# Sustainable Development and Environment Protection: a perspective of current trends and future options for industries

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## I. INTRODUCTION

Sustainable Development is now progressively becoming part of all the industrial/ corporate policies and vision statements in response to climate change policy discussions at the global level and national level. As a consequence of the conventions resulting from the UNCED – 1992 and adoption of Agenda 21, the principle of sustainable development has become omnipresent. As given in the report of Brundtland Commission, Sustainable Development is defined as the 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' [1]. Thus, Sustainable Development has become an overall integrating concept which practically embraces all economic, social and environmental issues in any development sector of industries. However, it does not exclude completely the use of exhaustible natural resources but proclaim that any use of exhaustible natural resources should be appropriately counterbalanced or compensated. The concept of Sustainable Development includes the idea of developing without depletion that is by moving beyond the affordability and regeneration of ecosystems. The basis for this concept is the need to integrate developmental and economic objectives with environmental protection [2]. Initially, this concept has not been acceptable to many developing countries as it seemed to overcast their targets for growth and development. However, it has been increasingly realized now that Sustainable Development cannot be achieved without significant economic growth and industrial development in the developing countries. [3, 4]

Thus the three critical components for promotion of Sustainable Development are economic growth, social equity and environmental sustainability. These three components when considered concurrently can ensure long-term Environmental Conservation without any sacrifice of development. Latest stance establishes that far from leading inevitably to environmental (and ultimately, economic) disaster, economic growth has generally been associated with declining, not increasing levels of environmental damage [5].

It is indisputable now that Environmental Conservation is no more a choice but a dire necessity for ensuring long-term economic growth and development, in future particularly, in the least developed countries. The pattern of decline and degradation of all crucial natural resources such as land, soil, forests, biodiversity and groundwater, resulting from unsustainable use and practices in the last few centuries is likely to be aggravated due to climate change in the next 25 to 50 years. Africa, South Asia and some regions of Latin America are already experiencing severe land degradation and freshwater scarcity problems [6]. Thus if industries do not adapt their processes and technologies to become environmentally sustainable their own existence may be at stake considering either lack of basic natural resources/ raw materials or the high costs for procuring them.

Increasingly industries/ companies are realizing the importance of implementing environmental initiatives in their business development and brand promotion. Sustainable Development and environment management have become inherent component of business management. Consequently, in pursuit of the goal of Environmental Sustainability the concept of carbon footprint has become significant globally in the corporate/ industrial sector. The activities involved under Environmental Sustainability can be broadly categorized as the elimination of waste and emissions from the pollution streams; maximizing energy efficiency of the equipments/ machinery and productivity enhancing i.e. efficiency improvement that can benefit conservation of natural resources for future generations.

The two major agendas involved in facing global environmental challenges are to decrease energy demand and raw material utilization which directly result reduction of emissions and waste generation by reducing specific requirements of the inputs per unit of output produced. Many companies globally across all the sectors are incorporating cleaner technologies in their manufacturing and infrastructural components like on site power generation, renewable energy sources, energy efficient technologies etc. Further, as water and land have been identified as the most critical limited resources in future, an increasing number of companies are educating their stakeholders to adopt water conservation practices and reduce both wastage and waste generation.

## II. SUSTAINABLE INDUSTRIAL PRACTICES

Some of the major activities being implemented in the field can be broadly categorized under the strategies of Environment Friendly Packaging & Greening Supply Chain, Renewable/ Clean Energy Technology and Sustainable or Environmental Reporting.

## III. ENVIRONMENT FRIENDLY PACKAGING

Packaging is an indispensable component of every industrial product as it ensures Environmental Sustainability indirectly by protecting products and goods, preventing wastages and enabling efficient business conduct for marketing and branding. However, as most industries are promoting eco-friendly buying behaviors, reduction in the amount of packaging and use of eco-friendly packaging material becomes inevitable, to reduce wastages and raw material utilization in the supply chain, greening the life cycle of the product ensure Environmental Sustainability in operations.

