

Clean Production Technologies for Sustainable Development

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Abstract:

Environment and development are the two sides of the same coin. Advancements in science and technology have accelerated the pace of industrialization. The industrialization is a continuous process and enhances the standard and quality of life of people but leads to environment degradation. Noise, exhaust fumes, wastes of different kinds adversely affects the environment and creates various kinds of health hazards. The Industrialization and environment and creates various kinds of health hazards. The industrialization and environment degradation go hand in hand. Since Industrialization is the basics of development, it cannot be given up. Hands of the clock cannot be turned back. The only option left is to control and manage environment degradation. The environment degradation, in fact started with the propagation of human race. Today environment degradation is a world-wide phenomenon and has become concern for control. The process of environment degradation has accelerated with the development of socioeconomic activities, for example agriculture, industrialization, drugs and pharmaceuticals transport, civil construction including roads and buildings, etc., with growing population, the requirements of food grains and other consumer items increasing greatly, leading to further environment degradation. As long as the assimilation capacity of receiving water system, land, air, etc., is more than the pollution load the importance of environment protection was not critical. But today there are places where rivers are polluted to the extent effluents, for example river Ganges at Kanpur, Mithi river at Mumbai. Industrialization is considered as the barometer of civilization. Increasing economic openness, growing economic interdependence and deepening economic integration in the world economy are the result of Globalization. In this never-ending race of making profit today, most of the organizations are forgetting their duties

towards environment. Community awareness, people's participation and clean production technologies with sustainable development is must for environmental conservation. Every industrial organization and every citizen should be motivated for achieving clean and green environment. Each state, each nation, each continent, the entire world should adopt clean technologies for production.

INTRODUCTION:

Industrialization is considered as the barometer of civilization. The rapid growth of population, standard of living, utilization of resources is leading to environment degradation, which is a threat to various types of animals, vegetation and human beings. Industries are continuously discharging pollutants into the atmosphere everyday and thus are the major cause for environment problems. Industrial development is viewed as ecology pariahs: often insensitive to the environment that contributes to poor public image of all the countries. With the global awareness about the environmental degradation, there is increasing pressure on the industry to restore the ravage done by incessant development. This is high time for 'green society' to play a major role in the next decade. Recycling, conservation and preservation will be a way of life. To protect the health and economic well-being of current and future generation, we must adopt a more pro-active role.

In recent years growing awareness on environment pollution has led to efforts to control pollution. Conventional command and control approach based on environmental regulations and relocation of industrial clusters has been attempted. Studies have shown that compliance to adhere to environment norms remains poor in the industries. The enforcement of regulations and relocation of industries are difficult tasks, due to large number of geographically dispersed units involved as well as the social and political dimensions. Reasons for poor compliance include: (1) Lack of off the shelf

technological solutions: (2) Lack of awareness in the industries; (3) Fear of reduced profits, etc., ISO-14001 certification is almost negligible in the small-scale sector.

Environmental evils

The huge quantity of waste generated by the industrial units either has been back filled in exhausted area of dumped and stock piled elsewhere. Manmade mountain can be seen all around the industrial belt. This symbolizes the reckless waste disposal practice degrading aesthetic values of the area and creating many environment problems. The land and precious soil is being depleted very fast creating severe scarcity of drinking water. There has been general increase in ambient temperature. Solid waste is the biggest polluter. With the global awareness of environmental protection and financial constraints due to increasing cost of waste handling it became very essential: (1) to upgrade the technology so as to improve recovery of natural resources and reduce generation of waste and (2) to reclaim the degraded land and rehabilitate the waste dumps by dense forestation and regenerate a green environment. To restore a clean and green environment, several steps need to be taken. The existing technologies should be upgraded by cleaner technologies which are sustainable to environment, society and future generation. An environment policy should be drafted and implemented.

Clean technology (CT):

Clean technology is defined as a measure to improve or adjust production process of products, so that consumption of raw materials, energy and natural resources is accomplished efficiently, with minimum waste or none at all. It is pollution reduction at source, including substitution of raw materials, recycling and re-using, which will help to conserve the environment and simultaneously reduce production costs.

Clean technology criteria: Key issues in each industrial sector, used as indicators for production efficiency and factory operation whether there are pollution prevention.

Key factor: Usage of raw material and natural resources per one product unit of each industrial sector is used as an index for production efficiency of each factory in the same industrial sector.

