documents
Tata Steel, Jamshedpur	Coke oven battery No.3 stack particulate-matter (PM) emissions of 83mg/Nm³ against standards of 50mg/Nm³; Sinter Plant No.3 stack PM emissions of 418mg/Nm³ against standards of 150mg/Nm³, solid waste disposal outside premises
Sail Durgapur	Coke oven effluent discharge chemical oxygen demand (COD) concentration level of 816mg/litre against standards of 250mg/litre, heavy leakage emissions of coke oven batteries
Sail Bhilai	Sinter plant No.2 stack PM emissions of 177mg/Nm³ against standards of 150mg/Nm³; coke oven battery No.10 stack PM emissions of 94.4mg/Nm³ against standards of 50mg/Nm³; high secondary dust emissions from its twin-hearth furnace steel melting unit
JSW Steel Bellary	Sinter plant No.2 stack PM emissions of 335mg/Nm³ against standards of 150mg/Nm³; high fugitive emissions from raw material handling area and pellet plant No.1
Vizag Steel (Rashtriya Ispat Nigam; RINL)	Coke oven effluent discharge COD concentration level of 264mg/litre against standards of 250mg/litre; metallurgical wastewater beyond the standards of 100 mg/litre
Jindal Steel and Power, Raigarh	Coal DRI kiln No.5 and No.6 stack PM emissions of 242mg/Nm³ against standards of 50mg/Nm³
Monnet Ispat and Energy, Raigarh	Coal DRI kiln No.2 stack PM emissions 226mg/Nm³ against standards of 50mg/Nm³; flyash solid waste dumping leading to air pollution in nearby school and villages
Bhushan Steel, Dhenkanal	Coal DRI kiln No.2 stack PM emissions 123mg/Nm³ against standards of 100mg/Nm³; heavy solid waste disposal of char (DRI process waste) and flyash outside premises

Note: mg/Nm³ = milligrams per normal cubic metre; DRI = Direct reduced iron. Source: CSE

Sail, Durgapur is the worst and JSW, the best

Figure 2

By-product coke oven battery stack particulate-matter (PM) emissions, 2007-10



Note: This also indicates how poor the batteries would be performing on economic terms such as energy efficiency and waste gas recovery. Source: CSE, CLSA Asia-Pacific Markets

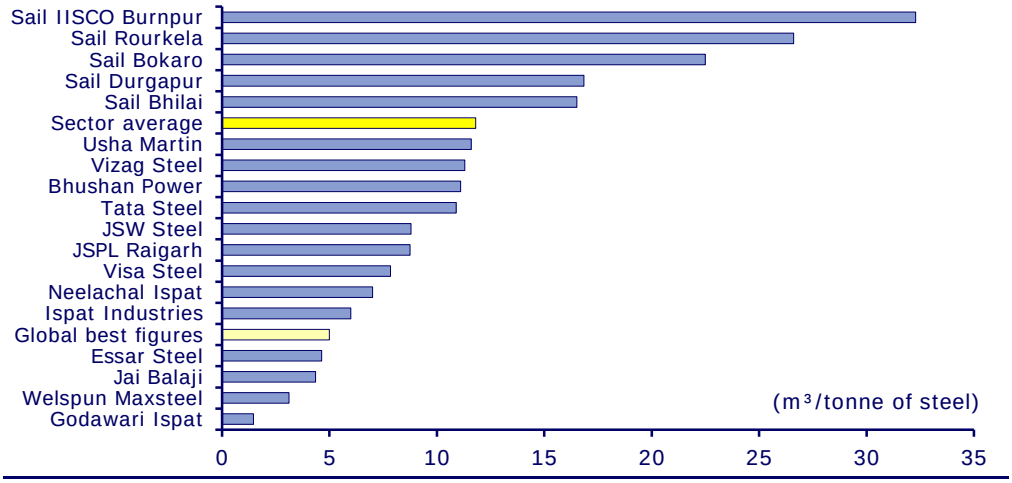
Solid waste generated is around 0.5 tonne/tonne of steel produced, going up to 1.2 tonne for coal DRI processes. Of the 21 plants in the study, 14 dump this solid waste outside premises, severely affecting nearby communities. This also shows poor land planning.

Water consumption, including power generation, township and other downstream operations, was at a high of 16-20m³/tonne of steel produced for large plants - around three times the global best practice.

Among integrated plants, Tata Steel and JSW perform well

Figure 3

Specific water consumption by Indian steel plants[1], 2009-10



[1] Including power, township and downstream. Source: CSE, CLSA Asia-Pacific Markets

The large-scale plants of Steel Authority of India Limited (Sail) and Vizag Steel (corporate entity Rashtriya Ispat Nigam) were found to be highly wasteful on land. They have close to 1,200 hectares (ha) of land per million tonnes of installed capacity; a well-designed plant does not need more than 200ha. If all the residual land with steel plants were to be properly utilised, the industry can produce more than 300m tonnes of steel, not the 75m tonnes it is producing today. In fact, the steel industry will not need extra land till 2025.

It was found that more than 50 people die every year in major steel plants of the country. The steel industry of India has one of the worst safety records in the world.

Coal DRI plants need urgent attention from a pollution-control perspective, especially of fugitive emissions.

Local community relations have been strained due to the industry's lack of concern and needs refocus. For example, JSW Steel, Bellary has severe conflicts with the local community on issues ranging from safety incidents, dust pollution and wastewater discharge. Villagers complained that health facilities are expensive and out of reach. Similarly, Vizag Steel has ignored polluting wastewater discharge to sea, thus leading to conflicts with fishermen. Bhushan Power and Steel, Sambalpur has poor relations due to indiscriminate solid waste dumping and poor land compensation. Essar Steel has had conflicts due to high dust pollution from its raw-material-handling area. Monet Ispat's Raigarh unit has faced several mass protests in recent years on issues of air pollution, land acquisition and water scarcity.

Figure 4

Flyash dumping near Monnet Ispat's Raigarh coal-based sponge iron facility, 2011

The ash dump creates air-pollution problems for local school and villages

Source: CLSA Asia-Pacific Markets

The future road map for the sector is clear. It will have to reduce its ecological footprints drastically, invest in health and safety of its workers and treat local communities as stakeholders and beneficiaries.

GRP has provided information on where companies stand and Indian/ global best practice for every technical indicator. The gap analysis has been clearly presented.

Plants will have to halve their energy use, use only water that is needed, stop discharging wastewater as well as recycle and reuse their solid wastes. They will have to take measures to reduce air emissions by sealing systems and capturing dust effectively.

In fact, the more the companies invest in environmental performance, the higher will be their cost-efficiencies. The investment in energy efficiency pays back, as does the reuse and recycling of waste. The less the use of material and energy, the lower the costs and the lighter the burden of disposals into the environment.

Therefore, good resource management not only makes the steel sector more efficient, but also protects the environment. This is a win-win outcome that the sector must strive towards.

CLSA

GRP benchmarks the environmental performance of a company on the basis of theoretical best practices. When rating an industry, how do you arrive at the theoretical best practices?