Sustainable packaging is being adopted by many companies to reduce their carbon footprint through use of recycled materials and minimization of waste generation. Companies have realized that highlighting their environmental initiatives to consumers is an important tool for marketing and branding consequently increasing sales and boosting their product reputation [7], especially in food industry, where the product quality is directly dependant on the packaging of the product.

Many industries have utilized these strategies to reduce millions of tons of waste in terms of cardboard, plastic films, plastic sheets, paper, glass etc. utilized in the packaging by introducing green packaging and consequently increasing their profits and contributing to their environment friendly branding, example Cisco has reduced 466 metric tones of its waste in 2012 [8].

## IV. RENEWABLE/ CLEAN ENERGY TECHNOLOGY

There are two main approaches for clean energy to promote Sustainable Development and environment protection can be categorized, firstly, under the adoption of cost-effective energy-efficient technologies in electricity generation, transmission, distribution, and end-use, which can simultaneously reduce operational costs and local pollution in addition to reduction of greenhouse gas emissions [9]. Secondly, gradual shift to renewable energy options, some of which are already cost effective, can enhance sustainable energy supply; can reduce local pollution and greenhouse gas emissions.

There has been a rapid growth of the industries in the renewable energy sector during 2002 to 2008, thus by the end of the 2007, the renewable energy industry has been estimated to be US $ 77.3 billion [10] for example companies like NIBE Energy systems are adopting high tech air pumps for indoor heating, ventilation and cooling, and reduce their energy costs [11].

Many initiatives at National level are being implemented through State and Central Pollution Control Boards, Ministry of Environment and Forests and Climate Change (MoEFCC), Confederation of Indian Industries (CII), The Energy Research Institute (TERI) , Bureau of Energy Efficiency (BEE) for adopting innovative strategies and solutions for energy efficiency. Many direct indirect benefits are being provided to the industries for improving energy efficiency in their establishments and processes. The future of clean energy technologies include [12]:

- Renewable energy (solar, wind, geothermal, bio energy, hydro)
- Renewable feed stocks
- Advanced vehicle
- Electricity storage
- Fuel cells
- Nuclear fission and fusion

The major challenge in adopting clean energy lies in rational energy pricing based on long-run-marginal cost principle that can level the playing field for renewable energy, increase the proliferation of energy-efficient and renewable energy technologies, and the economic viability of utility companies, ultimately leading to greenhouse gas emission reduction [6].

## V. ENVIRONMENTAL REPORTING

Sustainable reporting and Environmental reporting, voluntary as well as mandatory, is also getting prominence in the context of corporate social responsibility through various strategies and tools like CSR Tracker, Sustainability Reporting Guidelines, Sustainability Awards etc. Companies like TATA Power, Mahindra, Siemens, Maruti, TATA chemicals, WIPRO among many others are utilizing these tools for sustainable plus programme. These tools enable industries to communicate their sustainable practices to all the stakeholders and create a better brand image. Environmental information like greenhouse gas emissions, waste generation, energy consumption, use of transport can improve the transparency of industrial activities, thereby, providing a powerful tool to fight environmental degradation. Businesses have realized that they can save significant costs in areas like use of raw materials and supplies, reduction in waste, water, energy use, transport, travel and packaging.

Globally, industries have realized the benefits of environmental reporting for fulfillment of legal requirements, projecting their improved brand image, international marketing, environmental management, implementing organization's policy among others. Several initiatives are being pursued to measure and report an entity's progress on sustainable development. There are several countries in which the private sector is required to report greenhouse gas

emissions and energy consumption to the government. In India, a scheme for establishing consumption targets specifically for the energy intensive industries has been introduced as Perform, Achieve and Trade (PAT) scheme. An example is the Leadership in Energy and Environmental Design (LEED) – a US Green Building Council organization that employs 69-point criteria to award a certificate at platinum, gold and other levels to buildings [13]. Few of the criteria include sustainable sites, water efficiency, energy and atmosphere, materials and resource use, indoor environmental quality, and innovation and design process. As part of this international process, hundreds of corporate/ industrial buildings have received certifications worldwide, including several in India some of which have received the platinum rating.

