

MODULE 1

ENVIRONMENTAL MANAGEMENT STANDARDS

1.1 ISO (INTERNATIONAL ORGANIZATION FOR STANDARDIZATION):

It is the most widely used standard on which environmental management system is based on.

ISO 14001: It is the international standard that specifies requirements for an effective environmental management system. It helps organizations improve their environmental performance through efficient use of resources, reduction of waste, gaining a competitive advantage and the trust of stakeholders.

SIGNIFICANCE OF ENVIRONMENTAL MANAGEMENT

- i. It helps an organization address its regulatory requirements in a systematic and cost-effective manner.
- ii. This proactive approach can help reduce the risk of non-compliance and improve health and safety practices for employees and the public.
- iii. Business reputation – people may be more likely to support a business that cares about its impact on the environment.
- iv. Good for business through: cost savings – by spending less on raw materials, energy, water and waste management.
- v. Improving resource efficiency and reducing unnecessary expenditure - you will have policies and procedures in place that help you manage waste and resources more effectively. This can reduce your associated raw material and operating costs.

ENVIRONMENTAL PROTECTION

It is the practice of protecting the natural environment by individuals, organizations and governments. Its objectives are to conserve natural resources and the existing natural environment and, where possible, to repair damage and reverse trends.

ENVIRONMENTAL MANAGEMENT

Environmental management is defined as the management of the interaction and impact of human activities on the natural environment.

Environmental management is not merely a management of the environment but it is essentially the management of various activities with intolerable constraints imposed by the environment itself and with full consideration of ecological factors. Thus, it involves environmental planning, conservation of resources, environmental status evaluation, and environmental legislation and administration. The focus of environmental management is on implementation, monitoring and auditing; on practice and coping with real-world issues, rather than theoretical planning.

ENVIRONMENTAL PROBLEMS AND ITS CHARACTERISTICS

The various environmental issues at global level and their characteristics are listed below,

- Depletion of natural resources
- Water pollution
- Air pollution
- Ground water pollution
- Toxic chemicals & soil pollution
- Ozone layer depletion
- Global warming
- Loss of bio-diversity
- Extinction of wildlife and loss of natural habitat
- Nuclear wastes and radiation issues

Characteristics of environmental problems are as follows,

- vi. Water pollution is characterized by the presence of excess physical, chemical or biological substances that change the qualities of the water and are capable of causing harm to living organisms.
- vii. Air pollution is characterized by the release of pollutants such as carbon monoxide, lead, nitrogen oxides, ground-level ozone, particle pollution (often referred to as particulate matter), and sulfur oxides into the atmosphere as a result of human activities and wildfires.
- viii. Temperatures are rising world-wide due to greenhouse gases trapping more heat in the atmosphere. Droughts are becoming longer and more extreme around the world. Tropical storms becoming more severe due to warmer ocean water temperatures.
- ix. Contamination of water bodies due to use of chemical fertilizers and pesticides on agricultural lands.
- x. Deforestation can directly lead to biodiversity loss when animal species that live in the trees no longer have their habitat, cannot relocate, and therefore become extinct.
- xi. Deforestation also increase in release of Carbon dioxide into the atmosphere, because of absence of trees to absorb the carbon dioxide.
- xii. Waste generation is a result hyper consumption of resources which is characterized by accumulation of non-biodegradable trash in the form of plastic packaging, toxic e-

waste, and harmful chemicals that leach into our waterways. When this waste ends up in landfills, it generates enormous amounts of methane, which ranks as one of the worst greenhouse gases because of its high potential for global warming. It creates severe explosion hazards.

SYSTEMS APPROACH TO CORPORATE ENVIRONMENTAL MANAGEMENT

Corporate enterprises are some of the important vehicles of economic development in a country. There is a nexus between economic development issues and environmental management issues. Therefore, sustainable economic development should be environment-friendly. A company may be guided by short-term considerations where environmental issues, in the absence of legal compulsions, may be ignored. Companies must not forget that, with economic development, environmental awareness has been on the increase.

TRADITIONAL APPROACH

- The traditional approach to environment management emphasizes control of various types of pollution at the process and output levels (emission to air, discharges to water, solid and other wastes, contamination of land, noise, heat, etc.) But if the technology that is used for production purposes is not environment-friendly, the management system cannot be that effective in preventing environmental degradation.
- Recycling of waste materials, consumption of products by consumers, and disposal of packing materials after consumption, are some such important issues in environmental management that need to be properly addressed in any effective management system.
- Any effective management system should not only take care of the present needs of the society but also promote sustainable economic development.

SYSTEMS APPROACH: STEPS TO DEVELOP CORPORATE ENVIRONMENATL MANAGEMENT.

Step 1: Define the Organization's Goals for the Environmental Management System (EMS)

The first step in EMS planning is to decide why you are pursuing the development of an EMS. Are you trying to improve your environmental performance (e.g., compliance with regulations or prevent pollution)? Write your goals down and refer back to them frequently as you move forward. As you design and implement the EMS, ask the following questions: How is this task going to help us achieve our goals? How should we define the project scope? (i.e., What is the fence line of the organization that the EMS will cover? One location or multiple locations? Should we pilot the EMS at one location then implement the system at other locations later?)

Step 2: Secure Top Management Commitment

One of the most critical steps in the planning process is gaining top management's commitment to support EMS development and implementation. Management must first understand the benefits of an EMS and what it will take to put an EMS in place. To develop this understanding, explain the strengths and limitations of your current approach and how those limitations can affect the organization's financial and environmental performances. Management also has a role in ensuring that the goals for the EMS are clear and consistent with other organizational goals. Management's commitment should be communicated across the organization.

Step 3: Select an EMS Champion

Not all small or medium-sized organizations have the luxury of choosing among multiple candidates, but your choice of a project champion is critical. The champion should have the necessary authority, an understanding of the organization, and project management skills. The champion should be a "systems thinker" (ISO 9000 or ISO 14001 experience can be a plus, but is not necessary), should have the time to commit to the EMS-building process, and must have top management support.

