Sustainable Development in Mining (Iron & Steel Sector-Erdemir)

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ABSTRACT: More than half of the world's iron and steel production is based on the integrated method of transforming ore into steel The second foremost method of producing steel is through electric arc furnaces that recycle scrap Due to environmental effects as well as cost concerns that arise from mining activities, efficiency of the process of integrated steel production has to be maximized to the utmost extent Despite efforts for «cultivation and conservation following mining activities, it is evident that recycling scrap steel is beneficial for preserving limited natural resources for future generations The notion of sustainable steel finds meaning with modern ways of mining that exercise environmentally friendly methods and makes maximum use of limited available resources throughout the longest possible time span with the highest quality products attainable The use of scrap for the production of final steel products will induce significant contributions to this line of reasoning

It is only possible to preserve our resources for future generations and fulfill the contemporary parameters of development by the complete implementation of the concept of "Sustainable Development" As investment decisions made by modem investors are not limited to financial perfoimances of companies, stock exchanges have recently developed approaches which reflect the sustamabihty of companies so as for them be able to carry on with their respective activities m the future The Dow Jones Sustamabihty Index is an example of such an approach Taking this as a point of origin, identifying and monitoring indicators that reveal financial, environmental and social performances will serve to attain an important place in global commerce

1 SUSTAINABLE DEVELOPMENT

1.1 What is the Sustainable Development?

It has become the ambition of mankind throughout history to attain more comfortable and modem standards of living With the increase of global population, nations all over the world that serve this intention have come to realize in the early 90's that resources such as air, water and soil that were once though to be of endless supply are being exhausted with and increasing pace With the prevailing pace of consumption of the world's resources for the sake of attaining a more comfortable and modem life, the concern of not being able to find a world at all has led mankind to seek various ways for a solution The notion of Sustainable Development that has arisen as a result for the quest for a solution, calls for programming contemporary and future ways living without exhausting resources and making them available for future generations by establishing a balance between mankind and nature The notion of Sustainable Development consists of social, ecological, economic, and cultural dimensions

1.2. Sustainable Development Elements

Sustainable development is primarily monitored under three main headings The basis of the line of reasoning is placed on economic, environmental and social indicators that promote the utilization of resources efficiently (Figure 1)

The performances of companies are identified by sub factors that are under the three basic indicators whereby playing a significant role on the decisions made by investors

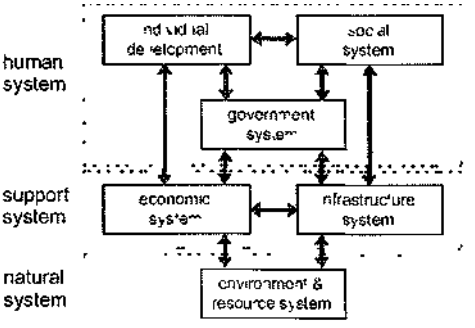

Figure Ï Sustainable Development Indicators

2 DOW JONES INDEXES FOR SUSTAINABLE DEVELOPMENT

Apart from production quality and environmental responsibility, those companies thit seek to leave operational companies for future generations are continuously carrying on with their work regarding the subject. Indexes that intend to compile performances of different companies under similar evaluation criteria, serve as a means for comparison. The indexes enable stock exchanges, private organizations and institutions to compare and monitor companies from similar or differing sectors.

The following reports are examined throughout the company analysis that are made for the ranking prepared by the Dow Jones Sustainable Indexes

- o Environmental reports
- o Health and safety reports
- o Social reports
- o Annual financial reports
- o Special reports (e.g. on intellectual capital management, corporate governance, R&D, employee relations)
- o All other sources of company information; e.g. internal documentation, brochures and website.

The Dow Jones Sustainability Indexes that operate integrally to the Dow Jones Stock Exchange and the indexes developed by the IISI (International Iron & Steel Institute) in 2004 can be shown as examples to the work achieved regarding the issue.

3 SUSTAINABLE DEVELOPMENT IN MINING (Iron & Steel Sector)

3.1 Activités that are carried out by the IISI (International Iron and Steel Institute)

The concept of evaluating the performances of companies by sustainability indexes have been adopted by the International Iron & Steel Institute in 2003.

In this respect, as a result of the extensive work accomplished, 11 indicators that represent the dynamics of the steel sector have been identified. This has developed a format by acquiring the data gathered from 42 IISI members that come from 30 different countries and represent 30% of the world's steel production. The indicators act as a means of comparison.

