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Student full name: Avani k Sheth

Address: 801,prakruti apt.
8th floor,race rourse circle
Baroda-390007
India

College name: I.E.D(institute of environmental design)
near nana bazar char rasta
vallabh vidhyanagar
Anand
Gujarat
India

College guide: Ar. Preeti Shah

Auroville guide: Ar.Anupama Kundoo
Ar. Lalit Bhatia

Thesis topic

(First draft)

Avani Sheth
3398
5th yr. architecture
IED Vallabh Vidhyanagar

Aim

Topic selected is to design an eco industrial park in the industrial zone of Auroville township in the state of Tamil Nadu located very near to Pondycherry.

Introduction

The climate change, local air pollution, loss of biodiversity and ecosystems, degradation of farm land, and massive depletion and waste of natural resources are some of the environmental signs of the system's failure to respect the natural constraints upon human activity.

Powerful arguments against this are needed for development as a means, not as an end in itself that takes precedence over environmental and human values. Put very simply, the goal is to reintroduce materials and energy back into productive reuse with the minimum energy required and the least waste of material in the process.

Why? Because we waste far too much. Actually we are more than ten times better at wasting resources than at using them. The end concern of industrial ecology is actually fairly easy to state. The goal, at the minimum, is to generate the least damage in industrial and ecological systems through the maximum circulation of materials and energy. Highest value use with the least dissipation of resources forms the core of systematic application of industrial ecology.

What is an eco industrial park?

An eco industrial park is a community of manufacturing and service businesses seeking enhanced environmental and economic performance through collaboration in managing environmental and resource issues including energy, water, and materials.

By working together, the community of business seeks a collective benefit that is greater than the sum of the individual benefits each company would realize if it optimized its individual performance only.

The critical element in defining an EIP is the interactions among its member businesses and their natural environment.

The goal of an EIP is to improve the economic performance and participation of the companies while minimizing their environmental impact.

Components of this approach shall include new or retrofitted design of park infrastructure and plants; pollution prevention; energy efficiency; and inter-company partnering.

Through collaboration, this community of companies becomes an “industrial ecosystem”.

Some common characteristics for the development of an eco industrial park will be:

- A single by-product exchange pattern of network of exchanges
- A recycling business cluster(resource recovery, or recycling companies)
- A collection of environmental technology companies
- A collection of companies making green products
- An park with environmentally friendly infrastructure or construction
- A mixed-use development (industrial, commercial, and residential)

Here a community of companies work together making the most efficient use of energy, material flow and transportation, park management and support services.

They seek to minimize the impacts on the industry as well as the ecosystem by careful site preparation with using sustainable design techniques and construction.

EIP and the community

Any industrial park is interdependent with the community and it relies on it for human and material resources, services, and trade.

Industrial ecology is a dynamic system-based framework that enables management of human activity on a sustainable basis by:

- Minimizing energy and materials usage
- Ensuring acceptable quality of life for people
- Minimizing the ecological impact of human activity to levels natural systems can sustain
- Maintaining the economic viability of systems for industry, trade and commerce.

An EIP in context

The most important criteria for creating and maintaining an eco-industrial park is linking its development with parallel initiatives in the larger community.

Key Trends

The major trends described in this transition toward a sustainable economy in terms of four potential design strategies:

- 1) Increasing efficiency and use of renewable energy and material resources;
- 2) Designing of communities and the built environment using ecologically-aware methods;
- 3) Sustaining and renewing natural systems; and
- 4) Redesigning of public and private sector organizations.

Why is an EIP needed?

For the companies involved, the eco industrial park offers the opportunity to decrease production costs through increased materials and energy efficiency, waste recycling, and elimination of practices that incur regulatory penalties. Increased efficiency may also enable park members to produce more competitive products. In addition, some expenses once occurred solely by individual businesses may be shared by firms in the park.

These may include shared waste management teams, environmental information systems, and other support services. Such industrial cost sharing could help park

members achieve greater economic efficiency than their stand alone counterparts.

It will play an important role in benefiting the environment as well as the society which is very much needed in the present scenario as we find our pollution levels rising.

