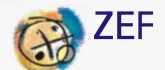










Eco-Industrial Parks

Planning and Development

An APIIC Initiative



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Eco-Industrial Parks

PROLOGUE

Due to continuously deteriorating environmental conditions and an increasing global demand for limited natural resources, interest in improved environmental performance and resource efficiency is growing world-wide.

The concept of Eco-Industrial Parks (EIP) has been first described at the United Nations Conference on Environment and Development, Rio de Janeiro 1992. Eco-Industrial Parks/Estates are a promising strategy to promote sustainable industrial development and to improve the industries' environmental performance in terms of management of materials, energy and waste. The Eco-Industrial Parks provide substantial benefits for participating companies, for the region and particularly for the workers.

"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 businesses seeks a collective benefit that is greater than the sum of individual benefits each company would realise if it optimised its individual performance only".

(Lowe et al. 1998)

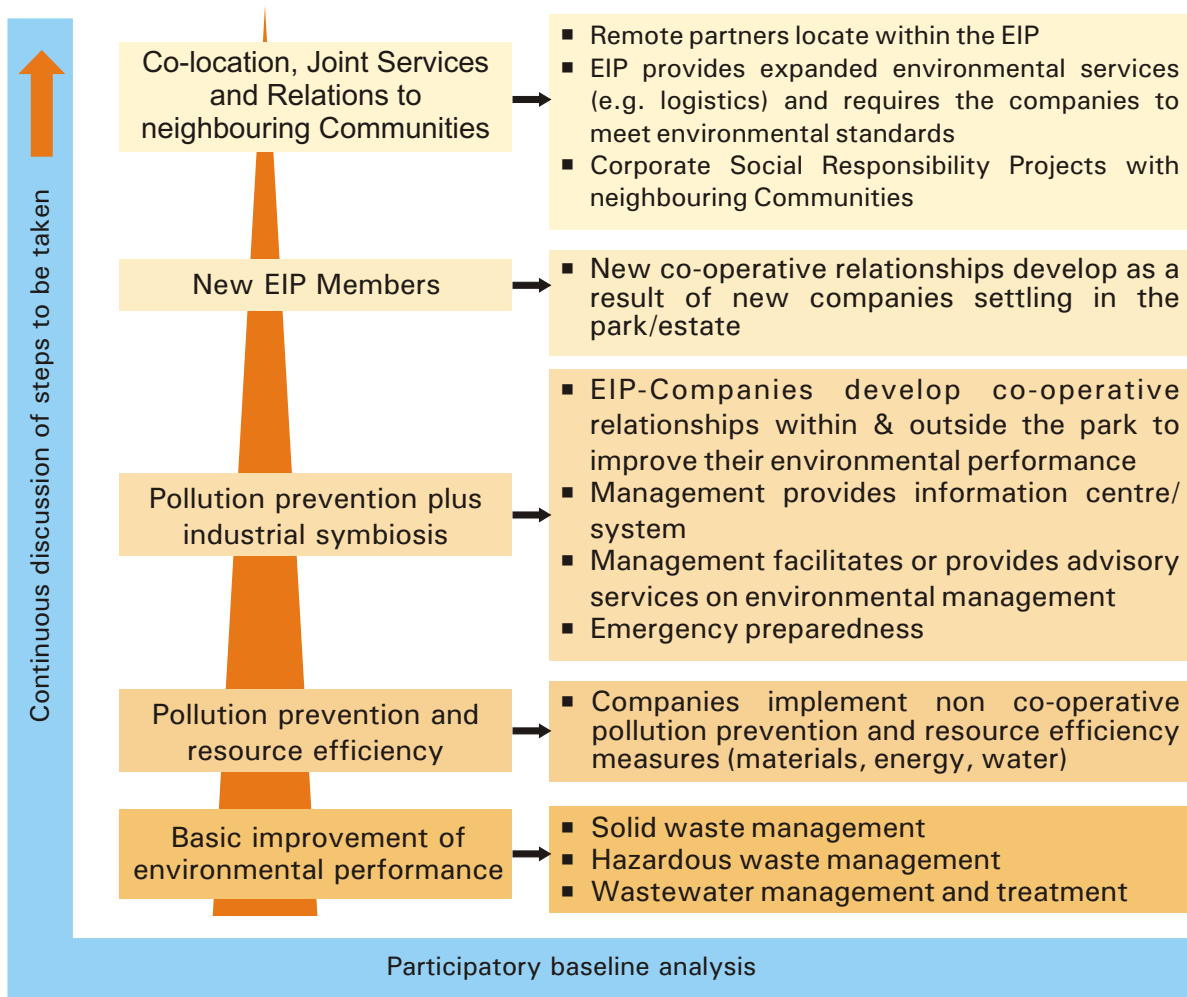
**... a community of
manufacturing and
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Eco-Industrial Parks