Chandra Bhushan

The green rating for a manufacturing unit is done by assessing more than 150 parameters (or indicators). For each parameter, based on the unit's performance, score is awarded on a scale of 0 to 10. The scoring pattern is developed to push even the best players for further improvement. Hence, performance matching the global best practice is awarded a score of 8 and those meeting the regulatory compliance standard or Indian sector average are awarded 2. Performance in between is awarded scores on a linear scale. And companies found to be below compliance level or sector average are awarded no marks.

To arrive at the final tally of 100%, weights are allotted to each parameter. The weightage signifies how critical are the parameter's impact on the environment and community.

Figure 5

There is always scope for improvement

Scoring scale for each performance indicator under GRP

Source: CSE, CLSA Asia-Pacific Markets

The idea of awarding the full 10 marks to theoretical best practice is to assert that even best players have scope for further improvement. For process efficiency-related indicators, theoretical best is determined on the basis of thermodynamic and stoichiometric reaction threshold levels. For pollution indicators, near zero waste with full recycle/reuse is considered theoretical best practice.

CLSA

What is the incentive for a company to share information with you for GRP? How do you rate a company that chooses not to participate and how valid are the ratings given to them?

Chandra Bhushan

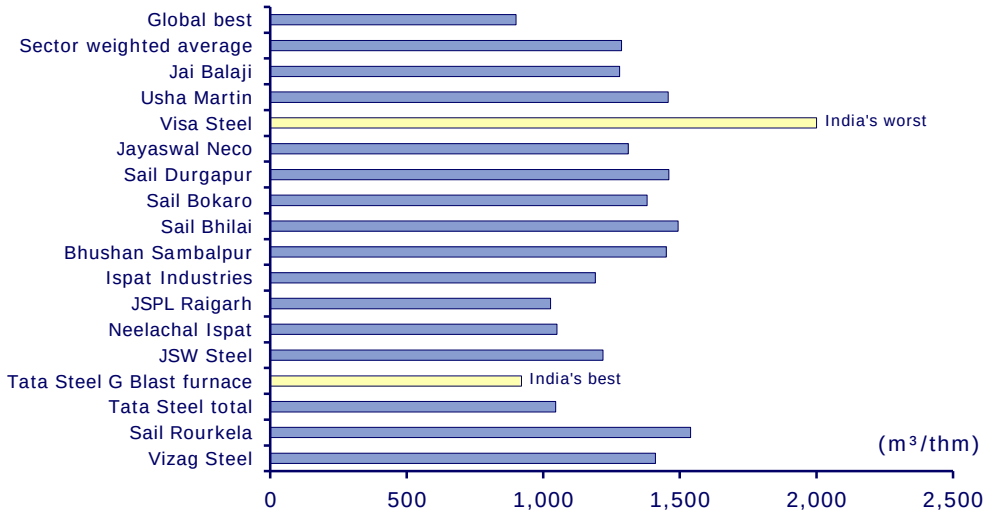
The primary incentive for participation is the reputational benefit that could be derived from an independent and rigorous public audit system. Companies tend to seek recognition for their efforts undertaken and hope to be ranked higher in the pecking order. Moreover, CSE clearly communicates that non-participating units would also be scrutinised and ranked, but potentially obtain lower grades. So, the fear of non-participation leading to adverse attention by stakeholders such as community, media and regulators also drives companies to participate.

Participating companies may use the rating to appeal to investors and their stakeholders. For instance, Neelachal Ispat - ranked fourth in our steel GRP, was recommended by its regulator Orissa Pollution Control Board for a national environmental award. Cases have been seen where customers have demanded products from greener manufacturing units alone. This was seen when a Swedish state-owned company approached CSE while deciding on its paper-sourcing contract with ITC's Bhadrachalam unit - ranked first in the 2004 GRP. And in some other cases, companies have used the ratings to attract and retain talent. Vizag Steel, for instance, used its third-place status in GRP in its recent recruitment drive. In fact, it would be reasonable to say that environmental image also tends to reflect a company's corporate-governance culture.

Figure 6

Tata Steel's latest furnace is the best

Specific hot blast volumes fed into blast furnaces, 2009-10



Note: m³/thm = Cubic metre/tonne of hot metal. Source: CSE, CLSA Asia-Pacific Markets

The other major incentive for participation is to get a clear and unbiased picture on the relative standing on various process and design parameters. GRP makes all efforts to share these "nuts and bolts" details across participating units so that they can gain deeper technical insights. Visits are made by the GRP team for sharing peer performance data. While providing instant clarity, it could also help company management to be more informed and vigilant during future decision-making. Hence, there are multiple incentives for participation.

For those companies that do not come forward to participate, ranking is done based on information collected from regulatory agencies, local community surveys, public domain and even by filing requests under the Right to Information (RTI) Act in case of public-sector units. GRP undertakes complete site surveillance around these units as well to assess the scale of pollution. The non-participating units do not allow survey within factories. All the information collected is analysed and compiled in a company-specific report and sent to the unit seeking its views and thereby participation.

For the rating, the non-participating units are awarded scores on indicators related to equipment design and efficiency (where data are available) as per standard procedures. However, where they get no scores are the categories of pollution impact and stakeholders' perception. Needless to say, the non-participating units are found to have extreme non-compliance and poor community opinion. Hence, their scores, though could be a few notches higher had they participated, reflects the real situation on the ground.

CLSA **GRP was launched in 1997. Since then, how has the attitude of Indian corporations changed? Is there better awareness and willingness to cooperate today?**

Chandra Bhushan When CSE started the rating project in late 1990s, environment was still out of the purview of most Indian industries. This was evident from our reading of the first rating of the pulp and paper sector. Only one unit was certified with the ISO 14001 Environment Management System (EMS) certification. Many companies did not even have a separate environment department. And after a year since the start of our project, only two companies out of 28 came forward for disclosure.

However, when the companies became aware of the seriousness with which GRP was conducting the rating, all of them got involved. As there was hardly any monitoring done by plants, EMS was given a thrust in the rating with the highest weightage. Subsequently, good participation was seen in automobile, chloralkali and the second paper ratings, with over 90% coming forward. In fact, when we did our second study on the paper sector in 2004, most firms had already equipped themselves with certifications and had qualified manpower.

So, during this period we found that the Indian industry was learning about environmental issues and challenges. Despite a lack of awareness, there was a willingness to learn. Hence, we may call the period of 1997-2004 as 'the era of environmental learning'.

By the time we rated the cement sector in 2005, environment had been mainstreamed in corporate-governance structures. All companies had functioning departments with management systems. This phase of 2005-07 could be called 'the era of institutionalisation'.

However, when it came to the steel sector, we were in shock to find steelmakers highly non-transparent and arrogant in the face of strict public scrutiny. Only 13 of 21 units (or just 62%) eventually came forward. This, despite many companies claiming to be "green", obtaining carbon credits and publishing sustainability reports. Our interim mining-sector study also showed serious breaches. So, in the third phase of 2008-12, we find that policies and institutions are there but practice is poor.

In essence, the attitude of the Indian corporate sector on environment has gone from promising to worse over the years. It is our understanding that its approach now is primarily of green-wash. While there is some awareness in company boards, due to the climate-change hype, the willingness to come forward for independent scrutiny is poor. Companies, particularly the large public-sector units and medium/small private players, are found to be hesitant.