Table 1. Sustainability Criteria for Dow Jones Sustainability Indexes

	Criteria	**Weighting (%)**
Economic	Codes of Conduct/Compliance / Corruption&Bribery	4.2
	Corporate Governance	4.2
	Customer Relationship Management	30
	Investor Relations	3.6
	Risk & Crisis Management	4.2
	Scorecards / Measurement Systems	4.2
	Strategic Planning	4.2
	Industry Specific Criteria	Depends on Industry
		;
Environment	Environmental Policy / Management	48
	Environmental Performance (Eco-EfEciency)	3.6
	Environmental Reporting*	1.8
	Industry Specific Criteria	Depends on Industry
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Social	Corporate Citizenship/ Philanthropy	24
	Stakeholders Engagement	3.6
	Labor Practice Indicators	3.0
	Human Capital Development	30
	Knowledge Management/ Organizational Learning	30
	Social Reporting*	1 8
	Talent Attraction & Retention	30
	Standards for Suppliers	2.4
	Industry Specific Criteria	Depends on Industry

3.2. IISI Sustainability Indicators

3.2.1. Investment in new processes and products

This indicator covers Capital and Research & Development expenditures of a company. Capital

expenditures include money used to acquire or improve long term assets, such as property, plant and equipment. Research & Development expenditures, paid by the company, includes money used for discovering new knowledge about products, processes, and services, and then applying that knowledge to create new and improved products, processes, and services that fill market needs. The investment in capital and research & development should be based on direct company spending and included in the year it was spent.

$$\text{Investment in new processes and products} = \frac{CE + RDE}{\text{Annual Revenue}}$$

CE: Capital Expenditure
RDE : Research and development expenditure (direct)

3.2.2. Operating Income

A measure of a company's earning power from ongoing operations, equal to earnings before deduction of interest payments and income taxes, called operating income or EBIT (earnings before interest and taxes).
Companies should provide the result based on their annual financial reporting and indicate the method used for calculating operating income.

$$\text{Operating Income} = \frac{\text{Operating Income}}{\text{Annual Revenue}}$$

3.2.3. Return on Capital Employed (ROCE)

A measure of the returns that a company is realizing from its capital. Calculated as profit before interest and tax divided by the difference between total assets and current liabilities. The resulting ratio represents the efficiency with which capital is being utilized to generate revenue. Values to be based on reporting year-end.

$$\text{ROCE} = \frac{\text{Total Assets - Current Liabilities}}{\text{Operating Income}} * 100$$

3.2.4. Value Added

Economic Value Added Analysis measures the value creation to shareholders by a company or business unit. The analysis measures a company's or business unit's ability to earn more than its total cost of capital.

$$\text{Value Added} = \frac{((ROCE - WACC) * CE)/100}{\text{Annual Revenue}}$$

WACC : Weighted Average Cost of Capital
CE : Capital Employed

3.2.5. Greenhouse Gas Emissions

The emission of greenhouse gases due to direct and indirect steel manufacturing. As identified in the Kyoto Protocol, Annex A, the greenhouse gases considered are carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SFg). The steel industry indicator will include C02 in the first instance.

$$\text{GHG} = \frac{\text{CO2 Emissions (Ton)}}{\text{Crude Steel Production}}$$

The carbon dioxide emissions include direct emissions from the crude steel production processes and indirect emissions from energy consumption. Emissions resulting from iron ore mining, coal mining, oil production, etc are not included. Credit is given for by-products, such as slag used in road building.

3.2.6. Material Efficiency

This indicator shows the ratio of material waste and economic or physical output, where waste includes those materials that ultimately end up in a landfill or are incinerated. This does not include utilities waste.

This indicator measures the amount of material sent to landfill or incineration, whether offsite or onsite and without regard to whether the incinerator has heat recovery or not. The idea is to capture the amount of material sent for permanent disposal.

$$\text{GHG} = \frac{CSP - (MSL + MSI)}{\text{Crude Steel Production}} * 100$$

CSP : Crude Steel Production
MSL : Material *Sent* to Landfill
MSI : Material Sent to Incineration Plant

3.2.7. Energy Intensity

This indicator shows the ratio of energy consumption and economic or physical output. The energy intensity includes direct energy consumption from the crude steel production processes. Resulting from iron *ore* mining, coal mining, oi! production, etc are not included. Credit is given for by-products, such as BFG, COG and OG.

$$\text{Energy Intensity} = \frac{\text{Total Energy Consumption (GJ)}}{\text{Crude Steel Production}}$$

3.2.8. Steel recycling

The ratio of recycled (scrap) steel used in the steelmaking furnace (basic oxygen or electric arc), including pre-consumer and post-consumer recycled (scrap) steel, and crude steel production.

$$\text{Steel Recycling} = \frac{\text{Scrap*}}{\text{Crude Steel Production}}$$

Total scrap charged to steelmaking furnaces

3.2.9. Environmental management systems

This indicator shows the certification to a recognized international environmental management system standard such as ISO 14001. Companies should provide data for those facilities 100% owned and not to include joint ventures.