The eco-industrial approach offers a wide variety of measures and tools to improve the environmental performance of individual industries and industrial estates/parks. However, each individual estate/park, no matter whether an already existing one or a newly planned, requires an individual mix of measures and tools.

The overlapping steps of Eco-Industrial development are:



Eco-Industrial Parks

ECO-INDUSTRIAL PARKS - AN OUTLOOK

All over the world, best practice examples for eco-industrial development and the contribution of regional resource synergies to sustainable development can be found. The best known example is the Industrial Symbiosis in Kalundborg, Denmark. Kalundborg provides an excellent example for the Industrial ecology approach as it is simple enough to understand the idea of an industrial ecosystem and yet sufficiently sophisticated to give a feeling for the enormous potential of this approach.

The history of Kalundborg began in 1961 with a project to use surface water from Lake Tissø for a new oil refinery in order to save the limited supplies of ground water. The city of Kalundborg took the responsibility for building the pipeline while the refinery financed it. Starting from this initial collaboration, various other collaborative projects were subsequently introduced and the number of partners gradually increased. By the end of the 1980's, the partners realised that they had effectively "self-organised" into what is probably the best-known example of a working industrial ecosystem, or to use their term - an industrial symbiosis.

The environmental benefits and savings achieved at Kalundborg are summarised below.

Environmental benefits		Related costs and savings
Reduction in consumption of resources		<p>Investment costs for 18 projects established until 1998: \$ 75 million</p> <p>Revenues are generated from selling the waste material and from reduced costs for resources</p> <p>The partners estimate savings up to \$ 160 million until 1998</p> <p>The payback time of a project is less than 5 years on average</p>
Oil	45,000 tons/year	
Coal	15,000 tons/year	
Water (total)		
Overall consumption	-25%	
Surface water	1,000,000 m ³ /year	
Groundwater	1,900,000 m ³ /year	
Reduction in waste emissions		
Carbon dioxide	175,000 tons/year	
Sulfur dioxide	10,200 tons/year	
Fly ashes	80,000 tons/year	
Valorisation of "wastes"		
Sulfur	4,500 tons/year	
Calcium sulfate (gypsum)	200,000 tons/year	
Fly ash (for cement etc)	80,000 tons/year	
Fertilizer from biomass		
Solid	60,000 tons/year	
Liquid	90,000 m ³ /year	
Yeast slurry as pig fodder (replaces soy)	Fodder for 800,000 pigs	

Eco-Industrial Parks

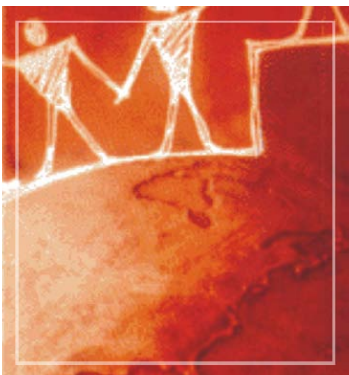
The philosophy behind this success story is that one company's by-product becomes an important resource to one or several of the other companies. The outcomes are a reduced consumption of resources and a significant reduction in environmental strain. The collaborating partners also benefit financially from the co-operation because the individual agreements are based on commercial principles.