Investors need to be, therefore, more discerning in seeking environmentally sustainable companies. The ISO 14001 certification has increasingly become a marketing gimmick plagued by problems such as conflict of interest (company pays auditors), numerous accreditation bodies and poor oversight. For instance, 10 out of the 13 steel plants participating in GRP were ISO 14001 certified, but each of them had received notices related to non-compliance on pollution standards. Few of them were chronic violators.

Even corporate sustainability reporting and third-party assurance systems can be gamed. Sail's Bhilai plant, which publishes annual sustainability reports, has received several regulatory notices for air-emission non-compliance by its coke ovens, sintering units and steel-melting shop over 2007-10. Hence, there is no gold standard yet for investors to accurately gauge environmental performance of corporations in countries like India.

Beyond certifications, the first step that investors could take is to ask companies to clearly declare in their annual reports and exchange filings as to whether any regulatory notices on non-compliance to air, water and solid waste pollution was received during a given year. Community complaints and court cases filed with regard to pollution could also be duly disclosed.

Going forward, the investor community should seek more independent due diligence studies and assessments.

CLSA **While Indian firms are not transparent, have you studied the disclosure levels of companies in other countries? Which of them are comparable to India and which are significantly better in disclosure?**

Chandra Bhushan We first need to appreciate that public disclosure programme is an alternative tool to conventional regulatory enforcement and market-based instruments for achieving pollution control. As the latter two means are fairly advanced in developed countries, the scope of public disclosure is limited but nevertheless powerful. For example, the USA's Toxic Release Inventory registry scheme is a strong tool for companies to disclose harmful chemicals release that are not yet governed by conventional laws. Moreover, government research on best practice technology and other regulatory documents are put on websites.

Public disclosure programmes accompanied with ratings have flourished primarily in developing countries where regulatory forces and political will are weak. The major disclosure programmes running in comparable countries to India are Indonesia's Programme for Pollution Control Evaluation and Rating (PROPER) and Philippines' Eco-Watch, both of which started in the 1990s. Based on their success, disclosure programmes were started in China (Greenwatch), Mexico (Clean Industry Programme), Vietnam (Green/Black Book), Chile and Colombia. Several research documents show that initially participation of corporations were low in these countries and increased gradually. More importantly, the same research documents show significant improvement in pollution performance over time.

CLSA **GRP does not stop with ratings. You lay down clear guidelines for the industry rated to improve its performance. What kind of initiatives have you seen the Indian corporations take? Please give specific examples. Why does corporate India take these steps? Is it just to better their image or is there sound economic logic?**

Chandra Bhushan The impact of GRP on corporations was visible in all the sectors we have rated so far. Following the rating, pulp and paper companies moved to farm forestry for raw-material sourcing and started water-conservation measures and phasing away elemental chlorine bleaching. After our assessment of the chloralkali industry, which showed dangerous mercury pollution, 85% of firms shifted to alternative membrane-cell technology. The automobile-sector rating pushed carmakers to disclose pollution certificates for the first time and enabled them to surpass vehicle emissions standards. After our cement study, the industry moved to address its high fugitive dust emissions levels.

Since our iron and steel sector rating too, some corporations have started to reduce wastewater discharge and bring in world-class safety inspectors already. For example, Vizag Steel has installed a new reverse-osmosis (RO) unit in April 2012 to recycle water and recover precious metallurgical waste. The company informed us that the water recycled from the new system is close to 10% of its current water demand. JSW Steel, Bellary has employed DuPont Safety Consultants in January 2012 for a five-year period to tackle the company's poor safety record. It has also worked on plugging wastewater outlets and recycling it back to the process.

The reasons why corporations undertake these initiatives are manifold. In most cases, these bring positive economic returns by improving the bottom line. Such measures may not have been properly scrutinised earlier and benchmarking enlightens and helps in informed and faster decision-making.

In some cases, measures improve security of supply of key raw materials and resources by minimising waste generation. In other cases, community and regulatory pressure forces companies to reduce pollution. Poor health and safety performance affects corporate image, productivity and talent retention, so they act as drivers. Hence, a number of motivating factors lead to firms deciding on initiatives. It is, however, made clear that green rating by itself does not force companies to act, but the public awareness creates a pressure.

CLSA **CSE has done GRP for a few sectors. Why is it that, barring the paper industry, it has not revisited the ratings after a few years to assess the improvement or otherwise?**

Chandra Bhushan We revisited the pulp and paper industry after five years to essentially check whether the disclosure programme really pushed the industry to improve on its pollution performance. The substantial improvement observed instilled confidence in us for undertaking further GRP research. In the other sectors rated, such as chloralkali and automobile, significant voluntary improvements have subsequently taken place due to government schemes/programmes and customer awareness. The cement sector, which is fairly market-driven, has aggressive internal competition that is driving the players to improve pollution control, as the waste here is the product itself.

On the other hand, India has over 17 heavy industry sectors that are categorised as highly polluting by the Central Pollution Control Board (CPCB). Hence, while there are many requests to CSE to revisit the earlier rated sectors, they have not been taken up as many more sectors are still in the dark.

CLSA **For better environmental compliance and standards, government intervention and regulation is more often than not necessary. How responsive have you found the MOEF/government of India to be and what has your intervention achieved?**

Chandra Bhushan Indeed, government regulation forms the foundation to achieve better environmental performance and GRP targets policy improvements as one of its key efforts. The MOEF/government of India has been quite responsive to GRP findings and has introduced different policy interventions. For example, bamboo has been taken off the timber list, eliminating monopoly control of the forests department. This has and will continue to boost farm forestry of the key raw-material source to the paper industry while providing sustainable livelihoods to the nearby community. Our study on the sector has also led to the introduction of standards for organochlorine (AoX), a carcinogen, for the first time.

Our chloralkali rating changed not only how mercury emissions are regulated in India but also raised alarm bells on poor inventory management globally, which led to new standards worldwide as well. The new mercury regulations are now based on input quantity, concentration in products and major point sources.

After our automobile rating, the Indian government forced adoption of vehicle emissions standards, equivalent to the EU stage norms. Following our cement rating, the CPCB came out with guidelines for fugitive emission norms in production and packaging areas. So, GRP has directly/indirectly aided the government to introduce standards and regulate with stricter control.

Interestingly, our chloralkali GRP study has also pushed the government to introduce market-based instruments. In the Union Budget of 2003-04, the government announced reduction in import duty from 15% to 5% for the alternative membrane-cell technology, taking cues from our study.

Even during our steel-sector study, state pollution control boards had become more vigilant and responsive to our concerns. The West Bengal Pollution Control Board issued a financial penalty in the form of performance bank guarantee of Rs10m to Sail's Durgapur unit in August 2011. The sum would be forfeited by the board in case compliance conditions are not met within the specified time.

We further hope that the steel-sector study will help the Environmental Clearance Committee to understand the inherent flaws and take corrective measures during the project-appraisal phase. Existing flaws include a lack of clear benchmarks on requirement of land, water, etc, while taking decisions on clearances; non-availability of information on best available technologies; no site visits undertaken prior to issuing clearance (this leads to site conditions and assimilative capacity of environment being ignored); overlooking past performance; and community concerns not being internalised in decision making.