Step 4: Build an Implementation Team

A team with representatives from key management functions (such as engineering, finance, human resources, production and/or service) can identify and assess issues, opportunities, and existing processes. Include contractors, suppliers or other external parties as part of the project team, where appropriate. The team will need to meet regularly, especially in the early stages of the project. A cross-functional team can help to ensure that procedures are practical and effective, and can build commitment to, and "ownership" of, the EMS.

Step 5: Hold kick-off meeting

Once the team has been selected, hold a kick-off meeting to discuss the organization's objectives in implementing an EMS, the initial steps that need to be taken and the roles of team members. If possible, get top management to describe its commitment to the EMS at this meeting. The kick-off meeting is also a good opportunity to provide some EMS training for team members. Follow-up this meeting with a communication to all employees.

Step 6: Conduct Preliminary Review

The next step is for the team to conduct a preliminary review of your current compliance and other environmental programs/systems, and to compare these against the criteria for your EMS (such as ISO 14001:2015). Evaluate your organization's structure, procedures, policies, environmental impacts, training programs and other factors. Consider utilizing an ISO 14001 self-assessment tool or incorporating other gap analysis tools.

Step 7: Prepare Budget and Schedule

Based on the results of the preliminary review, prepare a project plan and budget. The plan should describe in detail what key actions are needed, who will be responsible, what resources are needed, and when the work will be completed. Keep the plan flexible, but set some stretch goals. Think about how you will maintain project focus and momentum over time. Look for potential "early successes" that can help to build momentum and reinforce the benefits of the EMS.

Step 8: Secure Resources, Assistance

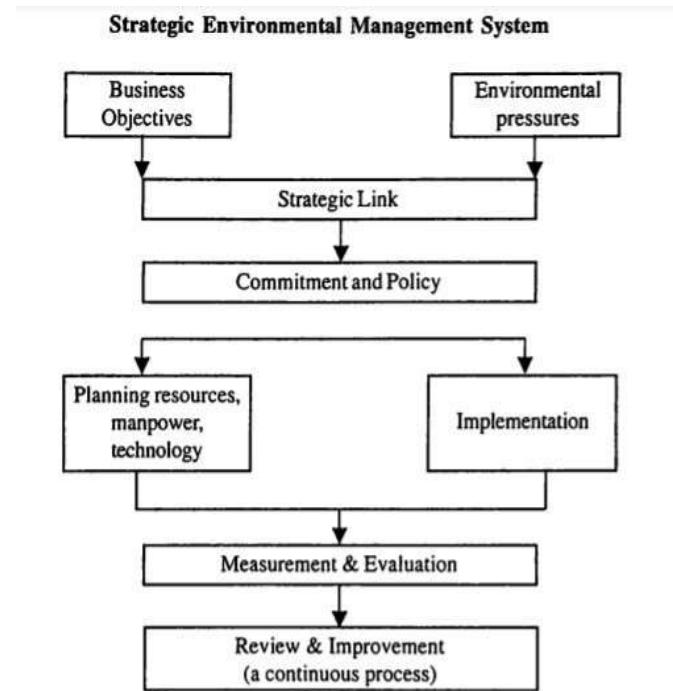
The plan and budget should be reviewed and approved by top management. In some cases, there may be outside funding or other types of assistance that you can use.

Step 9: Involve Employees

Ownership of the EMS will be greatly enhanced by meaningful employee involvement in the EMS development process. Employees are a great source of knowledge on environmental, and health and safety issues related to their work areas, as well as on the effectiveness of current processes and procedures. These employees can help the project team in drafting procedures.

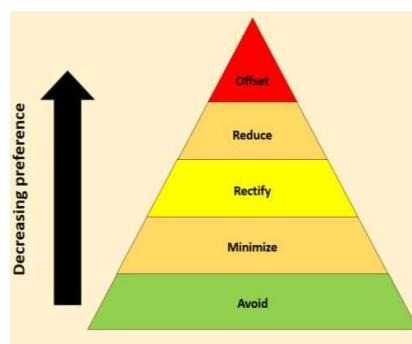
Step 10: Monitor and Communicate Progress

As you build the EMS, be sure to regularly monitor your progress against the goals and project plan, and communicate this progress within the organization. Be sure to communicate the accomplishments that have been made and describe what will happen next. Build on small successes. Be sure to keep top management informed and engaged, especially if additional resources might be required.



CLASSIFICATION OF ENVIRONMENTAL IMPACT REDUCTION EFFORTS

Impact reduction is vital because it ensures that the adverse environmental impacts of a developmental project are minimized or completely avoided. Mitigation/ impact reduction comes with a variety of levels, and this is commonly called as “**mitigation hierarchy**” in environmental impact assessment.



The hierarchy begins from the most beneficial method of mitigation and goes on to the least beneficial method of mitigation.

- i. **Avoid:** It is the first step in the reduction efforts. It is the complete mitigation of an impact, by preventing it from happening. It is obviously the most preferred form of mitigation, because it ensures no environmental damage.
- ii. **Minimize:** Here, the team recognizes that the environmental impact cannot be completely side-stepped; instead, they take steps to ensure minimal damage is done to the environment.
- iii. **Rectify:** Rectification of an impact implies that the impact has already happened; what we are doing now is damage control. In a way, rectification allows us to correct the mistake that led to the adverse environmental impact.
- iv. **Reduce:** Reduction of the extent of the impact through management practices and/or change in our methodology. It is when even reduction is not possible that we go for the final step of the mitigation hierarchy-environmental offset.
- v. **Environmental offset:** It is commonly defined as actions taken outside of the development site to compensate for the impacts in the development site. In effect, this means that the development authorities undertake environment conservation activities to compensate for what they do in order to achieve “no net environment loss”, or more specifically “no net biodiversity loss”.

The various efforts used in this context can be classified generally as follows,

- **Protection of ambient air and climate:** Prevention of pollution through in-process modifications: Activities and measures aimed at the elimination or reduction of the generation of air pollutants through in-process modifications related to: - cleaner and more efficient production processes and other technologies (cleaner technologies), the consumption or use of cleaner products. Treatment of exhaust gases and ventilation air: activities involving the Installation, maintenance and operation of end-of-pipe equipment for the removal and reduction of emissions of particulate matter or other air-polluting substances either from the combustion of fuels or from processes: filters, dedusting equipment, catalytic converters, post-combustion and other techniques.
- **Wastewater management:** Activities and measures aimed at reducing the generation of surface water pollutants and wastewater through in-process modifications related to:
 - cleaner and more efficient production processes and other technologies (cleaner technologies),
 - the consumption or use of ‘cleaner’ (adapted) products.