Naroda Industrial Estate is located in Ahmedabad in the state of Gujarat and was established in 1964 by the Gujarat Industrial Development Corporation. Nearly 900 industries in the estate employ roughly 30,000 people. A further 40,000 people can be considered to depend indirectly on the industrial estate. Approximately 26% of the industries in the Naroda Industrial Estate fall into the chemicals for dyeing. Other types of chemical production are plastics, pharmaceuticals, and pesticides. Engineering, textiles and trading companies complete the picture of significant industrial sectors within the estate. The estate provides services such as water, power, communications and other relevant infrastructure.



Approximately two-thirds of the companies are members of Naroda Industries Association (NIA). The function of NIA in the environmental sector has been:

- To set up Naroda Enviro Projects Ltd. (NEPL) to address and manage the environmental problems.
- Enabling the estate to set up its own landfill site for hazardous solid waste and a Common Effluent Treatment Plant (CETP) for treatment of wastewater from more than 200 companies, which provides a good example of working in a co-operative. The establishment of the CETP has also led to a better understanding of the waste material flows within the estate, thereby providing information on possible links between processes.
- NIA provides an opportunity for members to share information, to learn about different environmental approaches, to promote environmental awareness and to co-operate in the context of an industrial estate. The background was that the requirement of an environmental audit reporting was introduced by the State Pollution Control Board.



Eco-Industrial Parks

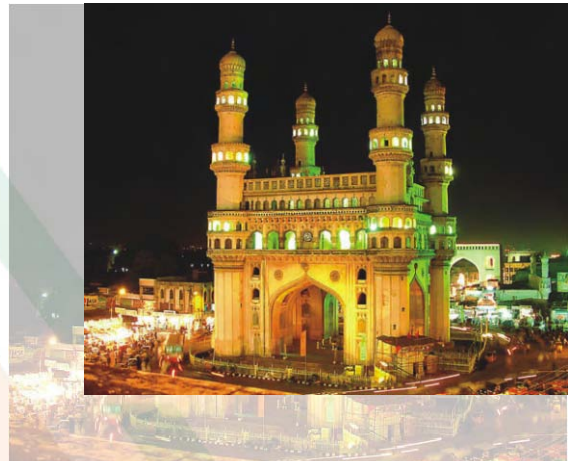
THE VISION OF APIIC - A PROMISING STRATEGY

The Andhra Pradesh Industrial Infrastructure Corporation Ltd. (APIIC) is the premier organization in the State of Andhra Pradesh, vested with the task of providing industrial infrastructure through development of Industrial Parks (IP). The corporation has so far developed over 280 Industrial Parks spreading over an extent of about 79,350 acres.

In keeping with the trend worldwide, and growing environmental concerns, APIIC is keen to achieve sustainable development of industries giving due considerations to environment protection.

To commemorate the 34th Formation Day of APIIC, in 2006, the Honourable Chief Minister of Andhra Pradesh announced creation of an Environment Management Fund (EMF) with an annual outlay of Rs. 50.00 Crores with an aim to address and subsequently implement Modern Environmental Management Systems in Industrial Parks.

The Government of Andhra Pradesh has decided upon its vision and objectives to transform the existing industrial parks into Eco-Industrial Parks and to ensure sustainable model(s) for Industrial Growth in the State.



... transform the existing industrial parks into Eco-Industrial Parks and to ensure sustainable model(s) for Industrial Growth in the State ...



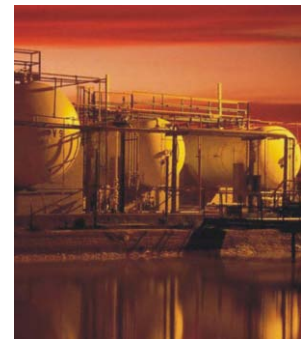
Eco-Industrial Parks

Helping solve environmental problem

Andhra Pradesh has over 270 notified industrial areas of about 1,500 industrial estates/parks existing in India. An average industrial estate/park has relatively small plots and mainly caters to small to medium scale industries. The plots in the estates/parks are allotted to industries as and when they come up. The demands are usually not well projected and also marketing is not objective driven. Until September 2006, when a notification was issued under Environment (Protection) Act, 1981, obtaining environmental clearances for the siting of industrial estates/parks was not mandatory. The environmental problems/concerns due to industrial estates/parks can be grouped under the following three headlines:

Improper siting

- Adequate 'designated sites' in Master or Regional Plans do not exist or the designation is not based on environmental considerations. This results often in haphazard and un-coordinated development of the industrial estates/parks and of supportive activities like housing, infrastructure and transport, frequently causes serious disaster risks.
- Insufficient consideration of environmental aspects often results in over exploitation of local resources, pollution problems, and negative impacts on the surrounding environment.



