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Research Article

Strategic Environmental Assessment (Sea) Process for Sustainable Earth and Environmental Waste Management Towards Sustainable Development

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Abstract

Strategic environmental assessment [SEA] process can be broadly defined as a study of the impacts of a proposed project, plan, project, policy, or legislative action on the environment and sustainability. The significance of the work entitled "Sustainable Earth and Environmental Waste Management" is mainly confirmatory as it solves environmental and social problems. In this research, the SEA process has been aimed to incorporate environmental and sustainability factors into sustainable earth and environmental waste management includes climate change and control as an example like production and manufacturing process project planning and decision-making processes such as project formulation and appraisal of wastewater treatment process, rotating biological contactors, trickling filter bed, biomedical parts, marine biopolymers, Indo-Matsushita midget electrode [battery carbon rod] plant in 1979 at Tada, sustainable bridge, road, and sanitation structure, green building, nuclear power plant, cotton roller ginning plant and concrete that included policies, programs, plans, and legislative actions. Sustainable materials for biopolymer and bio-plastic applications manufacturing process development is a kind of development that meets the needs of the present without compromising the ability and efficacy of future generations to meet their own needs. Environmental Impact Assessment [EIA] process can be defined as the systematic study of the potential impacts [effects] of proposed projects, plans, programs, policies, or legislative actions relative to the physical-chemical, biological, bio-medical, cultural, and socioeconomic components of the total environmental product life cycle. The primary purpose of the EIA process is to encourage the consideration of the environment in the Organizational's earth and environmental waste management project planning and decision making [EAWMPPDM] process and to arrive at environmentally compatible actions. The sustainable earth and environmental waste management process should include the integrated consideration of technical or engineering, economic, environmental, safety, and health, social, and sustainability factors to achieve business excellence as per post COVID-19 World Scenario. Before the National Environmental Policy Act [NEPA] process in 1970 in the USA, technical and economic factors dominance the World's manufacturing process projects. The objective of the study is to conceptualize a training course module incorporating the SEA process for the Sustainable Environmental Climate Change and Control for the officers of Bihar Institute Public Administration and Rural Develeopment [BIPARD], Patna, Bihar, India during the Research Year [RY] 2023-2024. The design of the study is cross-sectional. The limitation or recommendation of the study and check is to apply strategic environmental assessment process for sustainable environmental climate change and control towards sustainable development.

Keywords: Climate, Change, Earth, Technical, Sustainable, Materials, Manufacturing, Process, Management, Project, Waste, Sustainability.

1. Introduction

The legislation of the EIA process was established in 1970 by the enactment of the National Environmental Policy Act [NEPA] in the USA [1]. This was the first time that the EIA process became an official tool in the manufacturing sector to protect the environment. Three of the significant terms while complying with the requirements of the NEPA process are "earth and environmental waste management inventory", "earth and environmental waste management impact assessment process", and "earth and environmental waste management impact statement". EIAs of design of sustainable environmental structures were proposed to protect the environment during the year 1950 in Japan, Europe, and North America [2].

The purpose of the EIA process is to encourage the consideration of the environment and sustainability in the organizational planning and decision-making process. Historically, the choice of proposed projects, policies, plans, programs, permits, procedures, or legislations was primarily based on only one criterion called economic viability. Today, it is necessary to consider three criteria of economic, environmental, and social viabilities. Environment coupled with quality management [EQM] is an intricate Sustainable material for biopolymer and bio-plastic applications manufacturing process managerial approach that was the targeted research area to achieve socio-economic improvement and sustainability based on the triple-bottom-line approach (economical, environmental, and social) feasibility studies.

2. Materials and Methods

SEA process is a predictable process that is devised into two phases. The first phase is called initial environmental and sustainability evaluation [IESE] and the second phase is environmental waste management and sustainability impact studies [ESIS]. IESE has been carried out for Japanese Matsushita carbon company's proposed project, plan, program, policy, permit, procedure, and legislative action in India to determine whether potentially adverse effects on the environment and sustain efficacy concerning the physical, chemical, biological, bio-medical, economic, socio-economic environment and on human health and well-being are significant or whether mitigation measures can be adopted to reduce or eliminate adverse environmental and sustainability impacts.

Detailed SEA procedure can be called as ESIS that was applied to identify and evaluate the environmental and sustainability consequences both beneficial and adverse impacts to ensure that the environmental and sustainability impacts were taken into consideration in the organization's planning and decision-making process. SEA process is designed to identify and predict the potential impacts of the physical, biological, biomedical, marine, ecological, socio-economic, cultural environment and on human health and well-being are adequately protected. Given below some of the methods and techniques applied for the sustainable project formulation and appraisal of Bihar Institue of Public Adminstration & Rural Development [BIPARD] extension trainees and learners and to conceptualize various environmentsal waste management projects such as midget electrode [Battery carbon rod] project, nuclear power plant, and sustainable materials for biopolymer and bio-plastic applications manufacturing process project.

- Expert judgment and stakeholders' sentiments
- Checklist and matrices
- Multi-criteria analysis
- Case comparisons
- Simulation models
- Software and information system
- Questionnaires
- Group discussions
- Delphi approach
- Flow charts and decision trees
- Contingency analysis
- Overlays
- Fuzzy logic

Environment and sustainability compliance requirements have been identified and evaluated systematically in these projects.

2.1. Step-Wise Structure of SEA Process

SEA Process has been itemized by the following nine steps.

- Preliminary activities and decision of Terms of References [TOR]
- Scoping
- Study of baseline data
- Strategic environmental assessment and evaluation,
- Evaluation of alternative measures
- Assessment of alternative measures
- Preparation of final documents
- Decision-making
- Monitoring, measurement, and control opportunities for resource transformation and project implementation and its strategic environmental assessment process.

2.2. Conceptual Framework for Screening and Scoping of SEA Process

Screening and scoping processes are the items that are employed in the SEA processes (Figure-1).

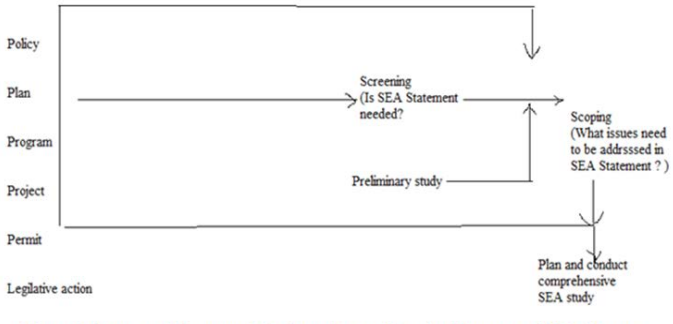

Figure 1: Conceptual Framework for Screening and Scoping Processes of SEA process

The three most significant items are, "Strategic earth and environmental waste assessment inventory, earth and environmental waste management impact assessment, strategic earth and environmental waste management impact assessment statement. Sustainable resources during the manufacturing process planning and decision-making process should include the integrated consideration of technical, economic, environmental, social, safety, health, and sustainability factors (Figure-2).