- Cleaner technology is aimed at prevention activities consist of replacing an existing production process by a new process designed to bring about a reduction of water pollutants or wastewater generated during production. It includes separation of networks, treatment and re-use of water used in the production process, etc. Use of cleaner products: prevention activities consist of modifying an existing production process so as to provide for the substitution of raw materials, catalysts and other inputs by non- (or less) water polluting products.
- **Waste management:** Activities and measures aimed at eliminating or reducing the generation of solid waste through in-process modifications related to cleaner technologies which is aimed at prevention activities. By replacing an existing production process by a new process designed to reduce the toxicity or volume of waste produced during the production process, including by separation and re-processing. Use of cleaner products: protection activities consist of modifying or adapting the production process or facilities so as to provide for the substitution of raw materials, catalysts and other intermediate inputs by new, "adapted" inputs the use of which produces less waste or less hazardous waste.
- **Protection and remediation of soil, groundwater and surface water:** Activities and measures aimed at eliminating or reducing the generation of solid waste through in-process modifications related to cleaner technologies which is aimed at prevention activities. It consists of replacing an existing production process by a new process designed to reduce the toxicity or volume of waste produced during the production process, including by separation and re-processing. Use of cleaner products: protection activities consist of modifying or adapting the production process or facilities so as to provide for the substitution of raw materials, catalysts and other intermediate inputs by new, "adapted" inputs the use of which produces less waste or less hazardous waste.
- **Noise and vibration abatement (excluding workplace protection):** The adaptation of equipment, vehicles (buses, trucks, or train and power units in the case of rail transport, aircraft and ships) in order to make them less noisy: soundproofing of hoods, brakes, exhaust systems, etc. Also includes plant modifications, specially conceived foundations to absorb vibrations, extra cost for regrouping of buildings and/or of

facilities in the interest of noise abatement, special facilities in building construction or reconstruction, equipment and machines conceived or constructed for low noise or vibrations, low noise level flares and burners, etc.

- **Protection of biodiversity and landscapes:** Activities and measures aimed at the conservation, reintroduction or recovery of fauna and flora species, as well as the restoring, rehabilitation and reshaping of damaged habitats for the purpose of strengthening their natural functions. Also includes conserving the genetic heritage, re-colonizing destroyed ecosystems, placing bans on exploitation, trade, etc. Of specific animal and plant species, for protection purposes.
- **Protection against radiation:** Collection and transport of high-level radioactive waste consists of the collection of high-level radioactive waste, generally by specialized firms and their transport to the place of treatment, conditioning storage and disposal. Conditioning of high-level radioactive waste consists of activities that transform high level radioactive waste into a proper and fit condition for transport and/or storage and/or disposal.

BUSINESS CHARTER FOR SUSTAINABLE PRODUCTION AND CONSUMPTION

Sustainable consumption and production refer to “the use of services and related products, which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of future generations”.

Sustainable production and consumption lead to Sustainable development which can be defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The International Chamber of Commerce (ICC) is a non-governmental organization serving world business. Its membership extends to more than 130 countries and includes thousands of business organizations and enterprises with international interests.

ICC has more than 80 years of experience as an international body representing the interests of businesses in all sectors, all over the world. It works to promote world trade and investment based on free and fair competition, and to harmonize trade practices and formulate guidelines and terminology for importers and exporters.

In response to the World Commission on Environment and Development report, ICC developed a 'Business Charter for Sustainable Development' which sets out 16 principles for environmental management.

The application of the principles thus improves business operations and strategies, while also driving innovation and shaping better policies and decision-making.

KEY BENEFITS IMPLEMENTING THE CHARTER PROVIDES KEY BENEFITS:

- Information clarity, and a framework of tools and methodologies.
- Reduction of risks and liabilities.
- Enhancement of efficiency and effectiveness of existing products and services.
- Generation of new business opportunities. Longer-term cost reductions.
- Enhancement of knowledge, education, and awareness.
- Increased employee loyalty.
- Higher standing in society and better reputational value.

The 16 Principles of ICC's business charter for sustainable development are as follows.

The charter covers environmentally relevant aspects of health, safety and product stewardship.

1. **CORPORATE PRIORITY:** To recognize environmental management as among the highest corporate priorities and as a key determinant to sustainable development; to establish policies, programs, and practices for conducting operations in an environmentally sound manner.

2. **INTEGRATED MANAGEMENT:** To integrate these policies, programmes and practices fully into each business as an essential element of management in all its functions.
3. **PROCESS OF IMPROVEMENT:** To continue to improve corporate policies, programmes and environmental performance, taking into account technical developments, scientific understanding, consumer needs and community expectations, with legal regulations as a starting point, and to apply the same environmental criteria internationally.
4. **EMPLOYEE EDUCATION:** To educate, train and motivate employees to conduct their activities in an environmentally responsible manner.
5. **PRIOR ASSESSMENT:** To assess environmental impacts before starting a new activity or project and before decommissioning a facility or leaving a site.
6. **PRODUCTS AND SERVICES:** To develop and provide products or services that have no undue environmental impact and are safe in their intended use, that are efficient in their consumption of energy and natural resources, and that can be recycled, reused, or disposed of safely.
7. **CUSTOMER ADVICE:** To advise and, where relevant, educate customers, distributors and the public in the safe use, transportation, storage and disposal of products provided, and to apply similar considerations to the provision of services.
8. **FACILITIES AND OPERATIONS:** To develop, design and operate facilities and conduct activities taking into consideration the efficient use of energy and materials, the sustainable use of renewable resources, the minimization of adverse environmental impacts of waste generation, and the safe and responsible disposal of residual wastes.
9. **RESEARCH:** To conduct or support research on the environmental impacts of raw materials, products, processes, emissions and wastes associated with the enterprise and on the means of minimizing such adverse impacts.