Principles of industrial ecology

A. Connect individual firms into industrial ecosystems

- Close loops through reuse and recycling
- Maximize efficiency of materials and energy use
- Minimize waste generation
- Define all wastes as potential products and seek markets for them.

B. Balance inputs and outputs to natural ecosystem capacities

- Reduce the environmental burden by releases of energy and materials into the natural environment
- Design the industrial interface with the natural world in terms of the characteristics and sensitivity of the natural receiving environment.
- Avoid or minimize creating and transporting toxic and hazardous materials.

C. Re-engineer industrial use of energy and materials

- Redesign processes to reduce energy usage
- Substitute technologies and product design to reduce use of materials that disperses them beyond possibilities of recapture.
- Dematerialization(do more with less)

How to develop an EIP?

Strategies for designing of an eco industrial park.

Several basic strategies are fundamental to developing an EIP or industrial ecosystems. Individually each adds value; together they form a whole greater than the sum of its parts.

A. Integration into natural systems.

- Minimize local environmental impacts by integrating the EIP into the local landscape, hydrologic setting, and ecosystems.
- Minimize contributions to global environmental impacts, i.e. greenhouse gas emissions;

B. Energy systems

- Maximize energy efficiency through facility design of rehabilitation, co-generation, energy cascading and other means;
- Achieving higher efficiency through interplant energy flows;
- Use renewable sources extensively;

C. Materials flow and waste management for the whole site.

- Emphasize pollution prevention, especially toxic substances
- Ensure maximum reuse and recycling of materials among EIP businesses
- Reduce toxic materials risks through integrated site level waste treatment
- Link the EIP to companies in the surrounding region as consumers and generators of useable by products via resource exchanges and recycling networks

D. Water

- Design water flows to conserve resources and reduce pollution through strategies similar to those described for energy and materials

E. Effective EIP management

- Maintains the mix of companies needed to best use each others by products as companies change
- Support involvement in environmental performance for individual companies and the park as a whole.
- Operates a site wide information system that supports inter-company communications informs members of local environmental conditions, and provides feedback on EIP performance

F. Building design and construction.

- Building design uses strategies for water energy efficiency and non toxic materials. New construction or rehabilitation of existing buildings follows best environmental practices in materials selection and building technology. These include recycling or reuse of materials selection and building technology. These include recycling or reuse of materials and consideration of lifecycle environmental implications of materials and technologies.

Methodology

Eco-industrial park development raises new questions within the context of traditional industrial development processes. Developing an industrial park shall require several rounds of planning and design.

The project feasibility itself gets detailed with each stage. The project must satisfy financial, economic development, public planning/zoning, environmental, and technical criteria at each step.

The eco-industrial park must follow the traditional process, while considering new design options in each phase of project planning. In terms of development, a strategic plan for dealing with all of the areas of concern is to be formed.

A rough framework shall be as follows:-

- Introduction
 - definition and importance of an eco industrial park
 - introduction to the project
- Site details and site planning, identifying the best possible site of a suitable size for the proposed project in terms of:
 - location
 - connecting links to the neighborhood sites and roads.
 - studying the demography
 - the temperature
 - weather conditions
 - quality of soil/topography
 - humidity levels
 - sun movements, etc.
 - quality in terms of generating economy
 - benefits and interaction to Auroville township
 - the exact area covered
 - trees or other landmarks
- Selecting and identifying the industries with proposed case study
 - the kind of industries which can benefit Auroville and its surrounding areas
 - industries that can survive independently and are in constant demand
 - non polluting, eco-friendly industries in terms of raw materials as well as products.
 - studying the process of each industry and identifying at which stage will they be able to benefit each other.
 - identifying the mother industry
- Planning the location of all industries as per their functioning and requirements
- Forming a chain that can be self dependent
- Providing common infrastructure to the industries

- Introducing living quarters for the work force.
- Planning other facilities like recreational parks, educational institutes, restaurants, etc.
- Conceptuals
 - description in brief
 - features of the EIP
 - analysis
- Design drawings:
 - site plan/plans
 - floor plans
 - floor plans with technical details
 - structural plans
 - elevations
 - sections
 - enlarged detail drawings
 - photographs
- Bibliography