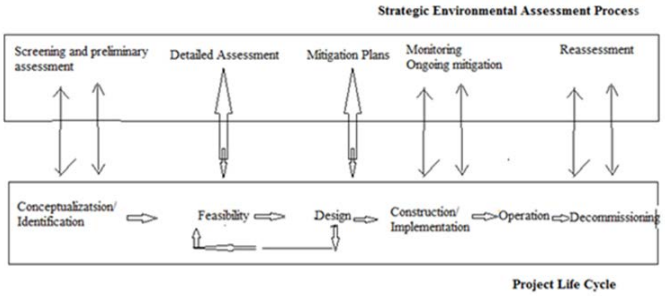

Figure 2: Strategic Environmental Assessment (SEA) Process at Different Phasea of Project Life Cycle Assessment

2.3. Strategic Environmental Assessment Management Plan [SEMP]

A strategic earth and environmental waste assessment management plan is a detailed plan and schedule for measures to minimize and mitigate any potential environmental and sustain efficacy impacts. SEMP should consist of a set of measurement, monitoring, control [mitigative] and institutional measures to be taken during the implementation and operation of the proposed projects to eliminate adverse environmental and sustainability impacts, offset them or reduce them to acceptable levels. The strategic environmental assessment process aims to incorporate environmental and sustainability considerations into strategic planning and decision-making processes of the project formulation and appraisal. International EIAs are important considerations in the project planning and decision-making process. It has been imperative to consider international EIAs in the concrete project to mitigate CO2 -induced climate warming problem and stratospheric ozone depletion problem. The International EIA process is a potentially good earth environmental management [2].

3. Results and Discussions

Environmental Health Impact Assessment [EHIA] process has been conducted for earth and environmental waste management including nuclear power plants to consider the safety and health impacts to mitigate psychological health loadings on workers and nearby residents. Social Impact Assessment [SIA] process can be defined as the systematic identification and evaluation of the potential social impacts [effects] of proposed projects, plans, programs, or legislative actions such that social consideration is encouraged in the EWMPPDM process and to arrive at actions that are socially compatible concerning a sustainable environmental waste management and sanitation project. SEA process concerns with environmental and sustainability effects in the CPPDM process and arrives at proposed projects, plans, programs, and legislative actions that are compatible concerning environment and sustainability issues.

The International EIA process required a multi-disciplinary approach that has been conducted very early stage of the Japanese Matsushita carbon rod project in 1982 for strategic environmental assessment. The paper highlights the SEA process conducted for certain projects that are based on operation and process approach and associated studies for sustainable development. Environmental waste engineering product environmental lifecycle analysis [LCA] has been conducted for identifying and measuring the impact of environmental waste management engineering industrial products on the environment and sustain efficacy using mass and energy balance methods. LCA considers the activities related to raw materials, transformation, ancillary materials, equipment, method, market, manpower, production, use, disposal, and ancillary equipment. As far as Sustainable materials for biopolymer and bio-plastic applications manufacturing process safety is concerning personal protective equipment and materials [PPEMs] that include garments, clothing, gloves, safety shoes, hard hats, safety glasses, shields, respirators, full aprons, safety belts, and other safety items which have to be used by an individual. Such equipment is important for personal protection and safety. It is the manager's and supervisor's responsibility to ensure that they are used. The enactment of worker's compensation law and occupational disease law shall increase materially the cost of insurance to industry. The increased cost and the certainty with which it is applied will put a premium on accident-prevention work. This cost can be materially reduced by the installation of safety devices. Sustainable materials for biopolymer and bio-plastic applications manufacturing process and waste management research experience has shown that approximately 80% of all the Sustainable materials for biopolymer and bio-plastic applications manufacturing process industrial accidents are preventable. EIA and EHIA processes have been conducted for earth and environmental waste management including a nuclear power plant to consider the safety and health impacts to mitigate psychological health loadings on workers and nearby residents.

SEA system is a potentially useful element of good environmental management and sustainable development; however, as currently practiced in Sustainable materials for biopolymer and bio-plastic applications manufacturing process industries, it is far from perfection. Emphasis should be given in Sustainable materials for biopolymer and bio-plastic applications manufacturing process industries on maintaining the economic viability of the operation, while in turn taking care to preserve the ecological and social sustainabilities of the country. The International EIA process required a multi-disciplinary approach that has been conducted very early stage of the wastewater treatment rotating biological contactors, trickling filter bed, biomedical parts, marine biopolymers, Indo-Matsushita Midget electrode project in 1982 at Tada for technical, economic, ecological, and social sustainabilities. The limitation or recommendation is to apply strategic environmental assessment process for sustainable environmental bio-polymers and bio-plastics materials towards sustainable development.

During the last two centuries due to the fast urbanization and industrialization along with the advancement of environmental waste management and sustainable materials for biopolymer and bio-plastic applications manufacturing process Science, Engineering and Technology, there have been considerable developments in Sustainable materials for the biopolymer and bio-plastic applications manufacturing process sector with the resultant wastage of copious amount of resources and tremendous environmental stress. Subsequently, it was realized that there were many adverse impacts on the environment and society. These unsustainable materials for biopolymer and bio-plastic applications manufacturing process developments have sustained environmental growth.

Sustainability of design and development, quality of life, safety on earth, and continuous process improvement of our environment are of utmost importance. Sustainable materials for biopolymer and bio-plastic applications manufacturing process development means a kind of Sustainable materials for biopolymer and bio-plastic applications manufacturing

process development that should be occurred without damages to the environment. Hence, hectic Sustainable materials for environmental waste management biopolymer and bio-plastic applications manufacturing process developmental activities during the last two centuries have caused considerable environmental and social impacts. These impacts have been measured, monitored, and mitigated by the international environmental impact assessment process (Figure-3).

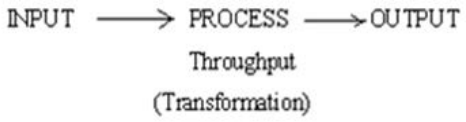

Figure 3: Construction Management by Process Approach

International EIAs are important in international project planning and decision-making process that mitigates potential environmental impacts in more than one country. The use of sustainable materials for technology and management in environmental and sustainability matters in two areas are sustainable development with global problems and prevention technologies that are designed to reduce the earth and environmental waste managerial effects of products and processes (Figure-4).

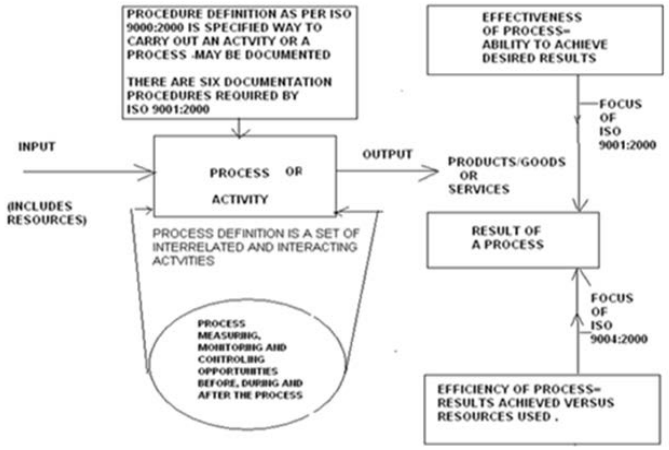

Figure 4: Schematic Diagram of a Construction Process

The integration of environmental protection and economic development is the most important strategic environmental assessment tool in achieving sustainable development (Figure-5)

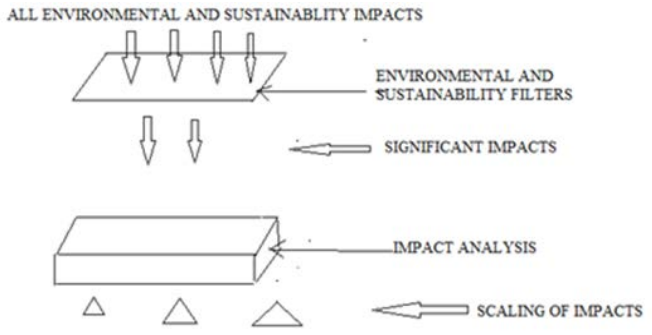

Figure 5: Procedure for finding Out the Significance of Environmental and Sustainability Effects

Earth and Environmental Waste Management Project planning and decision-making should include the integrative consideration of engineering or technical, economic, environmental, ethical, and social factors. A midget electrode waste management project was considered as a case study for the strategic environmental assessment process (Figures-5 and 6).