- 10. PRECAUTIONARY APPROACH:** To modify the manufacture, marketing or use of products or services or the conduct of activities, consistent with scientific and technical understanding, to prevent serious or irreversible environmental degradation.
- 11. CONTRACTORS AND SUPPLIERS:** To promote the adoption of these principles by contractors acting on behalf of the enterprise, encouraging and, where appropriate, requiring improvements in their practices to make them consistent with those of the enterprise; and to encourage the wider adoption of these principles by suppliers.
- 12. EMERGENCY PREPAREDNESS:** To develop and maintain, where significant hazards exist, emergency preparedness plans in conjunction with emergency services, relevant authorities and the local community, recognizing potential transboundary impacts
- 13. TRANSFER OF TECHNOLOGY:** To contribute to the transfer of environmentally sound technology and management methods throughout the industrial and public sectors.
- 14. CONTRIBUTING TO THE COMMON EFFORT:** To contribute to the development of public policy and to business, governmental and intergovernmental programmes and educational initiatives that will enhance environmental awareness and protection.
- 15. OPENNESS TO CONCERN:** To foster openness and dialogue with employees and the public, anticipating and responding to their concerns about the potential hazards and impact of operations, products, wastes or services, including those of transboundary or global significance.
- 16. COMPLIANCE AND REPORTING:** To measure environmental performance; to conduct regular environmental audits and assessment of compliance with company requirements, legal requirements, and these principles; and periodically to provide appropriate information to the board of directors, shareholders,

employees, the authorities and the public.

Tools for Sustainable Production and Consumption

Sustainable business management involves using various tools and methodologies to integrate environmental, social, and economic sustainability into business operations. Here's a comprehensive list of tools and approaches that can help organizations manage and enhance their sustainability efforts:

1. Environmental Management Systems (EMS)

ISO 14001: An international standard for environmental management systems that helps organizations improve their environmental performance and comply with regulations.

EMAS (Eco-Management and Audit Scheme): A European standard for environmental management that goes beyond ISO 14001, including a public environmental statement.

2. Sustainability Assessment Tools

Life Cycle Assessment (LCA): Analyzes the environmental impacts of a product or service throughout its entire lifecycle, from raw material extraction to disposal.

Environmental Impact Assessment (EIA): Evaluate the potential environmental effects of a proposed project or development before it proceeds.

3. Resource Efficiency Tools

Energy Management Systems: Helps organizations optimize energy use and reduce costs, such as ISO 50001, which provides a framework for managing energy performance.

Water Management Tools: Includes practices and technologies for efficient water use, recycling, and conservation, such as water footprint analysis and water stewardship programs.

Waste Management Tools: Strategies for reducing, reusing, and recycling waste materials, including waste audits and zero-waste initiatives.

4. Circular Economy Tools

Circular Economy Strategies: Includes approaches for designing products for reuse, repair, and recycling, and minimizing waste.

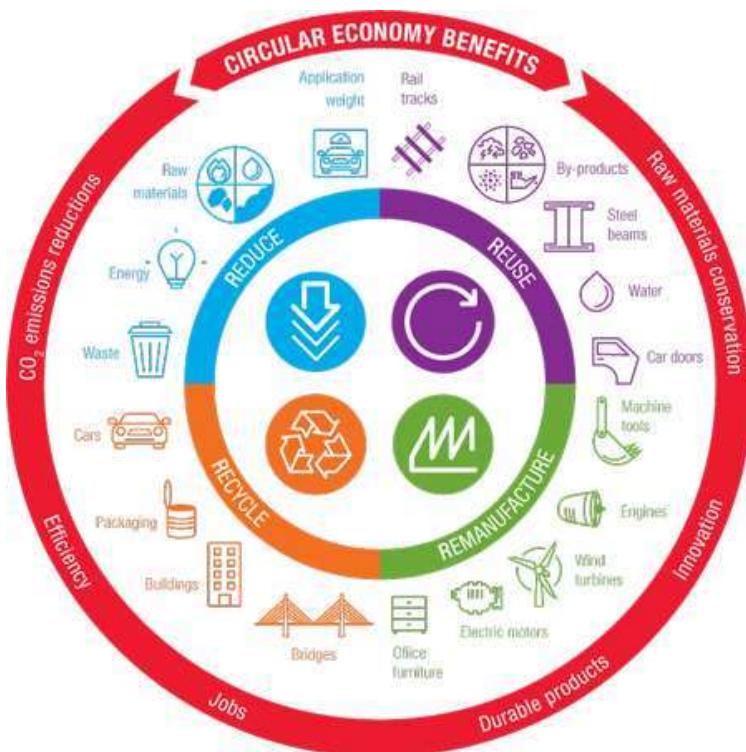
Material Flow Analysis (MFA): Tracks the flow of materials through a system to identify opportunities for recycling and resource efficiency.

5. Stakeholder Engagement Tools

Stakeholder Mapping: Identifies and prioritizes key stakeholders and their interests to ensure effective engagement and communication.

Sustainability Workshops and Surveys: Tools for engaging stakeholders in sustainability initiatives and gathering feedback on sustainability performance.

Community Engagement Programs: Initiatives that involve local communities in sustainability efforts and address their concerns and needs.



Circular Economy

The circular economy is a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing, and recycling existing materials and products as long as possible. In this way, the **life cycle of products is extended.**

Drivers for Sustainable Business Management

- The business case for sustainability has been at the forefront of much of the literature.
- When implementing a Business Charter for Sustainable Production and Consumption, several top business strategy drivers can guide and influence the approach taken by organizations.
- These drivers help align business operations with sustainability goals, ensuring that practices are economically viable, socially responsible, and environmentally beneficial.

1. Regulatory Compliance and Risk Management

Adherence to Environmental Regulations: Ensuring compliance with environmental laws and regulations (e.g., emissions limits, waste management standards) to avoid legal penalties and operational disruptions.

Anticipating Future Regulations: Proactively adopting sustainable practices in anticipation of stricter future regulations, which can help avoid compliance costs and disruptions later.