CLSA **How do you select the industry that you want to rate? What are the criteria?**

Chandra Bhushan As mentioned earlier, the CPCB has a list of 17 highly polluting sectors that come under the red category. GRP usually starts with this list. Beyond that, GRP primarily selects industries based on the extent of pollution impact, growth pattern and whether there is lack of information on the performance of individual plants and sector as a whole. Industries that have a large number of private players are considered as public-sector units are not affected much by reputational incentive. However, we understand that with the recent trend of listing of shares of public-sector units, they too would be affected by poor image and hence we could be considering coal-based thermal power plants.

In general, the selection depends on how fast a sector is growing. A high growth rate calls for urgent attention to address resource-use and pollution problems from existing as well as new units by taking more informed decisions by all stakeholders.

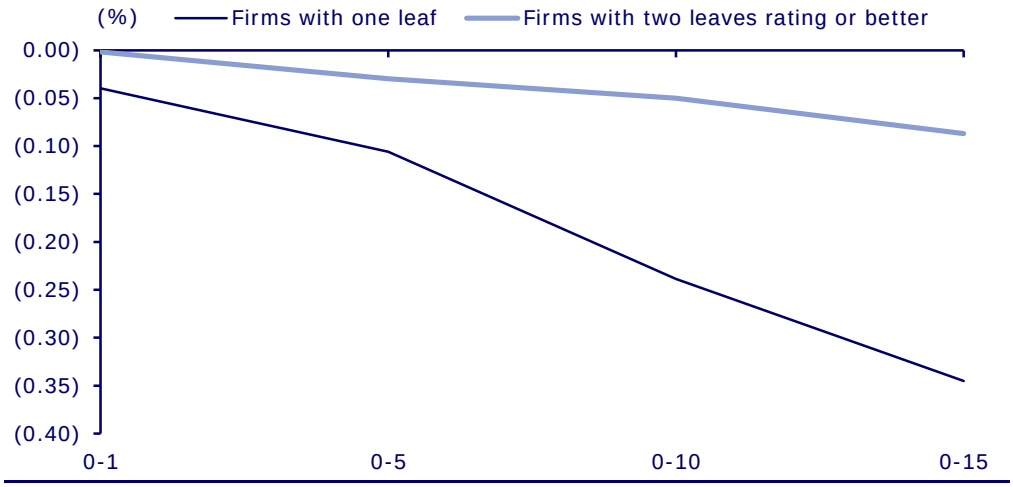
CLSA **Have you studied the financial and stock-market performance of companies and their GRP ratings?**

Chandra Bhushan CSE has not undertaken any stock-market performance research as it would have independence issues. Externally though, the Delhi School of Economics and Institute of Economic Growth published a research paper in 2003 titled *Do stock markets penalise environment-unfriendly behaviour? Evidence from India*. The paper done for three GRP sectors concluded that, 'We find that the market generally penalises environmentally unfriendly behaviour in that announcement of poor environmental performance by firms leads to negative abnormal returns of up to 43 per cent. A positive correlation is found between abnormal returns to a firm's stock and the level of its environmental performance.'

Stock price and GRP score correlate

Figure 7

Impact of GRP on share prices of companies



Note: Refer to Figure 9 on page 20 for award categories. Source: Gupta S and Goldar B (2005), 'Do stock markets penalise environment-unfriendly behaviour? Evidence from India', *Journal of Ecological Economics*, 52, pages 81-95, CSE, CLSA Asia-Pacific Markets

In particular, for pulp and paper and chloralkali listed companies the study found that abnormal cumulative return in first 15 days of one-leaf company (scoring 15-25%) was -0.35 versus -0.09 for the higher-scoring companies.

More definitive studies, however, need to be undertaken on the influence of environmental rating of Indian firms on capital markets. The stock-market performance over the past 10 years of companies previously rated also needs to be studied to identify any hidden patterns.

CLSA **One of the criteria in your rating process is stakeholders' perception. Why do you include this in what is otherwise an objective rating criteria and how is it important?**

Chandra Bhushan While the GRP is primarily based on quantitative performance for bulk of indicators, around 10-15% of the weightage is allotted to stakeholders' perception. Stakeholders include the local community, concerned pollution control board officers and GRP surveyors.

Numerical data disclosed by companies on environment and sustainable development tend to show a brighter picture, masking the real underlying performance. GRP therefore follows a risk-based approach at every step to ensure the scores reflect fair and conservative estimates.

To do this, company data need to be cross-checked from multiple sources. GRP surveyors initially verify with daily production reports and log books. A major independent source is the pollution control boards. However, it is generally found in India that many state pollution regulatory agencies do not undertake required monitoring and inspection of industries. In other cases, it was found that as industry groups are powerful in the regions they operate, regulatory agencies do not like to create a stir by presenting the accurate picture. Hence, independent and accurate data on pollution performance are not easily available. Thus, stakeholders' views are captured for a more precise assessment on the situation on the ground and act as a good alternative barometer.

Even though stakeholders' views are subjective, GRP attempts break them down into several sub-indicators (air/water pollution, land acquisition, transparency, etc) and quantify the overall perception in the form of an index. It just does not blindly allot a score for stakeholders' perception. So subjectivity is removed to the extent possible.

Secondly, stakeholders' perception also gauges how good are the claims of companies on social responsibility, such as providing basic amenities and maintaining harmonious relations. In all, the social dimension of the sector is vividly captured in this section and the numbers tell a story all by themselves.

CLSA **You have made site-specific studies of environmental impact within the scope of GRP and ignored subsidiaries, etc. The ratings, meanwhile, are for the company as a whole. Should your ratings then not be specific to the production stage rather than the company? For example, was Essar Steel's pellet plant evaluated and is it part of GRP?**

Chandra Bhushan GRP aims to compare the performance of plants in as much uniform platform as possible. As steel plants have different corporate structures (with some owning power plants and others hiving them off as subsidiaries) for producing the same tonne of crude steel, it is imperative to even out all heterogeneous factors.

Furthermore, environmental impacts for community and ecology are site-specific and the extent of damage in an area can only be assessed if the companies' subsidiaries such as power plants operating there are included.

It is to be made clear here that the GRP ratings are not for a company as a whole but for the production unit alone. Hence, for each stage, rankings and scores are clearly mentioned with the location of the facility.

Consequently, what is not included are the distant subsidiaries (located elsewhere) as they are having no bearing on the historical environmental impact of the main production unit. Hence, Essar Steel's Hazira unit, the pellet plant, located at Vizag, was not included in the assessment.

In a big-picture view, if one sits back and introspects, what final GRP scores do reflect are the relative performance of the plants. All stage-wise ratings are based on percentage performances that are then stacked up. So, the final scores reflect a generic underlying picture derived from scores of many stages and hence adding/excluding a stage subsidiary does not make much of a difference to the overall score.

CLSA **Your rating process is technology-neutral. Does it mean you normalise the differences due to use of different generations of technology of the same equipment like say, the C and H blast furnace of Tata Steel?**

Chandra Bhushan What we mean by technology-neutral is that different metallurgical routes (such as blast furnace or sponge iron) to make the same intermediate product (iron) are assessed in apples-to-apples comparison. So, performance of a blast furnace is compared against its own global best practice. Similarly, coal DRI is compared with its own best practice.