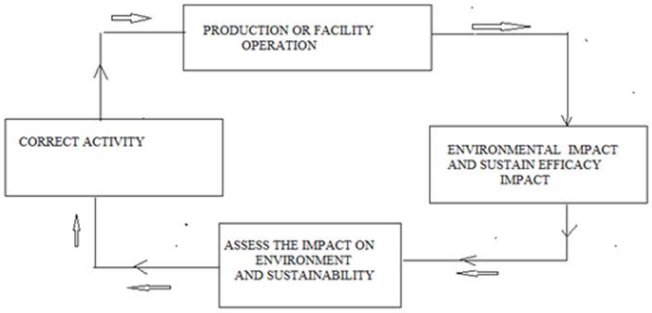

Figure 6: Environmental and Sustainability Entitled "After-the-Fact" Evaluation

The International EIA process has been designed for the sustainable midget electrode project design and Sustainable materials for the biopolymer and bio-plastic applications manufacturing process to identify and predict the potential effects of the physical, biological, bio-medical, marine, ecological, socio-economic, cultural environment and on human health and well-being are adequately protected. Environmental Impact Statements [EIS] have been prepared for the project which considering environmental and socio-economic factors concerning development and other proposed actions. Therefore, the EIA system is a potentially useful component of good environmental management [2].

In the chromium tanning industry, chromium environmental contamination and pollution have discharged beyond safe limits which seriously affects the life on the earth. Toxic emissions from industries, thermal power plants, smelting pollution, auto exhaust pollution in large metropolitan areas, photochemical smog have been poisoning the atmosphere beyond the permissible levels which causes serious health hazards. Air pollution causes adverse environmental health and social impacts. Mindless disposal of untreated industrial wastes in Odessa chromite mines and other radioactive wastes in nuclear power plants, Sustainable materials for biopolymer and bio-plastic applications manufacturing process debris, sanitary wastes, hazardous wastes, municipal solid wastes, agricultural wastes, domestic wastes have contaminated and polluted the water, soil, and land beyond the tolerable limits, which adversely affects land fertility, water quality, vegetation, aquatic and marine life.

This is proving more and more hazardous as this development continuously damaging the environment viz., melting of glaciers, climate change, carbon tetrachloride emission, greenhouse gas emission, ozone layer depletion. For example, due to continuous increase in CO2 concentration in the atmosphere due to industrial emission of about 382 ppm which leads to climate change. This decrease in glaciers contributes to about 29.5 % of mean sea level rise since 1991.

Water supplies stored in the glaciers were projected to decline. Besides contaminating and polluting the air, water, soil, and land, intensive technological activities lead to the depletion of natural resources.

This must have been required to bring our energy and intellectual capacity in tandem whereby that can meet the challenge efficiently without major disruption as well as without compromising on the livelihood of a future generation of their needs. The development would have occurred without damages to the environment and major disruption, and the process of urbanization and industrialization would have occurred sustainably by utilizing the resources efficiently. Now, these environmental problems are the present earth and environmental challenges and opportunities for improvement. To overcome these environmental problems that shall require new and more efficient solutions, technologies, processes, and products alongside behavioral change.

Low carbon and energy-efficient technology of Sustainable materials in manufacturing process industries can make contributions to mitigating impacts of economical growth on global warming (Figure-7). The resultant output of green products and services which are environmental advantages with good performance and cheaper prices. The dual goals of green design are waste prevention and better material management as depicted in Figure 7.

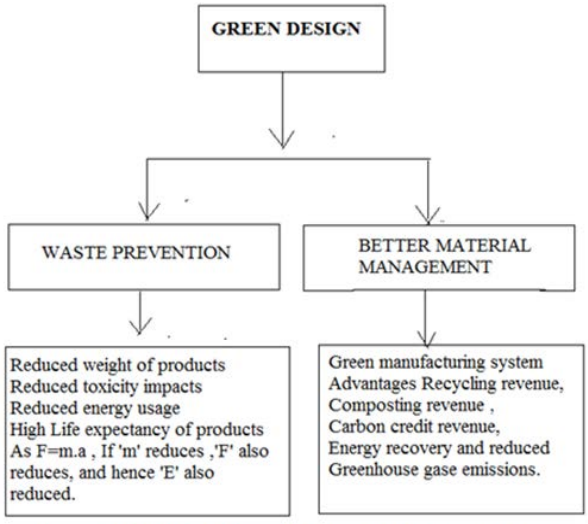

Figure 7: Dual Goals of Green Design and Manufacturing Process

Design and Sustainable materials for the manufacturing process of green buildings have considerably reduced the environmental impacts associated with manufacturing, use, and disposal. Before the enactment of the National Environmental Policy Act on Environment in1970 in the USA, only technical or engineering, and economic factors dominated the planning and decision-making process in most of the world projects, plans, programs, permits, policies, and legislative actions. As per the research results, the project planning and decision-making process must include the integrated consideration of engineering or technical, economic, environmental, safety, ethical, social, and sustainability factors. This important consideration can be referred to as the "Concept of the Four Es and 1 S" in the organizational planning and decision-making process. There are ecological and biogeochemical principles and tools such as energy flows and material cycling, element ratios, mass and energy balance, element cycling, product earth and environmental lifecycle assessment [LCA] (Figure-8) are available to solve major environmental problems that we face in our world today such as global warming, acid rain, environmental pollution and increasing greenhouse gases.

3.1. Product Environmental lifecycle Analysis (LCA)

Earth and environmental waste management engineering product environmental lifecycle analysis [LCA] is used for identifying and measuring the impact of industrial products on the environment and sustain efficacy using mass and energy balance methods (Figure-8). LCA considers the activities related to extraction of raw materials, ancillary materials, equipment production, use, disposal, and ancillary equipment [3].

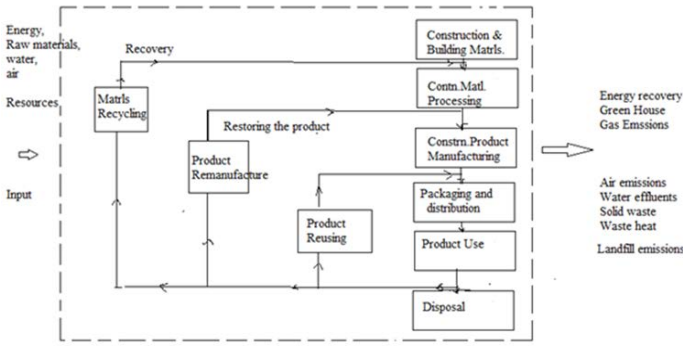

Figure 8: Construction Product Evironmental Lifecycle an Alysis

3.2. Environmental Health Impact Assessment [EHIA] Process for Nuclear Power Plant Project Towards Sustainable materials in manufacturing process Development

An environmental health impact assessment [EHIA] process is proposed in this research for nuclear power plant project during the sustainable environmentally friendly materials in manufacturing process phase to address psychological health impacts on workers and nearby residents. Environmental health impact assessment can be defined as the systematic identification and evaluation of the potential environmental health impacts or effects of proposed nuclear power projects, plans, programs, policies or legislative actions relative to the physical-chemical, biological, bio-medical, marine, cultural and socioeconomic components of the total environment. At present, there are more than four hundred thirty-seven nuclear power plants situated in the World. It may be worth mentioning that none of the nuclear power projects, plans, programs, policies, or legislative actions in the World have got sustainable practices in the conduction of the EHIA process.