Environmental problems within the estate/park

- Layout of the industrial estates/parks does not meet the requirements of the industries; e.g. land for different functions (process, storage, transportation, infrastructures and services, disaster management etc.) is not properly allocated and/or not adequate.
- Infrastructures like roads, lightning, water supply, sewers, plantation, common effluent treatment plants, waste collection and management facilities are not adequate and/or not managed and maintained properly.
- Industries are not grouped properly and thus networking for efficient energy/material/waste flow is not possible.
- Manufacturing processes and pollution control measures in industries are not up-to-date.

Eco-Industrial Parks

Environmental problems outside the estate/park

- Industrial estates/parks do not fit into the natural settings.
- Over exploitation of resources eg. Water.
- Haphazard development of housing areas.
- Impact on surrounding land uses viz. habitat, agriculture, forests etc.
- Stress on already inadequate supporting infrastructure viz. roads, hospitals etc.



The Eco-Industrial Parks are targeted to address all the above concerns. APIIC is paving a way for transformation of the existing industrial parks in Andhra Pradesh into Eco-Industrial Parks.

APIIC - the pioneer

In 2004, APIIC, Central Pollution Control Board (CPCB), Andhra Pradesh Pollution Control Board (APPCB) and the German Agency for Technical Co-operation (GTZ) entered into a Memorandum of Understanding to collaborate in a project for developing "Eco-Industrial Parks" in Andhra Pradesh. As a first step, a strategy on developing eco-industrial estates/parks was worked out by the experts of GTZ. Subsequently, a series of workshops, a baseline study for two industrial estates near Hyderabad and a training needs analysis (by InWent Capacity Building International, Germany) were executed under the project. As a result of these first activities several measures at various levels have been started. The overarching issue is development of the required capacities for all relevant target groups and strengthening of environmental infrastructure in the industrial estates/parks.



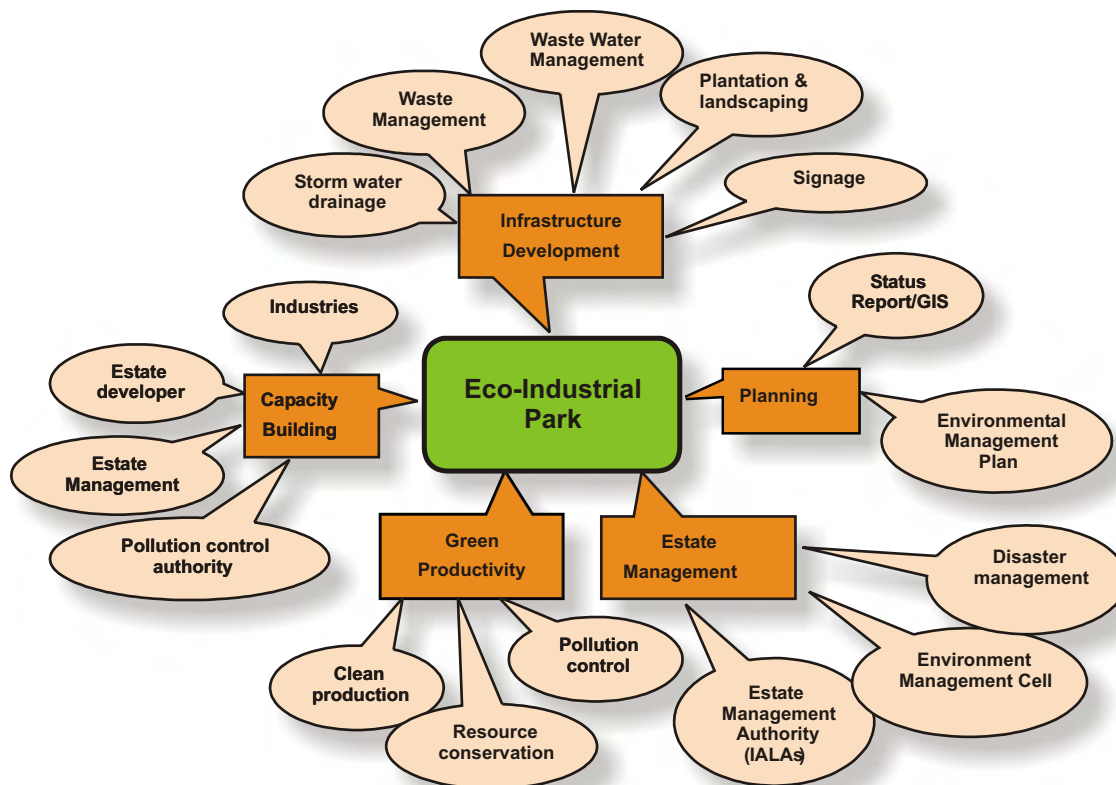
The APIIC, jointly with the Advisory Services in Environmental Management (ASEM) Programme of the GTZ, German Federal Ministry for Economic Development & Cooperation, has made a pioneering move to develop Eco-Industrial Parks in the state of Andhra Pradesh. The IP Nacharam and IP Mallapur are included in the pilot phase for transforming these industrial parks into Eco-Industrial Parks.