2. Market Demand and Consumer Expectation

Growing Demand for Sustainable Products: Meeting increasing consumer demand for products that are environmentally friendly, ethically produced, and sustainably sourced.

Brand Loyalty: Building customer loyalty by demonstrating a commitment to sustainability, which can enhance brand reputation and differentiate the company in the marketplace.

Green Consumerism: Leveraging trends towards eco-conscious consumer behavior to capture market share and drive growth through sustainable product offerings.

Competitive Advantage: Gaining a competitive edge by adopting sustainable practices and technologies that set the company apart from competitors.

3. Corporate Social Responsibility (CSR) and Ethical Considerations

Social Impact: Integrating sustainability into CSR strategies to address social and environmental issues, such as community development, fair labor practices, and ethical sourcing.

Stakeholder Engagement: Engaging with stakeholders (including investors, customers, and employees) on sustainability issues and demonstrating corporate responsibility through transparency and accountability.

Reputation Management: Enhancing the company's reputation by aligning business practices with ethical standards and societal expectations.

4. Innovation and Technology

Investment in Sustainable Technologies: Investing in new technologies that reduce environmental impact, such as renewable energy, energy-efficient systems, and sustainable materials.

Research and Development (R&D): Fostering innovation through R&D to develop new, sustainable products and processes that can drive long-term growth and competitive advantage.

5. Financial Performance and Efficiency

Risk Reduction: Minimizing financial risks associated with environmental liabilities, regulatory fines, and supply chain disruptions through sustainable practices.

Investment Attraction: Attracting investment from funds and investors focused on Environmental, Social, and Governance (ESG) criteria, which can support long-term financial stability and growth.

6. Global Trends and Agreements

Aligning business practices with international sustainability standards and agreements, such as the Paris Agreement on climate change and the United Nations Sustainable Development Goals (SDGs).

Meeting global market requirements for sustainability to access international markets and comply with global trade regulations.

Adopting best practices from leading international organizations to enhance competitiveness and maintain a leadership position in sustainability.

Barrier for Sustainable Production and Consumption

Sustainable development has been widely promoted as a holistic concept that aims or targets to integrate social, economic, and cultural policies to ensure high-quality growth. However, there are barriers to combating the implementation of sustainable development. These barriers are:

1. Financial Barrier

Initial Investment Costs: Implementing sustainable practices often requires significant upfront investment in new technologies, processes, or materials. These initial costs can be a major barrier, especially for small and medium-sized enterprises (SMEs). Insufficient incentives for the private sector to pursue sustainable development is another barrier.

Short-Term Focus: Businesses with a short-term financial focus may find it difficult to justify the costs of sustainable initiatives, which often provide long-term benefits but require upfront expenditure.

2. Knowledge and Expertise Barrier

Implementing sustainable production and consumption practices often requires specialized knowledge and skills that organizations may lack. This includes understanding new technologies, methods, and standards.

There may be insufficient training and education opportunities for employees to understand and apply sustainable practices effectively.

3. Regulatory and Compliance Barriers

Complex Regulations: Navigating complex and sometimes inconsistent environmental regulations across different regions can be challenging for businesses. Compliance can be time-consuming and costly.

Uncertainty: Changes in regulations and policies can create uncertainty, making it difficult for businesses to plan and implement long-term sustainability strategies.

4. Measurement and Reporting Difficulties

Developing effective metrics and indicators to measure sustainability performance can be challenging. Businesses may struggle to track and quantify their environmental and social impacts accurately. Sustainability reporting can be resource-intensive, requiring significant time and effort to compile data and ensure accuracy. Small businesses may find this particularly burdensome.

5. **Market and Consumer Barriers**

In some cases, there may be insufficient consumer demand for sustainable products or practices, making it difficult for businesses to justify their investment in sustainability. Businesses may face competitive pressure to prioritize cost-cutting and short-term profits over sustainability, especially in highly competitive markets with thin margins.

6. **Innovation Barriers**

Access to advanced technologies that support sustainable practices may be limited, particularly in developing regions or for smaller businesses. Integrating new technologies into existing systems can be complex and costly, potentially disrupting current operations.

7. **Stakeholder Expectations**

Different stakeholders (investors, customers, regulators) may have conflicting expectations regarding sustainability, making it difficult for businesses to balance and

address all concerns effectively. Effectively communicating sustainability efforts and achievements to stakeholders can be challenging, particularly if reporting lacks transparency or clarity.

8. Economic and Market Barriers

Economic Crises: During economic downturns or crises, businesses may prioritize survival and cost reduction over sustainability initiatives, even if they have long-term benefits.

Fluctuating Costs: The costs of sustainable materials and technologies can fluctuate, making it difficult for businesses to plan and budget for sustainability initiatives.

ENVIRONMENTAL STEWARDSHIP

Stewardship of the environment refers to protecting the environment through recycling, conservation, regeneration and restoration. It means taking responsibility for our choices. The responsibility for environmental quality should be shared by all those whose actions affect the environment.

Environmental stewardship can be defined as “the responsible use (including conservation) of natural resources in a way that takes full and balanced account of the interests of society, future generations, and other species, as well as of private needs, and accepts significant answerability to society” (Worrell & Appleby, 2000, p. 263).

Aldo Leopold (1887–1949) promoted **environmental stewardship** based on a land ethic “dealing with man’s relation to land and to the animals and plants which grow upon it. One of the first commonly accepted definitions of sustainable development came from the World Commission on Environment and Development, later renamed the Brundtland Commission. It defined sustainable development as meeting “the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland, 1987, p. 41). Sustainable development differs from environmental stewardship in that it may include aspects of social, economic and environmental sustainability, whereas environmental stewardship focuses solely on the natural world

TYPES OF ENVIRONMENTAL STEWARDS

There are 3 types of environmental stewards: **doers, donors, and practitioners.**

- Doers go out and help the cause by taking action. For example, the doers in an oil spill would be the volunteers who go along the beach and help clean up the oil from the beaches.
- A donor is the person that financially helps the cause. They can do anything from donating their money to hosting public events to raise funds. They are typically governmental agencies.
- Practitioners work on a day-to-day basis to steer governmental agencies, scientists, stakeholder groups, or any other group toward a stewardship outcome.