Clean technology advisor: A factory personnel, who have passed the test and is registered with department of industrial works, responsible for production control and loss of raw materials and natural resources and also for CT project implementation in the factory (if any).

Technology verification committee: A committee responsible for reviewing CT projects, proposed by organizations applying for incentives, in case where CT criteria and CT options are not available in the industrial sector.

Clean Technologies for production: Clean technologies for production have long been aligned with the development of new technologies in rejecting the earlier tradition of end-of-pipe, pollution control and waste treatment. Technologies for cleaner production opened up opportunities for innovation and application of new production technologies. These cleaner production technologies were to be adjuncts to the broader search for management strategies that would result in less wastes, less water and energy consumption and less use of toxic and hazardous chemicals. 'Clean-up' technologies focus on the technologies of production assembly, and product management. Thus, the concept of clean or cleaner technologies became embedded in the idea of cleaner production. Even, where these cleaner production program promoted clean production technologies early proponents remained skeptical that too heavy a focus on technologies might lead to a kind of technology obsession. They feared that too much attention to technology would undervalue the importance of changing production techniques, practices and values in business management and neglect what was often referred to as 'changing attitudes and improving know how.' Today, we have a more balanced view. A central focus on the technical aspects of cleaner production technologies can promote efficiencies, functional optimization and waste avoidance in industries and government facilities, but it is often the management and use of production technologies, that is a central objective in striving towards environmentally superior performance.

Today, we recognize that cleaner production is much more than simply changing the materials and equipment of production but as we think about the current challenges of achieving sustainable systems of production and consumption, it is clear that we have not yet integrated broader social and work quality values into our conception of cleaner production. Clean technologies for production is a preventive, company specific environmental protection initiative. It is intended to minimize waste and emissions and maximize product output. By analyzing the flow of materials and energy in a company, one tries to identify options to minimize waste and emissions out of industrial processes. Improvements of industrial organization and technology help to make the best possible use of

materials and energy and avoid waste, wastewater generation, and gaseous emissions and also waste heat and noise. Examples for cleaner production options are: (1) Documentation of consumption (as a basic of material and energy flows, for example with a sankey diagram); (2) Use of indicators and controlling (to identify losses from poor planning, poor education and training, mistakes); (3) Substitution of raw materials and auxiliary materials (especially renewable materials and energy); (4) Increase of useful life of auxiliary materials and process liquids (by avoiding drag in, drag out, contamination); (5) Improved control (internal or external) and (7) New, low waste processes and technologies.

Clean production policy: A clean production policy framework does not refer to simply making a few provisions (tax rebates, permitting provisions, etc.), in the existing system. Nor does it mean enacting a brand new, stand alone Cleaner Production Act. It requires interweaving the concept of preventive strategies in all facets of the government policy framework to make it uniformly supportive and favourable to the Cleaner Production concept.

It requires a change in thinking in how policies are formulated and implemented. In essence, it requires a paradigm shift-from the current reactive 'cure' approach to a proactive 'preventive' approach. Pollution and environmental management in the preventive approach get internalized and into the development process. Cleaner production strategies would thereby be integrated in various policies, such as : (1) Environmental policies, (2) Industrial policies, (3) Resource pricing policies, (4) Trade policies, (5) Fiscal policies, (6) Educational policies and (7) Technology development policies.

There is a wide range of available policy instruments that governments may use to stimulate the Cleaner Production adoption. It is important that policy-makers select the right mix of these instruments given the circumstance within each country. Used in conjunction with other elements of environmental management, cleaner production is a practical method for protecting human and environment health, and for supporting the goal of sustainable development. Production with no regard for environmental impacts creates water and air pollution, soil degradation, and large-scale global impacts, such as acid rain, global warming and ozone depletion. To create more sustainable methods of production, there needs to be a shift in attitudes away from control towards pollution prevention and management.

The United Nations Environment Programme (UNEP) Introduced the concept of cleaner production in 1989, and defined it is 'the continuous application of an integrated preventive environmental strategy applied to process, products and services to increase eco-efficiency and reduce risks to humans and the environment'. Clean technologies for production activities include measures, such as pollution prevention, source reduction, waste minimization and eco-efficiency. They involve better management and house-keeping, substitution of toxic and hazardous materials, process modifications, and reuse of waste products. At its heart, the concept is about the prevention, rather than the control of pollution. The control of clean production technologies questions the need for a particular product, and looks at other ways to satisfy the demand. It is a slowing down of the rate at which we use resources, and a gradual shift from linear to more circular processes, similar to those found in nature. The eventual goal of clean production is to achieve a 'closed loop' operation in which all excess materials are recycled back into the process.

