Use of New Eco-Indicators to Measure Sustainable Development Progress

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Abstract: The purpose of this paper is to highlight and discuss the shifting trends in environmental performance metrics in the 21st century. The indicators that will result from the new sustainability strategies are eco-indicators that express the integrated character of sustainable development and the societal values that lay behind them.. Eco-Indicators can express the environmental performance of the company in many ways. These indicators will be essential to manage and steer the environmental strategies in the 21st century.

Introduction

This paper discusses the shifting trends in measuring environmental performance in the 21st century, and how the firms will continue their commitment towards greater environmental responsibility and compliance records in the future with a performance measurement system that includes eco-indicators.

Existing Performance Measurement Criteria

Every industrial firm normally deals with a set of environmental issues that are common to many other firms within their own sector. The performance measures used for common issues are as follows:

- Pollutants emitted per ton of product (or units) manufactured
- Materials recycled per ton of product (or units) manufactured
- Solid & Hazardous Waste generated per ton of raw material processed
- Environmental compliance cost per $1000 revenue, in a given year
- Energy savings due to environmental initiatives, per unit produced, in a given year
- Pollutant loadings in wastewater released in a year per ton of product
- Solvents/chemicals reused in a process per ton of product
- Greenhouse gases emitted per ton of combustion fuels used
- Percentage phase-out of SARA Tier III toxic chemicals used in operations (base year 1987)
- Amount of hazardous materials stored underground as percentage of total hazardous materials stored
- Number of Hazardous material/waste spills per calendar year & number of reportable spills under CERCLA per year
- Number of incidents causing off-site consequences

However each one of these firms may have their own special initiatives or sustainable development strategies to deal with. The environmental performance criteria for these cases can be totally different.

Shifting Trends in Environmental Strategies

There has been a major shift in the corporate attitudes in the past three decades of corporate environmental management.

During the 70's, taking care of the environment was a burden for most companies. Many industries were primarily in a reactive mode while grudgingly complying with the evolving environmental laws. Environmental Management was certainly not a strategic issue, and responsibility was often delegated to an environmental staff department.

In the 80's, industry began to feel responsible for the damage to the environmental and the society, and wanted to win back the public confidence. A clean environment became a condition for doing business. The attention shifted from end-of-the pipe controls to pollution prevention.

During the 90's, environmental management became a strategic tool used by companies to gain a competitive advantage, and enable them to distinguish themselves from other firms. Environmental Management became the responsibility of the entire company, and not just the environmental department. The environmental aspects of products were measured during their entire life cycle and

incorporated in “change management” and the product design process. Major efforts were put into the communication with external stakeholders concerning environmental performance.

A new generation of environmental strategies has now arrived as we start the 21st century. The stakes and the expectations are going to be increasingly higher than ever before. The new generation of environmental strategies will have to satisfy the following characteristics:

More public involvement
Companies will have to contribute to society in all the three elements of sustainable development, and obtain a “societal license to operate”
Participation in the social learning process will provide insights to set a new sustainable course for businesses
Challenge for companies will be to meet the social needs at a low price to make a profit and provide a rate of return to meet shareholders’ expectations. These goals have to be met while avoiding environmental pollution or exhausting resources. The solutions that businesses will require will have to come from technological, organizational and strategic breakthroughs.

Measurement of progress toward a sustainable development is a big challenge. Companies will have to develop their own eco-indicators depending on their own setting and the line of business. The indicators will have to account for the consequences of decision-making on all the three elements of sustainability. The indicators have to reflect integrated issues like the cost to society or the use of key resources. And most importantly the eco-indicators will need a reference value to compare the performance of company parameters such as previous year’s performance, or against a company with a similar business line.

Examples of such eco-indicators are:
- Conservation of water resources so society does not have to pay for a new water resource facility
- Making products that don’t create a health hazard in the last phases of a product’s life cycle for the public, therefore making it necessary for them to remediate the hazards
- Preventing wastewater, air and other accidental discharges in to the community surroundings, thus preserving the safety and health of the citizens and also preventing property value declines.

All the companies that want to survive in this new trend of environmental management should ensure that their actions either meet or exceed the benchmarked industry standards. Or else, their “societal license to operate” may be jeopardized over a period of time, depending on when the society evaluates their performance and finds it deficient.

Case Studies of Existing Reporting Practices
All the firms included in these case studies have been using common performance metrics that are targeted mainly at the quantities of emissions or waste generated per unit of production or sales volume. Some companies have included the number of incidents reported, number of audit deficiencies corrected, and amount of energy saved. Even though there are guidelines released for reporting by the Global Reporting Initiative[1], an international organization, many firms are still trying to adapt to these guidelines. Therefore, the approach taken by firms for reporting environmental performance in different sectors may not be the same.