Eco-Industrial Parks

Comprehensive and sustainable approach a promising way forward

The APIIC, in its endeavor to transform the Industrial Parks into Eco-Industrial Parks, is planning a number of interventions as shown below.



On-going / Proposed Interventions in Eco-Industrial Parks

The concept for new eco-industrial parks is on 3Ms including site master planning & development, marketing and management.



Eco-Industrial Parks

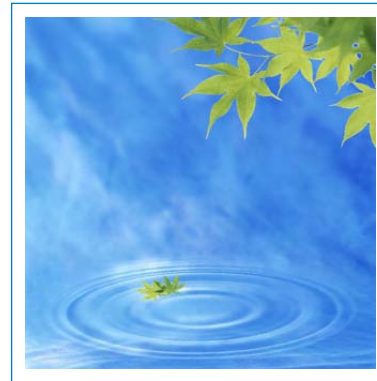
APPROACH & ACTIVITIES

GTZ Environment Cell at APIIC

To support APIIC in environmental planning & management, GTZ established an Environment Cell (EC) at APIIC. Tasks of the EC are:

- **Technical support tasks**

Identifying the requirements of APIIC and other stakeholders, detailing the requirements and proposing actions for fulfilling the requirements. Technical assistance to APIIC team and other stakeholders as per requirement, especially in achieving the objectives/targets of the project.



... taking forward the measures and positive learning's from the project ...

- **Coordination tasks**

Coordination with APIIC and other relevant stakeholders, such as consultants (local and overseas) appointed for various tasks, GTZ appointed training institutions, GTZ-ASEM at Delhi, Environment Management Cell established by APIIC at IP Nacharam and IP Mallapur so as to complete various defined tasks of the eco-industrial park project.

- **Documentation tasks**

Compilation of environment related GIS database for the existing industrial estates, documentation of 'environmental indicators', preparation of reports including case studies, progress reports etc.



The Environment Cell is also assisting APIIC in taking forward the measures and positive learning's from the project in other industrial parks throughout the entire State of Andhra Pradesh.

Eco-Industrial Parks

Collection and Processing of Baseline Data

Baseline data does not exist for most of the existing industrial parks. However, any comprehensive planning or improvement would require a minimum of reliable specific information.

- For the two pilot industrial parks in Nacharam and Mallapur, an Environmental Status Report was prepared in the year 2004-05. For both the industrial parks meanwhile sufficiently detailed data are available.
- A State wide collection process in more general manner for all the industrial parks in Andhra Pradesh is currently being executed by APIIC and the EC.