Further, if a unit has both these processes to make iron, then the final score is based on individual process scores weighted by installed capacity of those processes and no other extraneous preferential factors. In other words, GRP is not trying to favour one metallurgical route over the other.

In terms of vintage of generation of technology, all units under a process are considered uniformly. So the C blast furnace of Tata Steel commissioned in 1924 is compared with the environmental performance of the same facility's H blast furnace commissioned in 2008. In fact, what is found from this study is that older equipment is highly inefficient in resource consumption and pollution and needs to be phased out to improve performance. In many cases, it also makes economic sense. Tata Steel Jamshedpur has already phased out its A and B blast furnace, which were 100 years old and of significantly smaller unit capacity.

CLSA **Apart from technology vintage, the process itself may result in different parameters. Is your rating system process-neutral? Does it therefore mean that a blast furnace-basic oxygen furnace (BF-BOF) steel producer, which is, say, close to global best parameters would do better in rating if a competitive electric arc furnace (EAF) player is not close to global best parameters in EAF, but is significantly less polluting than the BF-BOF player?**

Chandra Bhushan Yes, as mentioned earlier, GRP has kept the rating process neutral where we do not favour one metallurgical route over the other. However, as mentioned before, each process is compared with its own global best practice counterpart. And global best parameters on air, water and solid-waste pollution signal minimum impact, irrespective of process. While adding up the cumulative score too, it is done on weighted installed capacity alone.

The broad message though coming from this study is that coal-based sponge iron configuration (used along with electric furnaces) has substantially more environmental challenges it needs to address in the form of controlling air-pollution and solid-waste disposal impacts. The process, which is predominant only in India, is in rudimentary form and a lot of technological development is required to reduce energy consumption and pollution impact.

While the choice of process needs to be further debated in the Indian context, we urge for stricter limits on minimum production unit capacity in India to start with. This is because of economies of scale for installing pollution control technology.

Incidentally, China's Ministry of Industry and Information Technology (MIIT) has announced new minimum capacity regulations for its iron and steel sector in early September. For example, it says blast furnaces should be more than 400m³ in volume, converter or electric furnaces should be above 30 tonnes in size and high-alloy steel furnaces should be over 10 tonnes.

CLSA **In resource use, the DRI-EAF based players score better than the BF-BOF players. How are the process differences normalised?**

Chandra Bhushan The DRI-EAF players that have scored higher in resource use are the natural gas-based sponge iron units. These units have lower specific energy, water-consumption and land-use pattern and hence, score higher than BF-BOF players. On the other hand, while coal-based sponge iron has low water use, it was found highly inefficient in energy consumption. The final results among coal-based production units (blast furnace or coal-based sponge iron) are mixed. All these differences of various processes are not normalised by GRP, as this shows the absolute performance to produce one tonne of crude steel.

CLSA **An integrated BF-BOF player would have more pollution because of coke oven batteries, etc, and would compare unfavourably to an EAF player. But your rating system does not take into account the pollution caused to produce the electricity and the scrap used in the EAF. Similar argument holds true for specific water consumption. Is that a weakness and is it possible to design a more holistic rating system?**

Chandra Bhushan No. As mentioned earlier, we are only doing apples-to-apples comparison in process, ie, a coke oven (of a unit) can score good marks if it is close to its own best practice. Similarly, an EAF unit can achieve low scores if it is operating poorly compared to its own best practice. The problem we found is that several BF-BOF plants were having low performance in different processes (including coke ovens) and need a lot to catch up. This is what the scores actually say.

Further, for plant boundary-level assessment categories such as pollution impact, resource efficiency and stakeholders' perception, absolute performance is considered, irrespective of configurations.

The GRP methodology takes into account relevant variations and site-specific environmental impacts. So, water and energy (including power) are considered and adjusted for like-to-like performance across all plants.

In general, it was found that the combined iron-making stages are the most polluting category and hence given highest weightage, 35 out of 100 (see Figure 6 below). It is here that the cleaner and polluting processes tend to differentiate and that reflects in overall scores.

Iron-making phase is given maximum weightage

Figure 8

Weight distribution for steel-sector GRP

	(%)
Production phase	**82.5**
Iron-making process	35.0
Steel-making process	7.5
Raw-material handling and storage	6.0
Overall pollution	18.0
Overall resource use	16.0
Corporate safety and environmental management systems	**7.5**
Stakeholders' perception	**10.0**
Total	**100**

Source: CSE, CLSA Asia-Pacific Markets

Nevertheless, with the best steel plant obtaining only 40% marks, GRP shows how far away the Indian plants are in terms of environmental best practice.

CLSA **Did your surveyors also undertake any study on the rehabilitation & resettlement (R&R) and sustainability work done by the companies other than relying on the stakeholders' perception of the same?**

Chandra Bhushan The first data we use for examining social responsibility and rehabilitation work are those that come from the corporations. Companies also take our surveyors around to showcase their initiatives. It is only thereafter that surveyors undertake independent interviews with stakeholders to cross-check these claims. A number of research documents and media reports are also used. The views of the company being rated and the stakeholders are published in an individual environmental report, which is then shared with the company to get its final response. All this information is then used for scoring the stakeholders' perception with as much objectivity as possible using several sub-indicators. So, a company may be perceived to be good in water-pollution criteria, but score poorly in air emissions and solid-waste disposal.

CLSA **You have observed that certain players have high Ebitda but low employee costs, etc. Ebitda is a good global comparison parameter when we look at similar routes of production and technology level. But it is irrelevant when you are comparing different production processes, plant vintages and capital intensities. Your thoughts?**

Chandra Bhushan We would like to make it clear that the discussion in the GRP on operating profit or Ebitda is only for a general observation as part of the study and not used for the environmental ranking whatsoever. Some companies have high Ebitda due to captive iron-ore and coal mines. In general, it was found that the share of employee costs in turnover is low in India's steel sector (2-10%, except Sail at about 18%). Many Indian firms also employ a large proportion of semi-skilled contract workers, keeping overall manpower costs low.

Indeed, Ebitda reflects only operational performance and not capex, which varies from company to company based on their expansion plans. So, while we understand that the analysis on capital-related costs is equally useful to investors, GRP has not yet made any specific research in this regard.

CLSA **Employee costs are low compared to which countries? Because of the low labour costs, Indian firms across sectors will have low employee costs irrespective of contract labour being employed or not. Further, should we not look at labour cost/person/per tonne of production? While commenting on the possible reasons for high incidence of contract workforce, have you looked at labour laws that may be at least partly responsible for this situation?**

Chandra Bhushan The employee costs of Indian labour are low compared to the advanced countries. The share of is around 2-10% of turnover in India, whereas it is high at 20% in the USA. While Europe and Japan have similar ratios as India, their productivity per employee is significantly higher. Hence, as per our study, labour costs of large Indian steel producers were around US$25-50/tonne of steel compared to US$50-100/tonne in advanced countries such as Japan, the USA and Europe. However, Chinese wage costs are still low at US$10-15/tonne, as per latest World Steel Dynamics data.