Nuclear power plants generate electricity using heat generated in pressurized water reactors where the nuclear reaction takes place. During the Sustainable materials for bio-

polymer and bio-plastic applications manufacturing process phase of nuclear power plants which use Uranium-235, Thorium-232, and Plutonium-239 as fuels in nuclear reactors causing nuclear fission. At that time the copious amount of radiation dose due to radioactive pollution escaping out in the order of about 120 billion Becquerel [120 GBq] to 240 billion Becquerel [240 GBq] that is 50 grams to 100 grams, radiation activities viz., Alpha (α), Beta (β) and Gamma (γ) as against the safe limits of 0.1 Bq /l or Bq/kg [ppm] inland, air and water when operating, repair and maintenance of replacingold nuclear fuels with new fuels taken place. High exposures to radioactive pollution damage mental health and psychological burden on workers and nearby residents.

As per a psychological health impact survey conducted by the author in a nuclear power plant at Quinson, China, severe psychological disorders including radioactive poisoning, depression and post-traumatic stress have been investigated to an extent among 49% of the nearby residents in and around 82% of the nuclear power plants in the World [World Engineers' Convention, Shanghai, China-2004]. Psychological health impact loadings due to radioactive environment on workers and nearby residents have been studied in this research during the test run phase using computer simulation models. Psychological health impact assessment [PHIA] on workers and nearby residents has been addressed to mitigate psychological health impact loadings on workers and nearby residents.

3.3. Environmental Health Impact Assessment (EHIA) Process for Earth and Environmental Waste Management for Sustainable Generic, Source Specific and Industrial Development

In this research, the EIA process has been investigated on the cotton double roller [DR] ginning industries using chrome composite leather-clad [CCLC] washers and design and development of an eco-friendly alternative. The objective is to assess the environmental health impacts of Indian cotton ginning industries. Most of the cotton ginning operations are performed by using DR ginning machines which serve an important role in the Indian cotton ginning industries. The rollers used are made of CCLC covering fixed to a shaft. The CCLC contains about 18,000 to 36,000 mg/kg [ppm] of chromium particles. When the seed cotton is processed in the DR ginning machine, the lint cotton is contaminated with hexavalent chromium dust of about 140 to 1990 mg/kg [ppm] which is a carcinogenic substance against the safe limits of 0.1 ppm. During the cotton ginning process due to persistent rubbing of CCLC over the stationary knife, the chromium particles are adsorbed into lint cotton such that the spun yarns and woven fabrics get contaminated about 100 to 200 ppm which according to World Health Organization [WHO] eco-standards should not be more than 0.1 ppm.

The CCLC rollers used in cotton roller ginning machines get powdered during the ginning process. As chromium is a cloud of specific dust, gin and mill workers and residents are directly exposed to this carcinogenic substance and are vulnerable to environmental health hazards. To offset this problem, pollution-free eco-friendly washers/rollers both for laboratory and commercial studies have been fabricated and experimented with. Environmental health inventory [EHI] serves as the basis for evaluating the potential environmental health impacts both beneficial and adverse of a proposed action. Environmental health impact statement [EHIS] describes the affected environmental health or environmental health setting without the project. The design and development of the EHI is an initial step in the EHIA process. It is concluded that the EHIA process should be conducted for certain projects, plans, programs, legislative actions, policies in the project planning, and decision-making process [4, 5].

3.4. International EIA Process

The International EIA process is a potentially good environmental management system [EMS]. International organization for Standardization [ISO]'s 14000 and 9000 standards focus on Environmental Management System [EMS] and Quality Management System [QMS] of all sorts of organizations apart from more than 19500 published standards. Environmental Management System [EMS] and Quality Management System [QMS] have been separately featured in ISO. Environmental Management System [EMS] standards apply to the management system concepts of an organization's environmental issues and opportunities [6]. It defines the features of an EMS that need to be in place to ensure that the organization identifies and focuses on improving areas where they have significant environmental impacts. This system can be integrated with ISO 9000 Quality Management System [QMS] standards to achieve excellence in quality as well as environmental obligations. The overall aim of the EMS is to provide protection to the environment and to prevent pollution to manufacture eco-friendly products and services.

EMS focuses on key drives of performance excellence in products and processes as well as organizations that are focused on delivering values to the customers, internal operational processes, and to staff's learning. Hence, this system approach to environmental management shall achieve excellence in the overall performance of the organization. In the present study about two-third of materials in manufacturing process waste was recoverable due to the conduction of intensive on-site waste management training programs, recycling and composting processes as against the conventional manufacturing process management practices which could able to recover the waste of only 10 to 15%. Sustainable environmental materials for manufacturing process wastes are produced by sustainable materials in manufacturing process sector. The study has been attempted to identify and evaluate a special waste minimization hierarchy of solid and hazardous waste management for properly managing process waste including minimizing generation and treatment that have been generated and disposing of waste residuals.

A case study has been included on the generation of waste in manufacturing process wastes and potential waste management strategies for a group or generic sustainable materials and source-specific, specific industrial processes. All materials for the manufacturing process generate wastes in the form of liquids, solids, or gases. Some wastes are consid-

ered hazardous. The waste minimization hierarchy of waste management is duly ranked from most desirable to least desirable (Figure-9). 1. Eliminating waste generation –Most desirable, 2. Reducing waste generation- Most desirable, 3. Reuse, recover or recycle waste materials- Most desirable, 4. Treating waste to diminish quantity and to detoxify the hazardous and non-hazardous solid wastes --Least desirable, 5. Disposing of waste residuals- Least desirable.

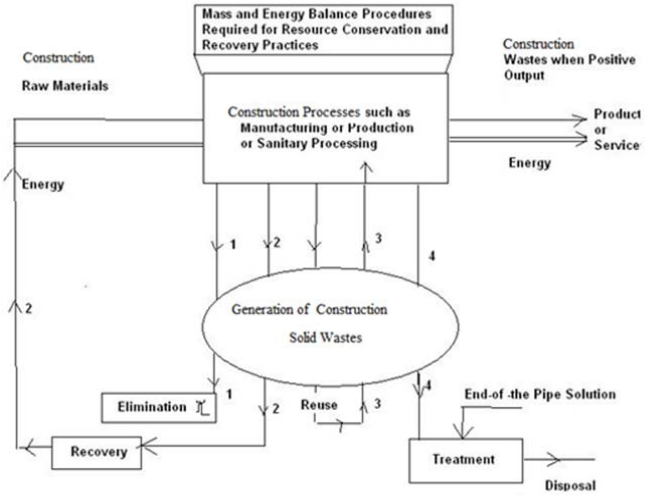

Figure 9: Schematic Representation of Constructional Process or Activity Showing Sustainable Construction Waste Management

Waste minimization includes only elimination, recovery, reduction, reuse, and recycle hierarchies. Waste minimization does not include treatment of wastes as well disposal that is point number 4 and point number 5 because these are traditional waste control strategies that involve treatment and disposal which are called end-of-the pipe solutions and are costly affairs as well as involve control of high discharge standards. Modern waste control strategies involve point number 1, point number 2, and point number 3 which are not requiring end-of-the pipe solutions for waste management problems. Solid and hazardous waste generation is the sum of material recovery and discards. Report on the waste audit conducted for Sustainable materials for the manufacturing process industry is presented for recovering two-third of municipal solid wastes [MSW] by recycling and composting processes (Figures- 10 and 11).