Chemical Industry Performance Trends
The chemical industry sector has numerous environmental issues to deal with. They are subject to a multitude of environmental regulations depending on their size, their product lines, their needs for importing or exporting chemicals, the original startup date of their manufacturing plants and the geographical location of their plants.

Many chemical manufacturing firms have made commitments to initiatives such as the Product Stewardship program[2] and the Responsible Care program[2]. These programs have helped chemical companies to be more socially responsible throughout the lifecycle of the chemical products they manufacture.

One of the leading chemical companies, Dow Chemical[3], publishes environmental performance annual reports which include charts that help express the progress the company has made in reducing discharges to each of the affected media. The significant performance metrics used in the 1999 EHS performance report were as follows:

- Tons of chemical emissions per year

- Wastewater per pound of production
- Waste per pound of production
- BTU used per pound of production
- Number of incidents (spills and leaks) in a specific year

Dow does not provide any explanations regarding normalization of data used in these charts. Without normalization of data, it is difficult to compare the performance in a given year with previous years or with other companies manufacturing the same products.

There was also a chart presented for progress towards implementation of "Responsible Care" globally. However, the percentages for completion of management practices appeared to be subjective. These charts don't add any new meaningful insight in the quality of their environmental management. Dow did not provide any detailed explanations on their accomplishments in the Responsible Care program.

Medical/Pharmaceutical Industry Performance Trends

The 1999 annual EHS performance report for Johnson & Johnson[4] briefly mentions its commitment to sustainable development. J & J however does not seem to be measuring their progress towards sustainable development objectively with any measurable parameters since the last inquiry made in March 2001.

The charts that provided information on environmental performance were:

- Hazardous waste generation per unit sales volume
- Toxic chemical releases per unit sales volume
- Solid waste disposal per unit sales volume
- Percent solid waste recycled
- Accidental releases and non-compliance events
- Cumulative CO2 (greenhouse gas) emission avoidance
- Packaging material used per location, by year

It is not certain if the data used in these charts by J & J is normalized to account for inflation, changes in production rates, permanent & temporary plant shutdowns, electricity rates in various locations where they operate, and productivity increases.
J & J should also be looking at the industry averages and excellence standards for benchmarking and setting goals at their own facilities. Their charts don't indicate that these important measures were taken.

Semiconductor Industry Performance Trends

In its annual EHS performance report for the year 1999, Intel[5] used similar performance measurement parameters as the companies reported from other sectors. Some of the most significant and meaningful parameters used for the charts were as follows:

- VOC/HAP/NOX emissions per year per unit revenue value
- Water use per unit revenue, by year
- Tons of solid waste recycled
- SARA Tier III releases, tons per unit revenue
- Energy use per unit revenue, by year
- Number of citations and violations per year

Although Intel's 1999 report mentions some sustainable development projects, there was no indication that Intel has developed any measurable eco-indicators.

Utilities/Energy Industry Performance Trends

In its annual EHS report for 1999, Duke Energy's[6] approach toward environmental metrics was similar to companies from other sectors. Duke Energy also identified additional performance metrics, which are unique to their industry. They also provided industry averages on their charts. This allows the public to compare Duke to other energy companies. It also provides Duke Energy the incentive to make internal improvements and make progress towards achieving the goals and surpass the industry average benchmarks.

The performance charts used by Duke in the annual report are as follows:

- Air emissions, per megawatt hour (includes SO2, NOX and CO2 emissions)
- Toxic chemical release, in pounds per year
- Reportable spills in gallons per year
- Hazardous wastes generated, pounds per year
- Coal ash utilization rate, expressed as percentage
- Number of violations and fines paid (dollars)

In Duke's annual report, there was no mention of sustainable development or any special projects undertaken for the community. Utility companies need to be more sensitive to these issues because their community members are also their customers in most cases. They are external stakeholders and could be very influential in future public involvement when Duke needs permits to expand their capacity in the future.

Conclusions

The annual performance reports produced by industries in various sectors indicate that several improvements need to be made. Benchmarking their performance against other standards of excellence is always necessary because in the new era of environmental management, their customers and stakeholders are likely to judge their performance by comparisons to industry standards and performance of other similar companies.

The new generation of environmental strategies in the 21st century will focus on realizing sustainable development. For companies, this presents a challenge of finding a balance between social needs, economic goals and environmental possibilities. The stakeholders will judge the companies on what value they bring to the society and the community they belong to. Simple one-parameter performance metrics will not be enough to manage sustainable development. They will have to be replaced by complex performance indicators that will incorporate the social, environmental and economic needs of the local community. Companies that take the lead in developing these indicators will be at the forefront of implementing the sustainable development strategies. Sustainable strategies will without doubt be one of the leading strategic concepts at least for the next twenty to thirty years in the 21st century.

References

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