We believe labour laws are not responsible for the increased proportion of contract workforce in the steel industry. It would appear that to keep costs low, semi-skilled workers are being principally hired. However, detailed study needs to be conducted on the major reason for this trend including labour laws.

Such a trend could in the longer term affect the steel industry in terms of poor skill development, in-house knowledge buildup, worker health and safety and product quality. This is something that calls for urgent attention from the industry and government.

CLSA **Absolute levels of parameters measured are important. Do you take into account the improvements over a period of time, say five years or 10 years, given that some plants may be carrying historical baggage of 30 or 50 or 100 years of operation?**

Chandra Bhushan Yes, GRP considers performance trends over a three-year time frame. It also takes into account developments taking place in the past five years in terms of expansions and innovations.

However, GRP does not take into account the vintage of the plant in environmental ranking, ie, there is no differentiation for a 30, 50 or 100-year-old plant. This is because most of the indicators are about current performance and practices. The principle adopted is also from the spirit of environmental standards established, which does not differentiate whether a plant is old or new. The pollution standards are the same across plants, irrespective of vintage, and the manufacturing units need to keep upgrading to bring in improvements. So, we have a 100-year-old plant (Tata Steel) coming in at 5th, whereas a 50-year-old plant (Sail Rourkela) at 11th.

In fact, many of the European and Japanese plants that are older than their Indian counterparts have constantly upgraded their facilities to improve their economic performance, while also yielding significant environmental benefits.

And lastly we would like to assert that GRP is purely an environment, health and safety performance ranking. The procedure is technically rigorous with a robust methodology and provides an unbiased, objective picture of performance. We do not want to bring in any distortions due to extraneous factors such as age, public or private sector, economic performance, etc.

CLSA **How would you account for the differences due to plant age and vintage? And is it relevant at all from the ESG perspective?**

Chandra Bhushan As mentioned earlier, age of a plant cannot be viewed as a shortcoming in the measurement of its environmental performance. In fact, environmental, social and governance (ESG) perspective should not be clouded by the vintage of a plant. In a growing sector such as steel in India, companies need to constantly explore opportunities for technological upgrade to improve their economic competitiveness. In most cases, they deliver better environmental performance as well. The upgrade also helps in attracting and retaining brighter talent, while ensuring the community nearby does not suffer the pollution from existing and new facilities.

CLSA **For every company, especially where there are multiple similar type of equipment like say EAFs or BFs or coke oven batteries, should the best achievements of a company be highlighted along with the year of installation/commissioning? It would help to gauge the progress.**

Chandra Bhushan Yes. All these details have been clearly presented in the individual environmental profile of the companies, which will soon be released publicly. This will help stakeholders get a deeper insight into each company's production and pollution performance, while also learning about the type of comments being received from various local stakeholders.

CLSA **How have the different companies fared in GRP? What do you think are the weaknesses, if any, in your rating process?**

Chandra Bhushan GRP's final score framework aims to show where companies stand relative to each other and global best practice. The rating bands expressed in the form of green leaves award pushes the industries for better practices and better performance.

One aim is to push companies towards better practices

Figure 9

Rating bands under GRP, 2012

Final score	Award category	Criteria
Above 75%	5 leaves	❑ Performance far exceeding compliance requirements ❑ Global best technology ❑ Best management practices
50-75%	4 leaves	❑ Good Compliance ❑ Good technology and performance ❑ Strong management practices
35-49.9%	3 leaves	❑ Average performance on compliance ❑ Average technology and performance ❑ Average management practices
25-34.9%	2 leaves	❑ Below average compliance conditions ❑ Below average technology and performance ❑ Basic management practices
15-24.9%	1 leaf	❑ Poor performance ❑ Frequent cases of non-compliance ❑ Inadequate management practices
Less than 15%	No award	❑ Regular non-compliance ❑ Poor performance and management practices ❑ Non-participation under GRP

Source: CSE

Final scores show an interesting trend of different sets of firms - resource crunch has forced the top rated ones to innovate

Figure 10

Final ranking of plants under GRP, 2012

Plant	Score (%)	Rating
Ispat Industries, Raigad, Maharashtra	40	
Essar Steel, Hazira, Gujarat	39	
Vizag Steel Plant, Visakhapatnam, Andhra Pradesh	36	
Neelachal Ispat Nigam, Kalinganagar, Orissa	33	
Tata Steel, Jamshedpur, Jharkhand	32	
JSW Steel Vijaynagar, Bellary, Karnataka	27	
Visa Steel, Kalinganagar, Orissa	26	
Godawari Power and Ispat, Raipur, Chhattisgarh	26	
Jindal Steel and Power, Raigarh, Chhattisgarh	24	
Jai Balaji Industries, Banskopa, Durgapur, West Bengal	23	
Sail Rourkela, Orissa	21	
Bhushan Power and Steel, Sambalpur, Orissa	20	
Usha Martin, Jamshedpur	15	
Welspun Maxsteel, Raigad, Maharashtra[1]	9	
Sail Bhilai, Chhattisgarh[1]	9	
Sail Durgapur, West Bengal[1]	7	
Sail Bokaro, Jharkhand[1]	7	
Jayaswal Neco Industries, Raipur, Chhattisgarh[1]	4	
Sail IISCO Burnpur, West Bengal[1]	3	
Monnet Ispat and Energy, Raigarh, Chhattisgarh[1]	3	
Bhushan Steel, Dhenkanal, Orissa[1]	2	

[1] These plants did not participate in the rating. Their performance is based on secondary information and community survey. Source: CSE

The units of public-sector major Sail were found to be highly polluting with poor regard to compliance to pollution norms. Only one plant (Rourkela) of the five participated despite repeated requests for participation.

Coal DRI plants were also found to have low score on account of no proper management of air emissions and solid-waste disposal.

It is interesting to note that all the three top companies work against economic odds. These units import their energy and do not have captive mines for iron ore. In the gas-based Essar Steel, Hazira and Ispat Industries, Raigad, energy costs are as high as 23-30% of turnover. In Rashtriya Ispat Nigam (Vizag Steel Plant), Visakhapatnam, iron ore constitutes 17% of its turnover and coking coal another 31%.

So, there is no level playing field. The top three companies have no option but to innovate to survive. They have invested in efficient technologies and work hard to reduce costs of energy and improve their material efficiency by ensuring reuse. Essar Steel has invested in hot DRI charging facility for its electric arc furnaces to minimise electrical energy consumption in the furnaces. Vizag Steel has invested in coke dry quenching to recover heat (for power generation) from red hot coke produced by coke ovens. Ispat Industries has advanced pulverised coal-injection facilities in its blast furnace, minimising use of expensive coke. These efforts, made for simple economic imperatives, also improve their environmental performance. But it is incidental, not deliberate.

As regards weakness in the rating, data collection on global best practices would be one area of improvement. Particularly, there is a need for best practice for coal-based sponge iron process.

As GRP only considers the major players, small companies that are equally polluting have been left out. This only means that large players are being pushed to improve their performance. We need a mechanism where small cluster-based players also need to be pushed for compliance.