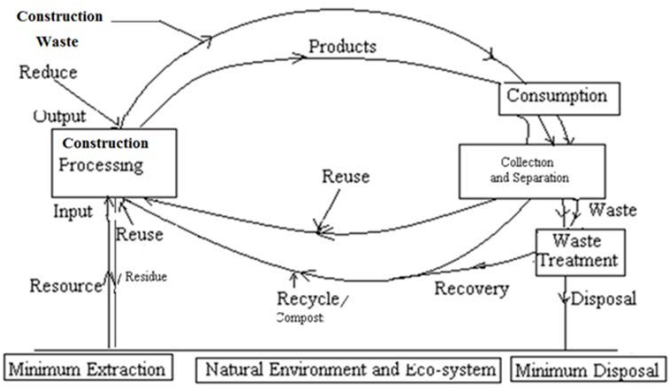

Figure 10: Closed Loop-Shaped Green Economy for Sustainable Construction Waste Mgt

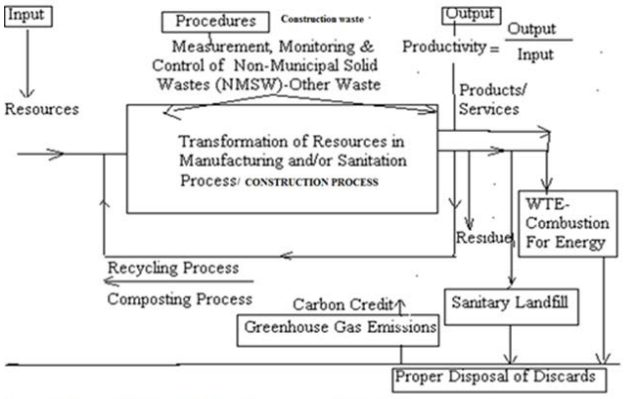

Figure 11: Sustainable Construction Waste Management System

To achieve sustainable economical improvement, natural resources to be utilized at optimum level to maximize efficiency as per the result analysis of optimum competitive and social markets. The efficiency of a kind of sustainable economical system is referred to in "A.K" sustainable economic model that is the product of engineering or technical factor level (A) and the capital (K). Sustainable economic improvement is explained by three factors which are given below: -

- The natural increase in the accumulation of labor potential,
- Capital accumulation or money with which a business is started and run,

And Sustainable technological momentum can be referred to as total factor productivity (TFP) or efficiency in Sustainable materials for the biopolymer and bio-plastic applications manufacturing process.

Such momentum keeps the capital development dynamic which emerges from the sustainable enterprise creation process, green products or services, new methods of production and processes, new Sustainable materials for manufacturing process management and transportation, new markets, and new forms of Sustainable materials for biopolymer and bio-plastic applications manufacturing process organization. Standard Production and Processing Function [SPF] is expressed based on operation approach as

$Y = f(C, L)$

Where Y=Output, C=Capital, and L=Labour

As knowledge is a crucial factor for economic growth, Standard Production Function (SPF) is modified based on process approach as

$Y = A.\ f(X1, X2, X3, X4, X5, X6 \ldots Xn)$

'A' represents Knowledge on sustainable materials for manufacturing process engineering or technical factor,

Y= Output,

Input elements are namely, manpower, machinery, materials, method, money, and market denoted as X1, X2, X3, X4, X5, X6, …Xn

f = Standard production process function.

As per the given standard production function, knowledge is

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a decisive production variation, sustainable innovation level is required in engineering or technical system. The solution is the development of reformed SEA implemented Earth and environmental waste management approach is recommended in manufacturing process industries.

3.5. Importance for the Conduct of Environmental Impact Assessment [EIA] and Management Study for the sustainable materials during the manufacturing process Projects

Historically, the choice of new Sustainable materials for biopolymer and bio-plastic applications manufacturing process projects was primarily on one criterion that is economic viability. Presently, second and third choice criteria that are environmental and social impact have become a strong yardstick, therefore a triple-bottom-line approach that is economic, environmental, and social factors to Sustainable materials for biopolymer and bio-plastic applications manufacturing process project viability. Environmental Impact Assessment [EIA] process is a systematic identification and evaluation of potential effects of proposed projects, plans, programs, plans, or legislative actions relative to the physical-chemical, biological, bio-medical, marine, cultural, and socio-economic components of the total environment.

3.6. Steps to Conduct Environmental Health Impact Assessment and Management

Step 1: Identification of quantity and quality characteristics of concerned
environment of proposed project.
Step 2: Preparation of description of existing environmental resource conditions.
Step 3: Procurement of relevant quantity and quality standards.
Step 4: Impact predictions,
Step 5: Assessment of impact significance,
Step 6: Identification and incorporation of mitigation measures.

3.7. Conduct of Environmental Impact Assessment [EIA] Study for the Efficient Earth and Environmentsal Waste Management process

- Prediction and assessment of impacts on the surface water environment,
- Prediction and assessment of impacts on soil and ground environment,
- Prediction and assessment of impacts on the air environment,
- Prediction and assessment of impacts on the noise environment,
- Prediction and assessment of impacts on the biological environment,
- Prediction and assessment of impacts on the biomedical environment,
- Prediction and assessment of impacts on the marine environment,
- Prediction and assessment of impacts on the visual environment,
- Prediction and assessment of impacts on socio-economic environment.
- Prediction and assessment of impacts on cultural environment,
- Prediction and assessment of impacts on the archaeological environment,
- Prediction and assessment of impacts on the anthropological environment

3.8. Benefits of EIA applications in Earth and Environmental Waste Management Processing Industries

- Considerable reduction in waste and the depletion of resources.
- Considerable reduction and/or elimination of the release of pollutants into the environment.
- Green design and green building products to minimize their environmental impact in
- production, use, and disposal.
- Control the environmental impacts of sources of raw material.
- Waste minimization and adverse environmental impact of new developments.
- Promote environmental awareness among employees and the community.

3.9. Environmental Management Programs

The organization shall establish and maintain a program(s) for achieving the environmental objectives and targets. It shall include designation of the responsible function, team, or individual and a time frame for achievement [6].

- State the objective/target.
- State the purpose [how the objective/target will support the policy].
- Describe how the objective/target will be achieved.
- State the program [team] leader.
- Designate departments and individuals responsible for specific tasks.
- Establish the schedule for the completion of the tasks.
- Establish the program review, which will include format, content, and review schedule.

3.10. Conduct of Social Impact Assessment [SIA] Study

Social Impact Assessment [EIA] process is a systematic identification and evaluation of potential social effects of proposed projects, plans, programs, plans, or legislative actions relative to the society. The purpose of the SIA process is to bring about a sustainable and equitable biophysical and human environment. SIA process includes the monitoring, measurement, and control opportunities including analysis and management of the intended and unintended social consequences whether both positive and negative impacts of planned interventions and any changes that take place in the social transformation process invoked by those interventions. The SIA process should include the analysis of the use of land, culture, industrial process, economic development, and their impact on service sectors such as water use, energy use, sanitation, and traffic. SIA process is done to ensure that there is no mismatch between the manufacturing process development and socio-cultural and economic development of the project areas.