Improvement of Environmental Infrastructure in the Pilot Industrial Parks

In order to transform the existing industrial parks into eco industrial parks, essential environmental infrastructure is needed. Without a proper drainage system for storm water and waste water, a common effluent treatment plant, waste transfer stations etc., the concept of eco-industrial parks cannot be applied properly. The infrastructure implementation includes the following:

- Storm water drainage including water harvesting
- Sewerage system
- Common Effluent Treatment Plant
- Plantation
- Hazardous waste management (Transfer Station/Temporary Storage Facility)

The project supports both the pilot parks in establishing properly such basic infrastructure.



Eco-Industrial Parks

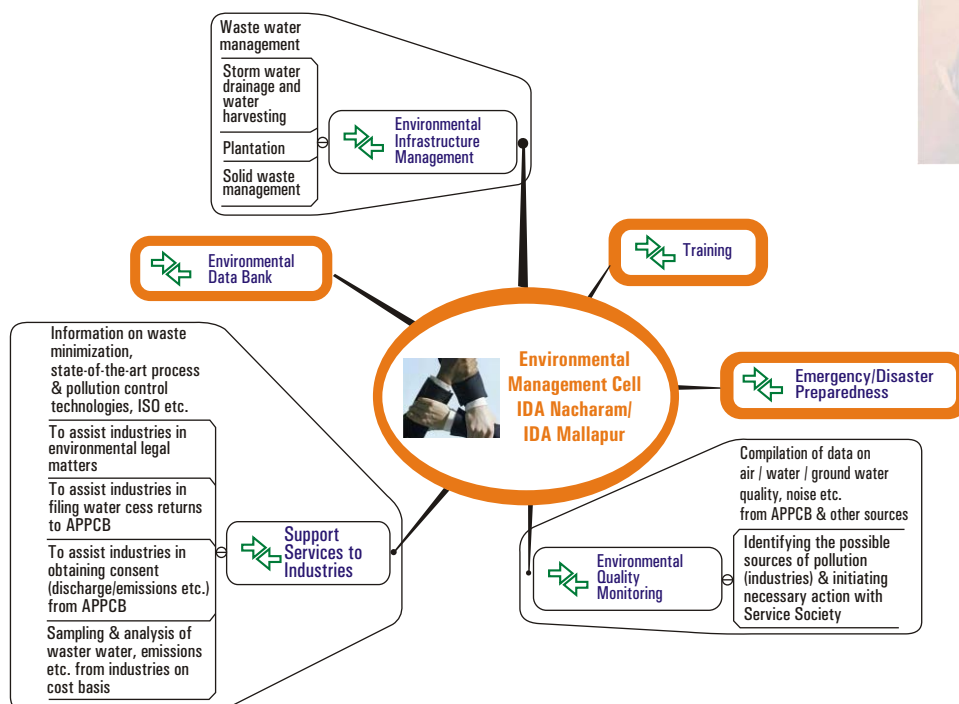
Establishing Management Structures in the Parks

The management structures in industrial parks frequently provide bare minimum services. Thus they neither fulfil the conventional concept of industrial parks nor the even more complex and important role of an estate management in an eco-industrial park. In order to transform existing parks into eco industrial parks, a complex management structure, offering all kinds of services, establishing networking structures etc. is needed.

... a complex management structure, offering all kinds of services, establishing networking structures etc. is needed ...

The Notified Municipal Industrial Area Service Society (NMIASS)/Industrial Area Local Authority (IALA) is responsible for performing the functions of the municipality in the existing Industrial parks of APIIC. To strengthen the environmental services in the industrial parks and assist the industries at IP Nacharam and IP Mallapur, as a pilot effort , APIIC has set up an Environment Management Cell (EMC) which is situated at IP Nacharam. The main functions of the EMC are:

- Support services to industries on environmental matters
- Environmental quality monitoring
- Environmental data bank
- Environmental infrastructure planning/ management
- Plan/coordinate training programmes
- Plan emergency/disaster preparedness



Eco-Industrial Parks

Capacity Building

A target group specific Capacity Building Programme has been developed with the support of InWEnt and GTZ-ASEM, mainly catering to APIIC, the IALAs and industries in IP Nacharam and IP Mallapur.