CLSA **Can you highlight some of the company-specific recommendations that you have given? For example, Tata Steel's No.8 and No.9 coke oven batteries/G and H blast furnaces seem to be performing well. The company has a phased modernisation plan. Have you studied that and its impact?**

Chandra Bhushan GRP primarily acts as a mirror to show where the good and bad areas of a company are. It is up to management and their shareholders to study our findings and take initiatives.

Through this process we do give company-specific suggestions on areas of improvement. For example, for Tata Steel's Jamshedpur unit, our recommendations include:

- Seriously address the issue of dumping melting shop slag outside premises
- Increase water accounting and balancing to minimise consumption
- Step up vigilance, monitoring and efforts on wastewater discharge
- Improve green-belt development and ambient air quality
- Phase out old and polluting coke ovens and sinter plants.
- Address local community concerns about pollution

GRP assessed the impacts of Tata Steel during the three-year window of 2007-08 to 2009-10 and found improving resource efficiency. However, the company's pollution levels remained high.

CLSA **Can you give some specific instances of gross violation of existing norms and regulations?**

Chandra Bhushan At large integrated steel plants with coke ovens where by-products are recovered, only 11 of the 45 batteries in India meet the leakage emission norms for toxic gases released. These gases contain dangerous polycyclic aromatic hydrocarbon (PAH) compounds, including benzene, which can cause cancer. While there have been numerous research studies abroad, we were surprised to find total ignorance among senior plant management and doctors in India. No scientific tests have yet been undertaken on the health impact on the workers here. Further, this process also releases toxic wastewater containing cyanide, tar, phenols and ammonia. None of the nine plants in India comply with these discharge norms.

Of the 34 sintering machines operating in the country, only three comply with the stack particulate-matter (PM) emission norms of 150mg/Nm^3. None of the sinter machines meet the minimum workzone fugitive emission levels.

In blast furnaces used for producing molten metal and where high fumes are generated, only 12 of the 43 surveyed units had installed cast-house dust emission control system. This implies others are not bothered by high dust emissions in workzone areas. Incidentally, as per a voluntary commitment of the companies with the government made in 2003, all of them should have had these systems in place by now.

In steel making, of the 30 basic-oxygen furnaces, only eight had installed advanced dog-house emission control. This means other furnaces have thick red dust emissions still openly coming out of their shop-floor roofs.

Metallurgical wastewater from BF-BOF process plants were found to be largely non-complying to suspended solids and heavy metals.

Non-compliant wastewater disposal

Figure 11

Vizag Steel discharges blast-furnace metallurgical wastewater into sea, 2011

Source: CSE

Again among coal DRI plants, none of them meet the stack PM and fugitive emission standards. Out of the eight plants having EAF, six have installed canopy hood dust emission control, but effectiveness of dust capture is a concern. Induction furnaces operated by smaller units do not have even basic air-pollution control and proper housekeeping mechanism.

As regards solid-waste disposal of slag and flyash, there are no standards established yet and plants dispose them haphazardly outside premises, creating huge problems to the community around.

To sum up, Indian steel plants have a long way to go to even meet the basic minimum compliance standards laid down by the government. We need to also bear in mind that existing Indian standards are far weaker compared to those in advanced countries.

CLSA **What are the risks to the companies if remedial measures are not undertaken, in your view? What are the specific risks that the investor and financial community should be aware of?**

Chandra Bhushan The Indian steel sector is growing annually in line with the country's real GDP rate and this should continue in the near future. On the other hand, our import tariffs on steel products are kept low at 5% (which has been increased to 7.5% for special products now). This means Indian steel players are exposed to competitiveness externally as well.

Meanwhile, rising raw-material and commodity costs have been eating into the profit margins of companies. What we have learnt from the GRP survey is that weak environmental performance implies wasteful expenditure and a poor cost-consciousness culture. So, in a competitive market setting, those players with poor environmental performance will see lower profit compared to their own historical performances.

Of course, raw-material security has given some Indian companies leeway and advantage, but that is being lost out through poorer productivity and higher waste generation.

Second, as companies wish to expand by building newer factories to cater to the growing steel demand, issues such as water, land and pollution impact become critical. The historical performances of their existing units may affect the level of acceptance from the local community where their new plants are to be set up.

Third, as environmental performance acts as mirror on corporate-governance culture, poor performers will have difficulty in attracting and retaining talent, a key ingredient for long-term productivity.

The importance of health and safety risk needs not be underscored to Indian players. Everyone is aware that the Indian government had to defer the Rs25bn IPO disinvestment of its Vizag Steel unit in July this year after a massive accident the previous month where 19 people died. Confidence in management from its own workers has been lost. Similarly, the cost to be borne by British Petroleum for its Deepwater Horizon incident is still fresh in memory.

For investors and the financial community, our steel-sector rating throws up loads of insights into the challenge of minimising investment risks. The learning could vary from deeper understanding of corporate-governance culture (including, if we may say, cost consciousness), management strategy, risk due to potential hazard/incident, sudden regulatory shock (such as closure of certain polluting units or entire facility), government rejection to further expansions, legal challenges and local community pressures that affect day-to-day operations.

In fact, financial institutions funding polluting units can suffer reputational damage if they ignore proper due diligence of ESG factors. This was found during our steel-sector GRP when International Finance Corporation (IFC), the World Bank's private-sector development arm, which boasts of having the best global ESG standards, was found investing in a slew of Indian companies with very poor environment and safety performances, including Usha Martin steel mill in Jamshedpur. CSE's revelation was picked up by global bank watchdogs.

Banks face major risks from lending to companies with poor environmental performance for the same reasons as mentioned above.

A picture is worth a thousand words

Figure 12

Red dust emissions from electric arc furnace units at Usha Martin, 2011

Note: IFC, Washington, held an equity stake in the company. Source: CSE

CLSA **Some companies disclose a few details in their annual reports or on their websites about their ESG performance. Would you like to comment on how the various steel companies stack up in this regard? This is important since more often than not these are the primary sources of information for the investor and studies like yours are done every five years or so.**

Chandra Bhushan Indeed, only four steel plants (Essar, JSW, Tata and Sail Bhilai) of the 21 assessed produce their own sustainability reports till date. For other plants, the brief information disclosed in their annual reports is the only source of information for investors.

What we found from the GRP survey is that regardless of whether a company produces a sustainability report or not, the pollution impact on the ground is quite contrary to the information presented. All kinds of disclosure by companies tend to present a good picture, masking the underlying and sometimes stark realities and risks. So, our caution is that information presented in these corporate reports should not be considered as sacrosanct in terms of materiality and completeness. The assurance provided by paid consultants is not proof enough. Even management-system certifications such as ISO 14001 or OHSAS 18001 have lost credibility. This is a phenomenon observed across industry sectors in India (and also other parts of the world), primarily due to conflict of interest. The flawed system of corporate disclosure in India is really a disturbing pattern.

What is needed is more independent, on-the-ground appraisal and factual reporting by qualified assessors who are free of conflict of interest. The banks, investor community, government and other interested parties need to come forward to have more periodic independent assessments done for the benefit of all.