Drivers/ What motivates stewardship behaviors

- Information and scientific evidence about the status of natural resources.
- Increasing awareness of the risks and opportunities associated with business supply chains
- Growing public interest in environmentally responsible purchasing and investing
- Regulations, customers, competitors and the local community.

Barriers/ What hinders people and organizations from adopting stewardship behaviors

- The perception that small actions do not make a difference
- Difficulty in making green products competitive in the marketplace
- Lack of attention to environmental performance by investment and financial institutions
- Difficulty in measuring stewardship behavior and performance
- Lack of commitment from the management of the stakeholders
- Lack of financial resources
- Lack of expertise on EMS
- Effect on the existing organizational structures

PRINCIPLES OF ENVIRONMENTAL STEWARDSHIP

Core Principle 1: Resource Conservation – making the most efficient use of resources (materials, energy, and water) through Energy Efficiency and Conservation Water Efficiency and Conservation Solid Waste Management and Conceptualizing Waste as a Resource Publications Management Events Management

Core Principle 2: Pollution Prevention – minimizing contamination of the environment by chemicals or other materials through Vehicle/Fleet Management of the Use of Chemicals and Other Hazardous Substances.

Core Principle 3: Occupational Health and Safety Managing Indoor Air Quality Comfort and Productivity in the Workplace Emergency and Disaster Management

BENEFITS OF ENVIRONMENTAL STEWARDSHIP

The Benefits of implementing an environmental stewardship programme are,

- i. Saving costs and adding value,
- ii. Potentially reducing company site's regulatory responsibilities,
- iii. Improving environmental performance and reducing liability
- iv. Providing company with a competitive advantage due to more effective and efficient operations.

Category			Example of Qualifying Stewardship practice
1			Write a policy (1-page document) that explains your company's environmental goals and policies.
2			Sites can obtain ISO 140001 certification or develop and utilize their own EMS to annually (or more frequently) evaluate their environmental performance.
3			Yearly report posted to your company web page that explains your company's environmental performance for the past year.
4			Report that shows all greenhouse gas emissions. Must include both onsite and offsite contributions.
5			Establish an Environmental Purchasing Policy that requires the purchase of environmentally responsible products whenever possible.
6			Establish vendor requirements/contracts with businesses that supply your company to ensure environmentally sound business practices are employed.
7			Does the site offer mentoring of an environmental nature to other businesses? If yes, describe the mentoring program and any available contact information the site can provide.
8			Participate or offer assistance to community leaders and local groups to address, educate and collaborate on environmental issues in the community.
9			Obtain LEED building certification (or other recognized green building certification) for new or major building renovation projects.
10			Utilize green building design concepts in new construction or renovation projects. No formal certification by LEED is required.
11			Conduct a detailed LCA of any products or site services/activities to evaluate environmental impacts, determine inefficiencies and institute improvements.
12			Reduce the amount of hazardous materials used at your facility or exchange your use of high hazard materials for less hazardous materials.
13			Implement changes at your facility that result in reduced water use. Examples: installation of water saving fixtures, grey water recycling systems, reuse of production waste water, rain water harvesting systems, etc.
14			Conserve materials used at your site by changing process, product or formulations, participate in waste exchanges, reuse operational waste, etc. Materials required to be recycled by the State or your County do not qualify.
15			Provide a program to reduce or eliminate employee commuting trips to the workplace. Examples: telework program, flexible work schedules, incentives to carpool or use public transportation, etc.
16			Reduce energy use associated with onsite processes or production operation. Examples: VFD motors on equipment, solar powered equipment or lights, etc.
17			Reduce transportation energy use by upgrading company fleet to hybrid Vehicles or electric vehicles, switching to cleaner burning fuels, etc.
18			Major installations, such as solar panels or wind turbines, to generate renewable energy for onsite use; or you can purchase energy from a green energy power provider.
19			Reclamation projects at your site or in the community, such as a wildlife habitat restoration, rain gardens, invasive species weed control, or use of native species.
20			Any environmental activity not recognized under other stewardship categories, such as being a member of a state sponsored voluntary program (i.e. NJ Clean Marina program).
21			Become a participating member/partner of an EPA Voluntary Program.

ENVIRONMENTAL MANAGEMENT PRINCIPLES

The principles of environmental management are helpful in environmental decision-making.

There are 7 environmental principles which are explained below,

1. POLLUTER PAYS PRINCIPLE (PPP):

For the last two decades, many economists have suggested that firms discharging polluting effluents to the environment should somehow be made to pay a price for such discharges related to the amount of environmental damage caused.

OECD (Organization for Economic Co-operation and Development) has suggested the Polluter Pays principles (PPP) as a general basis for the environmental policy. It states that if measures are adopted to reduce pollution, the costs should be borne by the polluters. According to the OECD Council, “The principle to be used for allocating costs of pollution prevention and control measures to encourage rational use of scarce environmental resources and to avoid distortions in international trade and investment is the so-called Polluter Pays Principle.” The essential concern of this principle is that polluters should bear the costs of abatement without subsidy.

2. THE USER PAYS PRINCIPLE (UPP): It is considered as a part of the PPP. The principle states that all resource users should pay for the full long-run marginal cost of the use of a resource and related services, including any associated treatment costs. It is applied when resources are being used and consumed.

3. PRECAUTIONARY PRINCIPLE (PP): This proposes protecting the environment through precautionary measures, especially for heavy activities that might cause more damage to the environment. Precautionary principle has major objectives which include measuring primary and secondary activities posing a threat to the environment.

Then industries are advised on ways and methods to implement which will not affect the environment so much throughout their daily activities. Precautionary activity measures the impact of any company and its activities, prescribing methods and measures with less negative impact on its environment according to environment impact assessments carried out at the time. Precautionary principle has been essential to protecting the environment, people, safe environment, implementation of policies and reducing degradation and soil erosion.

4. PRINCIPLE OF RESPONSIBILITY: Among principles of environmental management, this states each person and firm needs to be held accountable and take responsibility to maintain safe, clean and sustainable development. Ecological sustainability should be attained by ensuring the use of resources is properly managed and not wasted, people must go about knowing that one of their duties is to protect the environment, safe applies for firms and corporations extracting and committing gasses polluting the environment.