3.11. Sustainable Environmental Water and Waste Water Quality Management

Environmental Water quality is to be maintained in Sustainable materials for manufacturing process sites such that water supply to consumers is safe and hygienic. Relevant water quality standards are to be followed [4]. A sustainable sanitation facility is to be provided. A sanitation impact assessment study has been conducted for sanitation projects and plans. Sewerage systems, stormwater drainage systems, wastewater treatment systems, industrial waste treatment systems, sustainable septic tanks are important onsite requirements. Relevant wastewater discharge standards are to be followed. The process approach for measurement, monitoring, and control opportunities for water, wastewater, and industrial water quality and quality has been followed [4].

3.12. Safety Engineering and Management in Sustainable materials for manufacturing process Industries [Safety First]

Safety management is the systematic identification and evaluation of potential safety requirements of proposed projects, plans, programs, plans, or legislative actions. ISO 45000 Standards are referred. The purpose of safety engineering and management is to bring about design and Sustainable materials for the biopolymer and bio-plastic applications manufacturing process of sustainable civil engineering structures.It has been observed that some Sustainable materials for biopolymer and bio-plastic applications manufacturing process methods and machinery used in India are to be obsolete because they were old which operated on poor performances in terms of productivity, quality, efficiency, and safety. Some of the alternative pieces of machinery, which are indigenously manufactured, also do not guarantee superior performance and necessary safety conditions because of their poor design and materials of Sustainable materials for the biopolymer and bio-plastic applications manufacturing process. It is mandatory that checking for safety requirements about machinery, bridges, roads, and buildings. Safety personnel responsible for overseeing the safety of all operating personnel must be cognizant of the latest laws and regulations about worker safety and occupational health [7].

These are changed and/or updated from time to time. Checking for Safety [CFS] such that to ensure that the question of safety will not be overlooked, it is well to have all plans, specifications, and drawings checked for safety, making special provision for this in each set of specifications and the title plate of each drawing duly checking periodically for cranes, hoists, ventilation, lifts, tackles, fire protection systems, alarms, buildings, mechanical guarding and electrical and electronic equipment and heavy engineering equipment. Personal protective equipment [PPEs] and materials include garments, clothing, gloves, safety shoes, hard hats, safety glasses, shields, respirators, full aprons, safety belts, and other safety items that have to be used by an individual [7]. Such equipment is important for personal protection and safety. It is the manager's and supervisor's responsibility to ensure that they are used. As far as occupational disease prevention is concerned that those persons engaged in or working near operations are exposed to appreciable quantities of dust, fumes, or gas, adequate control measures must be adopted. Some major considerations involved in the application of effective control to industrial occupational disease are given. Some of the policies, practices, and procedures to prevent exposure of personnel to unsafe materials are also provided. As far as the worker's compensation law is concerned, it must be enacted strictly in our country. The principle involved is that the worker injured or disabled in Sustainable materials for biopolymer and bio-plastic applications manufacturing process industries should be enabled, through proper medical treatment, to return to wage-earning capacity as promptly as possible and while incapacitated, should receive compensation instead of wages, and regardless of fault. The expense of medical treatment and compensation should properly be borne by industry and become a part of the cost of its products. The laws generally provide that workers injured in the industry shall be furnished the necessary medical treatment, and, in addition, compensation based on a percentage of their weekly wages, payable periodically. Dependants of employees killed in the industry are likewise compensated.

Occupational diseases law provides provisions for compensation benefits in occupational – disease cases. The enactment of worker's compensation laws and occupational disease law shall increase materially the cost of insurance to industry. The increased cost and the certainty with which it is applied will put a premium on accident-prevention work. This cost can be materially reduced by the installation of safety devices [8]. Research experience has shown that approximately 90% of all the earth and environmental waste management accidents are preventable. As far as fire loss prevention is concerned, which is an indispensable element in environmental waste manufacturing process industry. It exists only with top management direction and the support of labor. The designation fire protection usually encompasses the entire field of prevention of loss by fire, including both the causes for the occurrence of fires and methods for minimizing their consequence.

Some of the fire standards of protection to prevent injury and loss of life are given in this paper. Fire protection engineering practices both in building design and in safe operating practices are also included [8]. Sustainable materials for biopolymer and bio-plastic applications manufacturing process noise safety is considerd as a pollutant, both as nuisance and as the cause of hearing impairment. There is evidence that in manufacturing process sites that noise causes ailments such as hearing impairment, physiological and psychological disorders including anxiety and heart disorders. Protection from noise is required when sound levels exceed relevnt noise pollution standards. When protective equipment is required, it must be provided by a trained person, and periodic checks made for the effectiveness and efficiency [8].

3.13. Total Environmental Waste Manangment and Earth Quality Management [TQM]

Total Environmental Waste Management and Earth Quality Management [TQM] can be broadly defined as a set of systematic activities carried by an institution to efficiently

achieve institutional objectives that satisfy beneficiaries at the appropriate time and price. The definition of quality is "The totality of features and characteristics of products or services that bear on its ability, efficacy, and values to satisfy a given or implied need". TQM is a comprehensive and structured approach to educational integrated management that seeks to improve the quality of educational services through ongoing refinements in response to continuous feedback. Thus, this standard definition of quality is applied commonly to both products and services that are stated and unstated [6].

TQM has an important role to play in addressing quality issues surrounding Sustainable materials for manufacturing process development.TQM is a comprehensive and structured approach to Sustainable materials for the manufacturing process sector that seeks to improve the quality of services through ongoing refinements in response to continuous feedback. TQM leads to sustainable materials in manufacturing process development. International Organizational for Standardization's ISO 9000 series defines TQM as a management approach centered on quality, based on the participation of all its members and aiming at long-term success through customer satisfaction and benefits to all members of the organization and society. Hence, TQM is based on quality management from the customer's point of view. TQM processes are divided into four sequential categories: plan, do, check, and act (Figure-12). This is also called the PDCA cycle or Deming's cycle for continuous process improvement. In the planning phase,

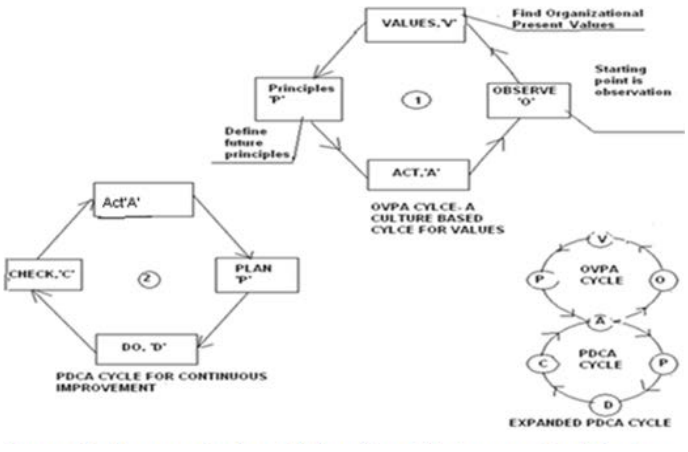

Figure 12: Conceptualization of Culture Based Environmental and Quality Management Entitled "OVPA" Cycle by Incorporating the Expanded PDCA Cycle for Indian Construction Industries towords Sustainable Construction Management

Environmentalist define the problem to be addressed, collect relevant data, and ascertain the problem's root cause; in the doing phase, Environmentalists list develop and implement a solution, and decide upon a measurement to gauge its effectiveness and efficiency; in the checking phase, Environmentalist lists confirm the result through before-and-after data comparison; in the acting phase, Environmentalist lists document their results, inform others about process changes, and make recommendations for the problem to be addressed in the next PDCA cycle. ISO 9000 series focus on quality management for all sorts of organizations. It defines the features of a quality management system [QMS] that need to be in place to ensure that identify and focus on improving the areas where they have significant process deficiencies [6]. The ISO 14000 Environmental Management System [EMS] standards apply to the management system to manage an organization's environmental issues and opportunities [6].