CLSA **After your study, are there any specific recommendations for the MOEF or the various SPCBs? It is evident that different SPCBs follow different standards. How can this be remedied?**

Chandra Bhushan The following are our broad recommendations to the environment ministry and state regulatory agencies:

- A move from concentration-based to load-based standards so to consider the environment's assimilative capacity as steel-industry production expands. The existing system of concentration-based standard prescribes limits as only specific quantity of pollutant in an emissions stream (such as mg/Nm^3 for a stack) or an effluent discharge (mg/litre) and does not consider the absolute quantity of pollutants (PM, sulphur dioxide ,etc) released from all streams combined on a per-hour or per-day basis. This is addressed by moving over to load-based standards.
- Tighten air-pollution norms including fugitive emissions in workzone areas.
- Clear guidelines are needed for solid-waste management and pushing for recycle and reuse.
- Do not allow new greenfield by-product recovery of coke oven batteries, as even the most modern units in India are unable to meet international standards.
- Develop norms to control fugitive emissions from raw-material handling and storage.
- Strengthen the capacity of regulatory boards to do proper monitoring and enforcement.
- Improve the accountability of pollution control board inspectors and all monitoring and inspection data should be made publicly available.
- Increase financial penalty for non-compliance so as to act as deterrent.
- Develop best practice guidelines which should be used by both regulators and industries.

The national pollution standards for emissions/discharges are those stipulated as maximum limits for any operating manufacturing facility across India. Further, as pollution becomes a localised issue where certain types of polluting industries are concentrated in some states, the public and political pressure could lead to those states imposing stricter regulations. This cannot be ruled out as local community concerns and ecology conservation take precedence. All these only imply that industries should individually and collectively strive for better pollution performance in the areas they operate to ensure that the environment is not damaged.

CLSA **It seems weak regulation and implementation is one of the main challenges. Would you agree and how can it be remedied?**

Chandra Bhushan We agree that weak regulation and implementation of the laws are key challenges in India. Increased transparency of all regulatory documents and correspondences, enhanced accountability of the concerned authorities, focus on indigenised technological solutions and clearly laid guidelines for new (upcoming) plants could be the starting steps for improvement.

CLSA **Have you seen any organisational issues of companies that could affect environmental performance?**

Chandra Bhushan

The poor emphasis on the environment among Indian steel plants is also evident in their organisational structure. Reporting to the managing director or chief executive officer ensures that the environment department does not have to work under the production department and hence, be under pressure and compromise on environmental issues.

In all participating steel plants (except JSW Steel, Bellary), it was found that the position of environment department head is quite low in the management hierarchy and the head usually operates under the production department itself. The stature of the head of the environment department has important implications for the green performance of a plant.

Quite low in the management hierarchy

Figure 13

Position of environment department heads, 2009-10

Steel plant	Plant head of the environment department reports to . . .	. . . who in turn reports to . . .
Vizag Steel, Visakhapatnam	General Manager (Environment and Safety)	Executive Director (Operations)
Sail Rourkela	General Manager (Environment and Safety)	Executive Director (Works)
Tata Steel Jamshedpur	Vice President (Total Quality Management and Shared Services)	Chief Executive Officer
JSW Steel, Vijanagar	Board Director and CEO (Vijaynagar Works)	Chariman of the Board
Neelachal Ispat, Orissa	Deputy General Manager (Technical services)	Executive Director (Works)
Jindal Steel and Power, Raigarh	Executive Director (Works)	Chief Executive Officer
Ispat Industries, Mumbai	President (Works)	Chief Executive Officer
Essar Steel, Hazira	Vice President (Environment, Health and Safety)	Chief Operating Officer
Godawari Power and Ispat, Raipur	Chief Operating Officer (Works)	Managing Director
Visa Steel, Orissa	President (Operations)	Managing Director
Usha Martin, Jamshedpur	Vice President (Engineering and Projects)	Chief Executive Officer (Steel)
Jai Balaji, West Bengal	President (Works)	Chairman and Managing Director
Bhushan Power and Steel, Orissa	Executive Director (Works)	Chairman and Managing Director

Source: CSE

CLSA

Have you found any exceptional practices, even if it is restricted to one part of plant operations, that you would like to highlight?

Chandra Bhushan

Yes, we have found the following exceptional practices in the steel sector:

- Vizag Steel reuses township wastewater to cool its rolling mills by installing an ultrafiltration system.
- Bhushan's Sambalpur plant cleans its blast furnace off-gas dust using dry gas instead of water.

- Jindal uses a tailor-made fugitive emission dust control system at the product-separation unit of its second coal direct reduced iron plant in Raigarh.
- Essar's Hazira unit reuses slag waster from melting in different applications.
- JSW's Bellary facility has a unit that removes sulphur from coke oven gas.

Figure 14

Town water being recycled and used for cooling the plant's rolling mills

Ultra-filtration skids clean Vizag Steel's township's sewage water, 2012

Source: CSE

CLSA **On various BF parameters, Ispat Industries scores well. But on DRI PM emissions, it scores poorly compared to Essar. Why would two equipment or processes in the same plant, of the same vintage, under the same management give such starkly different results?**

Chandra Bhushan It was found that Essar Steel has implemented a unique in-house technology called hot DRI charging to the subsequent steel-making phase. Under this system, the product coming out from the DRI process has to be instantly sealed to minimise heat loss before feeding to the electric arc furnace. The benefit for Essar Steel from this modification is not only about cost savings of electrical energy but also less air pollution.

Ispat Industries has not installed the hot DRI charging technology yet. So the plant cools the hot DRI pellets in an open space leading to huge PM or dust emissions.

CLSA **Have you made any assessment of the investments needed to undertake what you called the 'agenda for change' and what could be the quantum of investments?**

Chandra Bhushan No, GRP has not made any assessment of the investments required for making the sector environmentally friendly.

We would also like to reiterate here that investments alone will not help remedy the problem. It is also about improving corporate governance, organisational culture, sensitivity of top management to appreciate what being green is really all about, risk-mitigation philosophy, in-house knowledge build-up, enhancing skill levels and being well informed.

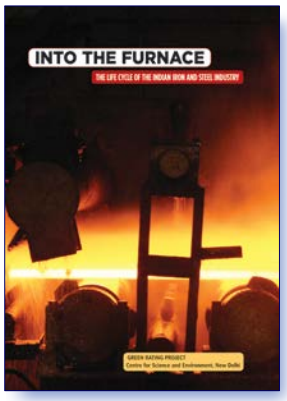
CLSA **Of all your recommendations, if you were to prioritise three for the government and three for the firms, what would those be and why?**

Chandra Bhushan As mentioned earlier, the priority recommendations for the government are:

- Move from concentration-based to load-based standards, as the assimilative capacity of environment due to expansions need to be considered
- Improve the accountability of pollution control board inspectors and all monitoring and inspection data should be made publicly available. This is to address the existing poor transparency of regulation.
- Increase financial penalty for non-compliance, as it will force management to take notice.

For companies, the priority recommendations are:

- Meet the national minimum standards for pollution.
- Undertake thorough resource-use audit and set timeline to improve its efficiency, especially for water.
- Periodically disclose environmental performance with accuracy and completeness, modernise health and safety conditions for workers and improve relations with local stakeholders.



Note: The relative scores of where each unit stands under different assessment categories have been published in CSE's book *Into the furnace: The life cycle of the Indian iron and steel industry*.

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