The four elements of clean technologies for production are : (1) The precautionary approach-Potential polluters must prove that a substance or activity will do no harm; (2) The preventive approach-Preventing pollution at the source rather than after it has been created; (3) Democratic control-Workers, consumers, and communities all have access to information and are involved in decision-making and (4) Integrated and holistic approach – Addressing all materials, energy and water flow using life-cycle analyses.

The benefits of clean technologies for production include decreased waste, the recovery of valuable byproducts, improved environmental performance, increased resource productivity, increased efficiency, lower energy consumption, and an overall reduction in costs. Implementing clean production technologies can be as straightforward as adopting better housekeeping practices or it may involve more complex measures associated with processes and products. The more sophisticated options may include switching to renewable energy sources, increasing material efficiency, and re-using and recycling byproducts. The product itself can be designed to reduce consumption of resources, to prolong its useful life, and to allow disassembly and recycling of its component parts. Cleaner production requires a new way of thinking about processes and products, and about how they can be made less harmful to humans and the environment. For successful implementation, the concept must be effectively communicated within

the organization. Employees at all levels, including senior management, should be actively involved. Guidelines to implement a cleaner production approach: (1) Identify the hazardous substance to be phased out, on the basis of the precautionary principle; (2) Undertake a chemical/material flow analysis; (3) Establish a time schedule for the phase-out of the hazardous substance in the production process, as well as its accompanying waste management technology; (4) Implement and further develop cleaner production process and products; (5) Provide training and technical and financial support; (6) Actively disseminate information to the public and ensure their participation in decision making; (7) Facilitate substance phase-out with regulatory and economic incentives and (8) Facilitate the transition to cleaner production with social planning, involving workers and communities affected. This cost of complying with environmental legislation can be significantly reduced by companies that adopt production techniques.

The latter are often more cost-effective than control technologies. The costs of dealing with wastes are reduced, and there is potential for new markets to be discovered through innovations or the sale of byproducts. Cleaner Production can reduce environmental risks and liabilities and lead to greater competitiveness. By demonstrating a commitment to cleaner production, companies can also improve their public image and gain the confidence of consumers.

The environment audit:

The environment audit is a review of activities affecting the environment to determine the status of an industry's compliance with central state and local environmental laws and regulations. It also provides the industries with data and other information on which environmental decision and planning could be based. The environmental compliance audit can be company-wide and comprehensive, or it can be limited wither to particular facilities owned by an industry or to determining compliance with specific regulatory programmes. Whatever the audit's scope, the basic principles and considerations related to the conduct of an audit will remain the same. An environmental audit is a management tool for taking inventory of a company's environmental assets and liabilities. The audit provides information on an industry's compliance status at a given point of time, analysis of the perceived implications of the information gathered and, if management so chooses, options that arise from this information and analysis. In short, an audit

provides a snapshot of one segment of management's responsibility.

Planning and conducting the audit: An environmental compliance audit should be tailored to fit the industry's circumstances and needs. Though each industry is different, the basic elements of a successful audit are the same. These elements include: (1) Defining the purpose and scope of the audit, resolving policy issues and establishing priorities, (2) Assigning departmental responsibility for the audit function and ensuring in-house cooperation, (3) Choosing the audit team, (4) Reviewing central, state and local laws and regulations to identify regulatory programmes applicable to company operations, (5) Selecting elements of analysis on which to base data collection, (6) Beginning the audit, (7) Preparing compliance profiles, (8) Conducting a site visit, (9) Analyzing and presenting the results of the audit and (10) Evaluating the audit.

Conclusion

The future of a nation depends on its youth and continuously implemented programmes to promote the youth's capability. To enhance the leadership skills of potential students and to encourage them to develop an appreciation for their environment and energy, educational institutions should design youth leadership development programme to fulfill this goal. Industrial development is viewed as ecology pariahs; often insensitive to the environment that contributes to poor public image of all the countries. With the global awareness about the environmental degradation, there is increasing pressure on the industry to restore the ravage done by incessant development. This is high time for 'green society' to play a major role in the next decade. Recycling, conservation and preservation will be a way of life. To protect the health and economic well-being of current and future generations, we must adopt a more proactive role.

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