It defines the features of an EMS that need to be in place to ensure that the organization identifies and focuses on improving areas where they have significant environmental impacts. This system has been integrated with ISO 9000 Quality Management System [QMS] standards to achieve excellence in quality as well as environmental obligations in midget electrode projects. The overall aim of the EMS is to provide protection to the environment and to prevent pollution to manufacture eco-friendly products and services. The ISO 14000 series of standards assist the organizations to excel environmental and economic gains for continuously improving organizational performances. They are used for the prevention of pollution, reduction in wastes, enhancement of internal management system efficiency, optimum utilization of resources, and compliances for legal and regulatory requirements. EMS can be divided into five events which form the sequence of a cycle (Figure 13).

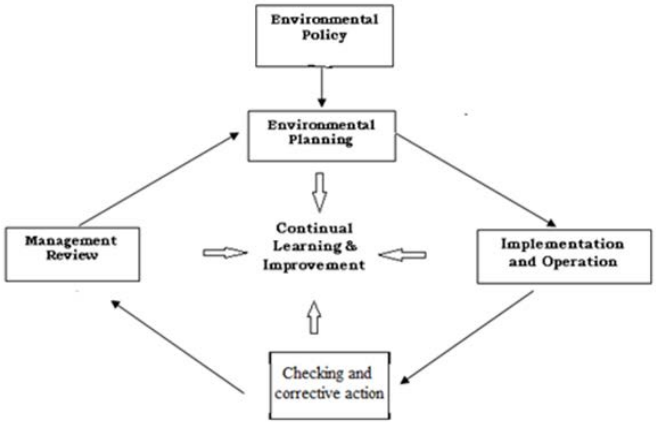

Figure 13: Environmental Management System

These five events are (1) Environmental Quality Policy, (2) Environmental Quality Planning, (3) Environmental Quality implementation and operations, (4) Checking and corrective actions, and (5) Environmental Quality Management Review. The ISO 14000 series of standards have also been designed to cover the areas of environmental issues and opportunities for the organizations to compete for the global customer-centric markets so that the products and services can be manufactured at par with the international requirements [6].

EMS focuses on key drives of performance excellence in products and processes as well as organizations that are focused on delivering values to the customers, internal operational processes, and to staff's learning. It may be mentioned that Environment and Quality Management [EQM] is a managerial approach centered on environment and quality

through beneficiary satisfaction in Sustainable environmental materials that lead to economical improvement and environmental sustainability. Hence, this system approach to environmental management shall achieve excellence in the overall performance of the organization.

3.14. Environmental Health Impact Assessment [EHIA] process Proposal for nuclear power plants

This research note discusses an importance of conducting environmental health impact assessment [EHIA] process for the project proposal of Nuclear Power Plants. There are more than twenty-four nuclear power plants situated in rural and urban areas in India having an installed capacity of 7500 MW including pressurized heavy water reactors and light water reactors. Nuclear Power Corporation of India Limited [NPCIL] has identified Rajauli in Nawada district of Bihar as the possible site for creation of 2000 MW nuclear power plant proposal. It is also important to conduct EHIA process study to address psychological and neuroscience impacts on nearby residents at Rajauli in Nawada District, Bihar [Reference 1]. The adverse environmental health impacts on nearby residents form certain types of projects, such as nuclear power plants to address Psychological impact assessment [PIA] process are mental adverse health effects, depression, anxiety, post-traumatic stress disorders, damages to mental health impacts including emotional somatic unsafe radioactive disorders on human being, animals and plant ecosystem. A high dose of ionizing radiation as shown in given below figure that can cause immediate damage to a person's body, including at very high doses, radiation sickness and death. At lower doses, ionizing radiation can cause health effects such as cardiovascular disease and cataracts, ulcer as well as cancer.

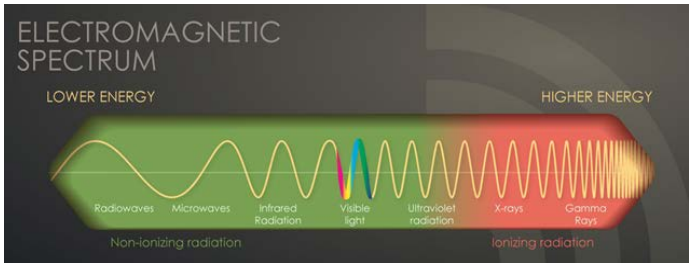

Figure 14:

The ionizing radiation is a form of energy that acts by removal of electrons from atoms and molecules of materials that include air, water and land [LAW] interactions and interrelations and living tissues and organs. High energy short wavelength ionizing radiation can travel unseen and pass through LAW.

"Environmental Health Impact Assessment can be defined as the systematic identification and evaluation of the potential health impacts of proposed nuclear power projects, plans, programs, policiesor legislative actions relative to the physical -chemical, biological, nuclear, cultural, and socioeconomic components of the total environmental health. EHIA which is a specialised terminology that is divided into most significant terms, Viz., "environmental health inventory", "environmental health impact assessment" and "environmental health impact statement".

The objective of the study and check are to conceptualize strategic environmental health assessment [SEHA] process for the generic, source specific and industrial sector in order to control climate change. Organizational planning and decision-making process should include the integrated consideration of technical or engineering, economic, environmental, safety, health, social and sustainability factors to achieve climate sensitivity environment. As per author's investigations conducted on EHIA during 4-5, November 2004 for the Qinshan Nuclear power plant, China Nuclear Power Co.Ltd., [CNPC], Qinshan that has been appraised and evaluated for safe nuclear environment compared to all twenty four nuclear power plants as it is a multi-unit nuclear power plant in Qinshan town, Haiyan county located in Jiaxing, Zhejiang province at China [Reference 1, World Engineers Convention Proceedings at Shanghai, 2004] . Nuclear radiation study has been conducted at CNPC and nuclear simulation and environmental health impact modelling including heat exchangers were investigated.

Environmental technological perspectives on climate change mitigation in urban and rural environments are discussed with reference to nuclear safety called environmental health impact assessment [EHIA] process has been focussed for the nuclear power project at Bihar as a project proposal of NPCIL. Environmental health Impact Assessment process is designed and developed to identify and predict the potential environmental health effects of the physical, biological, ecological, socio-economic, cultural environment and on human health and well-being are adequately protected at Rajauli in Nawada District, Bihar. Strategic environmental health assessment (SEHA) process has been aimed in order to incorporate environmental quality (EQ) and sustainability factors in to organizational project planning and decision-making process. The primary purpose of the SEA process is to encourage the consideration of the environment, safety, health, social and sustainability factors in organizational planning and decision-making process and to arrive at actions that are compatible (Reference 2).