In the pilot efforts, capacity building measures are offered for industries to support and accelerate the implementation of environmental management measures within the companies. An Eco-Club has been established in IP Nacharam and IP Mallapur to build mutual confidence amongst the enterprises and to strengthen local community of industries.



Elaborate training programmes on industrial park management are in the offing especially for the APIIC's team. Developers, planners, the relevant authorities and estate managers at different levels are the target groups of a series of training courses which will enhance their professional capacities in relation to eco-industrial parks. These courses will be developed and implemented in close cooperation between the Indian and the international partners of the project.

A round-table on eco-industrial development in Andhra Pradesh and an International Conference on eco-industrial development in India, in an international context will finally disseminate the activities and lessons-learnt to a broader audience and the political sector.



Eco-Industrial Parks

IGIAT's Support to APIIC in Eco-Industrial Park Development

A Memorandum of Understanding is signed between the Indo-German Institute of Advanced Technology (IGIAT), Visakhapatnam and APIIC, for supporting the endeavour of APIIC in development and management of Eco-Industrial Parks. With the GTZ environment group in India, Advisory Services in Environment Management (ASEM), IGIAT supported orientation training programmes on eco-industrial park planning and management for the officials of APIIC, AP Pollution Control Board (APPCB) and the Notified Municipal Industrial Area Service Societies of IP Nacharam and IP Mallapur.

IGIAT has developed a training course concept on eco-industrial estate/park planning and management (supported by GTZ-ASEM & InWEnt). The 3 modules course consists of lectures/presentations, discussions and intense group work.



... supporting
the
endeavour of
APIIC in
development
and
management ...

- Module 1 (1 week) provides sensitisation and orientation
- Modules 2 (1 week) focuses on knowledge and capacity building on management of industrial estate/parks, environmental and infrastructure services and environmental management
- Module 3 (3 days) provides knowledge and skills on the planning phase while taking an existing industrial park data

Detailed elaboration of the course concept, preparation of the modules and execution of the first cycle of the course will be implemented in close cooperation between IGIAT, InWEnt and ZEF - University of Bonn, Germany. IGIAT has signed an MoU for cooperation with InWEnt and ZEF.

All training courses will be announced under the newly launched website of the ASEM HRDP-NET (www.hrdp-net.in). This website was developed with substantial support from InWEnt experts for Human Resource Development Program coordination under ASEM. Besides information on upcoming and past training activities the website includes reports, presentations and training material.



Eco-Industrial Parks

PARTNERS & THEIR ROLES

Andhra Pradesh Industrial Infrastructure Corporation Ltd. (APIIC)

APIIC, formed in 1973, is a company owned by the Government of Andhra Pradesh and is envisioned as a facilitator for industrial investment and development of parks/estates in the State.

APIIC has so far developed over 281 Industrial Development Areas and Estates spreading over an extent of about 79,350 acres. A large number of leading industrial houses have their presence in these Industrial Areas.

The parks/estates are equipped with approved layouts, internal roads, water and power supply. The Corporation has also encouraged setting up CETP at Jeedimetla, Patancheru and solid waste management at Jeedimetla.

Nodal Agency for all Industrial Infrastructure Projects including IT, Biotech, Apparel Parks and SEZ in the State, its core functions include Acquisition / Alienation of Government lands for Industrial Parks, Identification of sites for Industrial Areas and development of layouts, APIIC also facilitates Provision of Infrastructure facilities in developed and existing layouts, Allotment of developed plots, Industrial Investment, Planning and Development of Projects and Promotion of Infrastructure Projects under Public Private Partnership (PPP) mode.

Gesellschaft fuer Technische Zusammenarbeit (GTZ)

GTZ is a service enterprise for development cooperation with worldwide operations. Owned by the German Federal Ministry for Economic Development & Cooperation, the organisation operates as a private-sector enterprise with a development-policy mandate: to make sustainable improvements to the living conditions of people in partner countries and to conserve the natural resource base on which life depends.