Another example is the Global Reporting Initiative (GRI), which is a multi-stakeholder process and an independent institution wherein mission is to develop and disseminate globally applicable Sustainability Reporting Guidelines [14]. These guidelines are for voluntary use by organizations, for reporting on the economic, environmental and social dimensions of their activities, products, and services. Started in 1997, GRI is an official collaborating Centre of the United Nations Environment Programme (UNEP) and works in cooperation with UN's Global Compact. The motivation for using the above types of reporting criteria is diverse. In a recent evaluation of GRI, 85% of the reports addressed climate change, and 74% of respondents identified economic reasons and another 53% ethical reasons for reporting their company's performance to GRI. India's ITC Limited, for example, has won a platinum LEED rating for its Gurgaon building, and also reports its Sustainable Development performance to GRI as a carbon positive corporation, i.e. it sequesters more carbon than it emits.

All industries/ corporate agencies are increasingly becoming aware of mandatory environmental reporting systems as per the statutory requirements of the environment legislation which has been refined and aligned in tandem with national policies as well as commitments under international treaties on sustainable development. The major pollutants resulting from manufacturing processes across various industrial sectors to be reported under various acts/ policies are summarized in table below [15, 16]:

TABLE: 1 POLLUTANTS RESULTING FROM MANUFACTURING

| Pollutant | Effect |
|---|---|
| Greenhouse gas (GHG) emissions from direct and indirect energy use, landfill gases | Global climate change |
| Emission of toxins, carcinogens, etc. including use of heavy metals, acids, solvents, coal burning | Human organism damage |
| Water usage and discharges, e.g. cooling and cleaning use, in Particular | Water availability and quality |
| Electricity and direct fossil fuel usage, e.g. power and heating requirements, reducing agents | Depletion of fossil fuel resources |
| Land use, water usage, acid deposition, thermal pollution | Loss of biodiversity |
| Emissions of CFCs, HCFCs, nitrous oxides, e.g. cooling requirements, refrigerants, cleaning methods, use of fluorine compounds | Stratospheric ozone depletion |
| Land appropriated for mining, growing of bio-materials, manufacturing, waste disposal | Land use patterns |
| Material usage and waste | Depletion of non-fossil fuel resources |
| Sulphur and NOx emissions from smelting and fossil fuels, acid leaching and cleaning | Acid disposition |

## VI. CONCLUSION

The future trend of sustainable development and environment protection is expected to gain fourfold momentum considering the statistics of global industrial growth and corresponding pressure on the exiting natural resources [17]. The UNCED – 1992 and adoption of Agenda 21 had ensured transition in the global corporate policies and adoption of agenda on environment in the corporate policy of industries/ companies. The international and national policies on Sustainable Development and Environment Protection have ensured development of well framed regulatory framework. However, with evident benefits of adoption of sustainable practices and environment friendly technologies in the CSR activities, marketing, branding, reducing wastages, financial savings and legal compliance, the industries are adopting voluntary sustainability practices and reporting. However, to ensure long term sustainable benefits of these approaches, and a much larger impact on the grass root level

communities, companies/industries require to ensure consolidated efforts of in all the three dimensions of social, environment and economic development. The social dimension includes workers health and safety, impact on local communities, quality of life, benefits to disadvantaged groups, for example, the disabled. While, economic dimension involves creation of new markets and opportunities for sales growth, cost reduction through efficiency improvements and reduced energy and raw material inputs; and creation of additional value through supply chain management. Lastly, environmental dimension concentrates primarily on reduced waste, effluent generation, emissions into environment; reduced impact on human health, use of renewable raw materials and elimination / replacement of toxic substances. Over time, as indicators and measurement tools become available, the pursuit of Sustainable Development is moving out of theoretical academic discourses, and being put into practice increasingly by institutions and private industry. The trend is likely to strengthen globally as nations and their respective industrial sectors come to recognize the limits on access to and development of natural resources for the overall benefit of the environment.

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