SEA process protocol has been proposed for the EQ control. The health impacts of projects, plans, programs, or policies should be considered in the organization planning and decision-making process. Because of the importance of these concerns, particularly in developing and developed countries, environmental health impact assessment process is addressed. For certain types of projects such as nuclear power plants, it is necessary to address psychological, neurological, and physiological impacts on nearby residents and populations for the assessment and mitigation of mental illness in order to assess and mitigate mental health that is environmental health impact assessment and their components such as prediction and assessment of impacts on the air environment, surface water environment, soil and ground water environments, noise environment, biological or ecological environment, habitat based methods, cultural environmental impacts, architectural , historical and archaeological impacts, visual and aesthetic impacts, socioeconomic

environmental health impacts including public participation on environmental health impact decision making process .

The aim of the study is to conceptualize and develop SEHA and SEA processes for the control of climate change and environmental pollution. Social Impact Assessment [SIA] process can be defined as the systematic identification and evaluation of the potential social impacts [effects] of proposed nuclear power projects, plans, programs, or legislative actions such that social consideration in Rajauli is encouraged in project planning process and to arrive at actions that are socially compatible. This treaty and official government procedures of SEHA helpful for making much earlier in the decision-making process than EHIA process proposal of Nuclear Power Plant as depicted in given below nuclear power plant and psychological impacts and mental health damages on nearby residents of Rajuali.

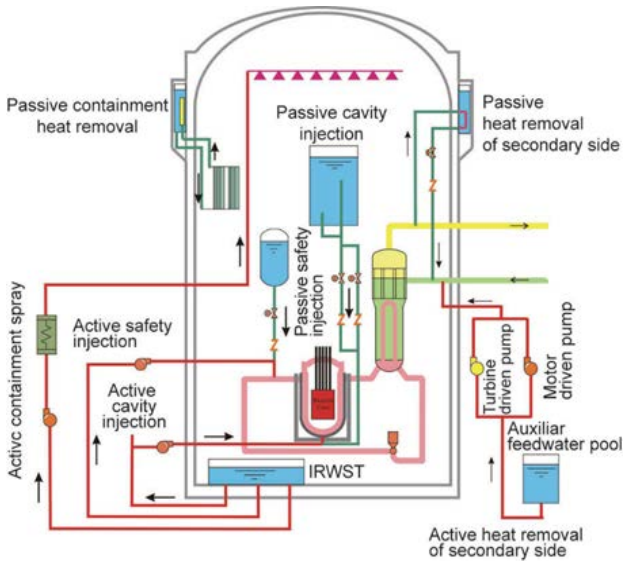

Figure 15:

The workers and mothers of young children are at risk of environmental health impacts such as depression, anxiety, psychosomatic, and post-traumatic symptoms about nuclear radiation exposures including stigma impact assessment nearby local residents. It is suggested to mitigate environmental health impacts due to psychological symptoms among village people, power plant workers, and medical program and awareness needed to reduce stigma, integration of psychiatric treatment and medical treatment (Reference 3) as the nuclear effect change damage of mental health and psychological impacts on nearby residents at Nuclear Power Plant Proposal of NPCIL at Rajauli, Nawada district of Magadh division of the State of Bihar [3-6].

4. Conclusions and Recommendations

SEA process has been aimed order to incorporate earth and environmental waste maangment quality and sustainability factors into project planning and decision-making processes, such as projects' formulation and appraisal of wastewater treatment rotating biological contactors, trickling filter bed, biomedical parts, marine biopolymers, Indo-Matsushita midget electrode (battery carbon rod) plant in 1979 at Tada, sustainable bridge, road and sanitation structures, green building, nuclear power plant, cotton roller ginning plant and concrete that included polices, programs, plans, and legislative actions. The primary purpose of the SEA process is to encourage the consideration of the environment, safety, health, social, and sustainability factors in the organization and process and to arrive at compatible actions that are compatible. EIA should be considered as an official tool to protect the environment. Sanitation impact assessment has been investigated for sanitary projects and plans. EIA process is a multidisciplinary approach that must be necessary for providing a prevention mechanism for environmental waste quality management and protection in environmental waste manufacturing process development.

EIA process is designed to identify and predict the potential effects of the physical, bio-medical, marine, biological, ecological, socio-economical, cultural environment and on human health and well-being are adequately protected. As per research results, the process should include the integrated consideration of technical or engineering, economic, environmental, safety, health, social, and sustainability factors to achieve business excellence. The SEA process protocol has been proposed for checking the environmental quality and social assessments and management plans. This treaty and official government procedures of SEA helpful for making much earlier in the decision-making process than the EIA process. Therefore, it is the key tool for sustainable development. SEA aims to incorporate environmental and sustainability considerations into strategic decision-making processes, formulate policies, plans, and programs, and legislative actions [9-14].

Prior to the National Environmental Policy Act [NEPA] process in 1970 in the USA, technical and economic factors dominance the World's waste manufacturing process projects. The objective of the study is to conceptualize the SEA process for the BIPARD trainees. The ISO 14000 Environmental Management System standards and ISO 45000 occupational safety and health management system standards should apply to the management system concepts of total quality management to the management of an organization's earth and environmental waste management issues and opportunities for continuous improvement. It defines the features of an EMS that need to be in place to ensure that organizations identify and focus on improving areas where they have significant environmental impacts [15-17].

EMS focuses on key drives of performance excellence in products and processes as well as organizations that are focused on delivering values to the customers, internal operational processes, and to staff's learning. Hence, this system approach to environmental management shall achieve excellence in the overall organizational performance. Engineering product environmental lifecycle analysis has been conducted for identifying and measuring the impact of sustainable materials for manufacturing process industrial products on the environment and sustain efficacy by means of mass and energy balance methods. LCA considers the activities related to raw materials, transformation, ancillary materials,

equipment, methods, market, production, use, disposal, and ancillary equipment. As far as the processing requirement and safety reports are concerned, personal protective equipment and materials that include garments, clothing, gloves, safety shoes, hard hats, safety glasses, shields, respirators, full aprons, safety belts, and other safety items have to use by an individual. Such equipment is important for personal protection and for safety. It is the manager's and supervisor's responsibility to ensure that they are used. The enactment of worker's compensation laws and occupational disease law shall increase materially the cost of insurance to industry.

The increased cost and the certainty with which it is applied will put a premium on accident-prevention work. This cost can be materially reduced by the installation of safety devices. Sustainable materials for biopolymer and bio-plastic applications manufacturing process management research experience have shown that approximately 90% of all the waste manufacturing processing industrial accidents are preventable. It is concluded that earth and environmental waste management coupled with quality management is a managerial approach centered on environment and quality through beneficiary satisfaction that leads to economical improvement and sustainability based on the triple-bottom-line approach. TQM has an important role to play in addressing quality issues surrounding sustainable materials for manufacturing process development. Sustainable water and wastewater management have been discussed.

EIA and EHIA processes have been conducted for a nuclear power plant to consider the safety and health impacts to mitigate psychological health loadings on workers and nearby residents. SEA system is a potentially useful element of good earth and environmental management and sustainable development; however, as currently practiced in industries, it is far from perfection. Emphasis should be given in sustainable materials for manufacturing process industries on maintaining the economic viability of the operation, while in turn taking care to preserve the ecological and social sustainabilities of the country. The International EIA process required a multi-disciplinary approach that has been conducted very early stage of the wastewater treatment rotating biological contactors, trickling filter bed, biomedical parts, marine biopolymers, Indo-Matsushita carbon rod project in 1982 at Tada for economic, environmental, and social viabilities.

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