$$\text{Steel Recycling} \sim \frac{\text{Number of Employees and Contractors Working in Registered Production Facilities}}{\text{Total Number of Employees and Contractors Working in Production Facilities}}$$

3.2.10. Employee training

Instruction to bring about skilled behaviour of employees, which may include various methods such as classroom instruction, written instruction, computer-based instruction or on-the-job instruction. Companies should report the data available to them. Guidance on the definition of training to be provided. Number of contractors and contractor training are not to be included for this calculation.

$$\text{Employee Training} = \frac{\text{Total Days of Training}}{\text{Total Number of Employees}}$$

3.2.11. Lost time injury frequency rate

A lost time injury is an industrial injury causing loss of time from the job on which the injured person is normally employed beyond the day or shift on which the injury occurred. In addition, cases where loss of time does not immediately follow the injury, but where there is a direct relation between absence and injury, are generally regarded as lost time injuries.[2] The lost time injury frequency rate is the number of lost time injuries for each 1,000,000 working hours.

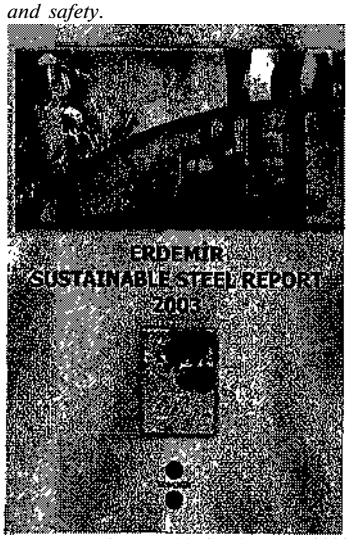
$$\text{I TfFR} = \frac{\text{Number of Lost Time Injuries}}{\text{(Total Number of Hours Worked/1000000}}$$

4. ERDEMIR SUSTAINABLE STEEL REPORT

Ereğli Iron Steel Works Co. (ERDEMFR), has issued its Sustainable Steel Report in 2004. This has enabled Erdemir's indicators to be comparable with other steel producers worldwide.

The report, which is composed of the three basic elements of Sustainable Development, consists of the following company information:

1. *With the Environmental Performance Indicators, the importance given to the effective preservation of the environment by the careful and precautious utilization of resources.*
2. *With the Economic Performance Indicators, the thought of sustaining economic growth and creating dependable employment opportunities.*
3. *With Social Performance Indicators, the reduction of social poverty, providing equality, the improvement of living quality, and the improvement of occupational health and safety.*



Şekil 1. ERDEMIR Sustainable Steel Report 2003

In revealing the three basic indicators, the IISI criteria have been taken as a point of origin. The criteria have been supplemented with Sustainability indexes that are unique to Erdemir to give a broader picture. These criteria are given as:

- Increase in Capacity'
- Investments
- Value Addition since the establishment

- Environmental Strategies
- Environmental Investments
- Energy Balance
- Dust Emissions
- SO2 Emissions
- NOx Emissions
- Usage of Recirculation Water
- Specific Water Consumption
- Recycled iron from BOF slag
- Blast Furnace Fuel Consumptions
- Energy Management Center
- Environmental Performance Index
- Number of Intern Students
- Educational Programs
- Social Responsibility Projects

Table 2. Erdemir Sustainability Indicators

Sustaimibility indicators - Summary 0aüı . -			
No	Indicator	Value	**Units**
1	Investment in new processes and products	0,11	us$/us$ Revenue
2	Operating Income	0,19	US $ / US $ Revenue
3	Return on Capital Employed (ROCE)	13,66	%
4	Value added	0,08	US $ / US $ Revenue
5	Greenhouse Gas Emissions	0,65	tonnes of C02/ tonne of crude steel produced
6	Material efficiency	82,39	%
7	Energy intensity	13,52	GJ / tonne crude steel produced
8	Steel recycling	0,23	tonnes scrap / tonne crude steel produced
9	Environmental management systems	1,00	Number of Employees and Contractors in Registered Production Facilities / Total Number of Employees and Contractors in Production Facilities
10	Employee training	6,57	Training Days / Employee
11	Lost time injury frequency rate	6,70	Frequency/1,000,000 Hours Worked

5. CONCLUSION

The notion of Sustainable Development and hence performance indicators have been established parallel to the vision of a world in which companies that produce for the future will prevail. The iron and steel sector has defined its respective performance indicators as of the year 2003. The indicators are continuously being monitored and controlled as to enable companies to prevail in the future by increasing their profit shares.

The Mining sector, which happens to be in a very important position in terms of environmental effects, should monitor and control their performances not merely in terms of profit bu also in terms of contributions to the environment and society.

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