Established in 1974, GTZ offers its clients competitive, needs and target-oriented services. It's advisory services place emphasis on the building of institutional capacities in order to strengthen public institutions. This includes strengthening of core state functions, allocating market forces and promoting implementation capacity within and between governmental, private and para-state organisations.

India, has been a priority partner country of German Development Cooperation for more than 4 decades and is one of the major recipient countries. The priority areas are: Economic reform and development of the market system, Health and Environmental policy, protection and sustainable use of natural resources and Energy.

Advisory Services in Environmental Management (ASEM)

ASEM is a joint programme of the Indian Ministry of Environment and Forests (MoEF) and the German Agency for Technical Cooperation (GTZ) focusing on urban and industrial environmental management aiming at environmental improvement and sustainable development. Set up in August 2002, ASEM constitutes a new phase of the Indo-German development cooperation.

India and Germany consider sustainable development as the overall goal of a development policy. Both sides agree that environmental management is an important area in the framework of bilateral development cooperation.

ASEM supports and coordinates projects that focus on eliminating or reducing urban and industrial pollution and hence improve living conditions. The aim is to provide environmentally, economically, and socially viable solutions which create winning situations for all involved parties. To achieve this, ASEM provides technical and, as appropriate, financial support.

Eco-Industrial Parks

Indo-German Institute of Advanced Technology (IGIAT)

IGIAT is established at Vishakhapatnam, under the Indo-German technical cooperation agreement. The main objective of the institute is to provide further training and consultancy services for technology intensive SMEs. IGIAT takes pride in its competence to organize and conduct specialized courses, and act as a major resource centre for different industries in and around Andhra Pradesh for their Training & Development needs in the following sectors:

- Automation and industrial process control
- Infrastructure and environmental engineering
- Integrated electrical and mechanical maintenance
- Precision manufacturing
- Information technology

In the long term IGIAT is expected to become an anchor point in India for cooperation and networking among similar technology centres supported by GTZ in South and Southeast Asia. One of the focal areas of technology for IGIAT services is 'Infrastructure and Environmental Engineering'.

IGIAT is partner of the Industrial Service Network (ISN), a network of technical training institutions all over India, supported by GTZ. These training institutions are potential clients for train-the-trainers activities as well as for the implementation of the training course itself.

InWEnt Capacity Building International Germany

InWEnt is a joint undertaking of the German Federal Government, the governments of the federal states, and industry.

InWEnt's practice oriented training courses and advisory services build competence and ability to manage the process of human resource development in the ASEM programme and all its projects. InWEnt supports the dialogue between the different stakeholders and provides supervision, hands-on-training, and guidance for key elements of the HRD thrust area of ASEM.

Since late 2005 InWEnt experts are involved in ASEM's Eco-Industrial development activities in Andhra Pradesh. In this endeavour, InWEnt is focussing on training needs analysis, the development of training programs, certification training and training of trainers. In July, 2007 InWEnt and IGIAT signed a Letter of Intent emphasizing both partners' intention to further cooperate in the development and implementation of certification courses for key personnel for Eco-Industriale Estate Development and Transformation.

Centre for Development Research (ZEF)

ZEF is an international and interdisciplinary research institute affiliated to the University of Bonn, Germany, that started its activities in 1997. ZEF's three departments on Political & Cultural Change, Economic & Technological Change and Ecology & Natural Resources Management offer a broad and integrated perspective on developmental aspects. ZEF's main research areas are land use, water management, biodiversity, sustainable energy and health.

Through its Bonn International Graduate School for Development Research (BIGS-DR), ZEF contributes to strengthening the international development research community. The programme is educating highly qualified academic staff, advisers, and managers for both the private and public sectors. ZEF's research, advisory work and other activities are carried out in close cooperation with national and international partners.

In June 2007, ZEF and IGIAT signed a Letter of Intent to cooperate on Eco-Industrial Development. The cooperation will comprise student exchange, guest lectures, and a joint research initiative on the adaptation of the Eco-Industrial Development approach to the specific conditions of developing countries.

C O N T A C T S



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