5. PRINCIPLE OF EFFECTIVENESS AND EFFICIENCY: It is the responsibility of government in every country, city or state to ensure, well-structured policies and procedures are put in place for essential waste management. Failure to properly manage waste can lead to diseases, soil problems, chemical build ups, water borne diseases. Hence it's essential that through the principle of effectiveness and efficiency, major agencies and council do everything possible to reduce waste building up and control dump sites for garbage. Encourages various organization bodies and agencies to decentralize, implement new methods of management, proposed through new public management NPM to enable them attain desired results when protecting the environment at minimal cost.

6. PRINCIPLE OF PROPORTIONALITY: This refers to striking a balance between development and protecting the environment. Building of basic essential infrastructure through development has been considered major part for Human development, therefore, protecting the environment but so does development. Without the environment which provides for land, man would not have where to build homes.

But one important key point to take note of is that both must be fairly managed and balanced. Development should not hinder and destroy the environment and also environmental protection must happen while allowing development.

7. PRINCIPLE OF PARTICIPATION: Every citizen, person, government and firms have a responsibility to participate in environmental decision making and protection policies. Through collective collaboration in the affairs of the environment it's easy to foster a shift and wave reflecting need to protect the environment. Every individual should take a major step and contribute to issues relating to solid waste management, garbage collection, construction, chemicals, gaseous omission and demolition materials which are likely to affect the environment and how to reduce the impact.

NATIONAL POLICIES ON THE ENVIRONMENT

Environmental policies may be either enacted as laws by governing bodies or created and enforced by government agencies. They may originate from local, national, or foreign governments, and address an array of issues including,

- Air or water quality,
- Fossil fuel extraction,
- Energy conservation,
- Habitat protection or restoration,
- Pesticide use,
- Storage/disposal of hazardous materials,
- Trafficking of endangered species.

ENVIRONMENTAL POLICY IN INDIA- NATIONAL ENVIRONMENT POLICY, 2006.

The National Environment Policy (NEP) 2006 by the Ministry of Environment and Forests (MoEF) aims at mainstreaming environmental concerns into all developmental activities. It emphasizes the conservation of resources and points out that the best way to aid conservation is to ensure that people dependent on resources obtain better livelihoods from conservation, than from degradation of the resources.

The National Environment Policy (NEP), 2006 was an effort towards India's commitment to a clean environment and making a positive contribution to international efforts. The NEP builds on the various earlier policies that had addressed the challenges of the environment and the need for sustainable development before this policy. Some of them are:

- National Forest Policy, 1988
- National Conservation Strategy and Policy Statement on Environment and Development, 1992
- Policy Statement on Abatement of Pollution, 1992
- National Agriculture Policy, 2000
- National Population Policy, 2000
- National Water Policy, 2002

OBJECTIVES OF NATIONAL ENVIRONMENTAL POLICY, 2006.

- i. **Conservation of critical environmental resources:** To protect and conserve critical environmental resources and invaluable natural and man-made heritage which are essential for life-supporting livelihoods and welfare of the society
- ii. **Inter-generational Equity:** To ensure judicious use of environmental resources to meet the needs and aspirations of present and future generations.
- iii. **Efficiency in Environmental Resources Use:** To ensure efficient use of environmental resources in the sense of reduction in their use per unit of economic output and to minimize adverse environmental impacts on society.
- iv. **Environmental Governance in the Management of Resources:** To apply the principles of resources. To apply the principles of good governance (i.e. transparency, rationality, accountability, reduction in costs and time, and public participation) to the management of environmental resources.
- v. **Enhancement of Resources:** Appropriate technology and traditional knowledge, managerial skills, and social capital will be used to conserve and enhance resources.
- vi. **Livelihood Security for the Poor:** To ensure equitable access to environmental resources for poor tribal communities, which depend most on environmental resources for their livelihood.
- vii. **Integration of Environmental Concerns for Socio-economic:** Development; to integrate environmental concerns into policies, plans, programs, and projects for socio-economic development.

STRATEGIES OF NATIONAL ENVIRONMENTAL POLICY, 2006.**Land Degradation**

- Adoption of science-based and traditional sustainable land use practices through research and development.
- Pilot scale demonstrations and farmers' training.
- Promote reclamation of wasteland and degraded forest land.
- To reduce desertification through action plans.

Biodiversity

- Strengthen the protection of biodiversity hot spots.
- Pay attention to the potential impacts of development projects on biodiversity resources and natural heritage.
- Conservation of Genetic material of threatened species of flora and fauna

Wildlife

- Expanding the Protected Area Network.
- Paralleling multi-stakeholder partnerships for afforestation.
- Encouraging eco-tourism at wildlife sites.
- Implementing measures for captive breeding and release into the wild identified endangered species.

Wetlands

- Identification of valuable wetlands to prevent their degradation and enhance their conservation.
- Sustainable tourism strategies for identified wetlands.

To take explicit account of impacts on wetlands of significant development projects

Forests

- To formulate an innovative strategy for an increase of forest.
- Afforestation of degraded forest land, wasteland, and tree cover on private or revenue land.

Environmentally sensitive Zones

- Identify ESZs.
- Formulate area development plans

- Create local institutions for the management of ESZ

Sustainable Coastal Resources

- Sustainable management of mangroves
- Protection of the coastal environment

Conservation of Freshwater Resources

- Conservation of groundwater
- River management

ABATEMENT OF POLLUTION

Abatement is a general term used for methods or technologies that reduce the amount of pollutants generated in a chemical or other manufacturing facility.

(or)

Pollution abatement refers to technology applied or measures taken to reduce pollution and/or its impacts on the environment.

The most commonly used technologies are scrubbers, noise mufflers, filters, incinerators, wastewater treatment facilities, and composting of wastes.

Pollution abatement involves source reduction, in-process recycling, in-plant recycling, design modifications, off-site recycling, and treatment to make the waste less hazardous. Source reduction refers to the examination of various processing units in detail to determine if wastes can be minimized.

The step involves several layers of study:

- Waste inventory is generated.
- Critical processes leading to identification of waste
- Alternative processing strategies are studied to reduce the amount of waste generated in these processes.

1.12.1 ABATEMENT OF DIFFERENT TYPES OF POLLUTION**1. AIR**

- Smog, ground-level ozone pollution, acid rain and climate change influenced by greenhouse gas emissions are all products of fossil-fuel combustion, whether for industrial processes, electricity generation, or gasoline-powered vehicles.
- Examples of contemporary abatement strategies include requiring smoke-stack scrubbers on coal-fired power plants to reduce emissions of sulfur and nitrogen dioxides and placing caps on carbon emissions to reduce greenhouse gases.

2. WATER

- Water pollution usually comes in one of two major forms, point source pollution and nonpoint source pollution. Point sources include specific releases of pollutants into waterways, like industrial effluents or untreated sewage.
- Nonpoint sources are not locally specific and include pollution from stormwater runoff in urban areas and pollutant leaching from contaminated soils.
- Abatement measures include requiring treatment of sewage wastewater solids, installation of storm runoff retention systems (also called wet ponds) in areas with a high density of impervious surfaces, and educating the public about the dangers of stormwater pollutants to streams, rivers, and aquifers.

3. SOIL

- Land pollution can come from a variety of sources. Landfills, chemical and fuel refinery leaks or spills, and industrial agricultural techniques that require heavy use of pesticides and chemical fertilizers all contribute to soil pollution.
- Abatement measures include eliminating lead from fuels to reduce lead pollution of the soil, requiring underground liners for landfills, voluntary recycling programs, regulating fuel and chemical production to minimize risks of spills or leaks and exploring alternative agricultural methods to reduce the need for pesticides and herbicides.

4. ENERGY CONSERVATION

- Another basic but important pollution abatement strategy includes what many calls reducing your carbon footprint. More people using fewer resources and less energy reduces pollution impacts on a larger scale.
- Examples of conservation include: using cleaner-burning fuels and renewable sources of energy like solar or wind power, using public transportation or carpooling, recycling and reusing paper, plastics and metals, insulating your home to make it more energy-efficient, installing energy-efficient appliances, and buying locally produced goods to reduce the need for shipping of products over long distances.

CONSERVATION OF RESOURCES

Consumption of natural resources is increasing with growing population. With the increasing industrialization and urbanization, we need to conserve natural resources for their destruction will also upset the ecological balance. Conservation is the proper management of a natural resource to prevent its exploitation, destruction or degradation. Conservation is the sum total of activities, which can derive benefits from natural resources but at the same time prevent excessive use leading to destruction or degradation.

The nature provides us with all our basic needs but we tend to over exploit. If we go on exploiting nature, there will be no more resources available in future. Hence there is an urgent need to conserve nature for the following reasons.

- To maintain ecological balance for supporting life.
- To preserve different kinds of species (biodiversity).
- To make the resources available for present and future generations.
- To ensure survival of human race.
- To prevent negative impact on the environment.

METHODS ADOPTED TO CONSERVE RESOURCES

- i. Promote efficient water use techniques, such as sprinkler or drip irrigation, among farmers. Provide necessary pricing, inputs, and extension support to feasible and remunerative alternative crops that may be raised by efficient water use.
- ii. Support practices of rainwater harvesting and artificial recharge and revival of traditional methods for enhancing groundwater recharge.

- iii. Mandate water harvesting and artificial recharge in all new constructions in relevant urban areas
- iv. Prepare and implement a comprehensive strategy for regulating the use of groundwater by large industrial and commercial establishments based on a careful evaluation of aquifer capacity and annual recharge.
- v. Support R&D in cost-effective techniques suitable for rural drinking water projects for remedial measures and removal of arsenic fluoride, and other toxic substances.
- vi. Improve productivity per unit of water consumed in industrial processes, by making water assessments and water audits mandatory in identified industries and utilities.
- vii. Suitable sites for dumping the toxic waste material may be identified and remedial measures may be taken to prevent the movement of the toxic waste in the groundwater
- viii. Consider mandating the installation of water-saving closets and taps in the building bye-laws of urban centers.

CHARTER ON CORPORATE RESPONSIBILITY FOR ENVIRONMENTAL PROTECTION

- The Ministry of Environment & Forest (MoEF) launched the Charter on "Corporate Responsibility for Environmental Protection (CREP)" in March 2003 to go beyond the compliance of regulatory norms for prevention & control of pollution through various measures including waste minimization, in-plant process control & adoption of clean technologies.
- Industrial development is an important constituent in our pursuits for economic growth, employment generation, and betterment in the quality of life.
- On the other hand, industrial activities, without proper precautionary measures for environmental protection are known to cause pollution and associated problems. Hence, it is necessary to comply with the regulatory norms for the prevention and control of pollution.
- Alongside this, it is also imperative to go beyond compliance through adoption of clean technologies and improvement in management practices.
- Commitment and voluntary initiatives of industry for responsible care of the environment will help in building a partnership for pollution control. This is the very purpose of this Charter.

- The Charter has set targets concerning conservation of water, energy, recovery of chemicals, reduction in pollution, elimination of toxic pollutants, process & management of residues that are required to be disposed of in an environmentally sound manner.
- The Charter enlists the action points for pollution control for various categories of highly polluting industries.
- The Charter also enables the industry to know the Government programmes, priorities and concerns in respect of 17 categories of major polluting industries and gives appropriate time for implementation of action points identified in the sectoral discussions thus relieving the industry from the sudden burden and enforcement pressure.

17 CATEGORIES OF HIGHLY POLLUTING INDUSTRIES

1. Aluminium Smelting
2. Basic Drugs & Pharmaceuticals Manufacturing
3. Chlor Alkali/Caustic Soda
4. Cement (200TPD and above)
5. Copper Smelting
6. Dyes and Dye Intermediate
7. Fermentation (Distillery)
8. Fertiliser
9. Integrated Iron & Steel
10. Leather Processing including Tanneries
11. Oil Refinery
12. Pesticide Formulation & Manufacturing
13. Pulp & Paper (30 TPD and above)
14. Petrochemical
15. Sugar
16. Thermal Power Plants
17. Zinc Smelting