

# Master Class on Integrated Waste Management

Designed to meet the capacity  
building needs of industries,  
infrastructure facilities and  
institutional facilities

Ten modules  
Ten hours  
Three assignments



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Global Thinking  
Local Delivery

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**Module 1: Waste management and challenges** - What is a waste-definitions and perceptions, waste generated from industries – CPCB statistics, cost of waste disposal with statistics with sector wise, challenges faced by industries in disposing the wastes in India, environmental fate and transport of waste disposed, environmental and legal liabilities of waste disposal-few court case etc, waste management hierarchy, benefits of waste minimization in terms of disposal cost, energy, water etc– few statistics for few sectors, sustainability goals & waste management and agenda for the training session.

**Module 2: Overview of waste management regulations in India** – Seven waste management rules, overview of solid waste management rules, construction and demolition waste rules, hazardous and other waste management rules, battery waste management rules, E-waste management rules, plastic waste management rules and fly ash management rules, master sheet on roles and responsibilities of industries and waste generators for complying with waste management rules, hazardous waste authorization etc.,

**Module 3: Basic principles of waste management** - Five principles of waste management, avoid at the source, reduce during the operations, waste as by product for efficient reuse, recycling through material segregation and identifying recycling vendors, zero land fill concepts and two case studies on zero land fill initiatives.

**Module 4: Waste audits in industries:** mapping raw materials, industry process technologies and mass balance studies, stream wise waste generation and its characteristics, wastes from packaging and forwarding, waste from process units, wastes from utilities operation, routine and specific maintenance programs, master list of wastes generated from major industrial operations such as oil & gas, pharmaceutical industry, paper and pulp, textile and dyeing, manufacturing facilities, metallurgical industries, bench-marking waste generation from specific industrial sector.

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## Module 5: Pollution Prevention (P<sub>2</sub>P) and waste minimization programs in process industries -

Fundamentals of life cycle approach, basic concepts of Design for Environment, basic concepts of green chemistry, few case studies of P<sub>2</sub>P opportunities for waste minimization or avoidance, risks and opportunities in implementing waste minimization programs, integrating waste minimization programs in to organization's business goals for reduced operating cost, reduced carbon footprint and avoiding contingent liabilities.

## Module 6: Hazardous and other wastes

**management rules:** Definition and methods for classifying hazardous wastes as per applicable regulations, list of scheduled hazardous wastes for the each of the industry sector and applicability, classification of hazardous wastes based on pollutant concentration, TCLP test, data interpretation and classification of HW, hazardous waste handling and storage requirements as per the guidelines, occupational health and safety during the storage and handling of hazardous waste.

## Module 7: Integrated Municipal solid waste

**management programs** – waste category as per MSW Rules 2016, three bin system and source segregation methods, waste collection programs and infrastructure needed, material segregation facilities, disposal of non-recyclable materials, aiming at zero land fill programs in industrial colonies, methods for developing cost benefit analysis of waste recycling programs, occupational health and safety aspects of municipal solid waste management programs.

## Module 8: Composting and wet waste recycling technologies

– conventional and innovative technologies for converting wet waste (food waste, vegetable trimming waste, industrial canteen waste and dairy waste etc), selection of composting technologies, SOP and troubleshooting of composting facilities, biomethanation of mixed green waste, basic worksheet for evaluating cost benefit analysis of biomethanation facilities.

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**Module 9: Other waste recycling and processing technologies** – Thermal incineration for energy recovery, environmental concerns and minimum environmental standards for incinerators, good engineering practices of design and operation of incinerators, basic requirements for co-processing of wastes, applicable rules, procedures for obtaining permission for co-processing in Cement industry, briquette technology for combustible wastes, plasma technologies, pre-treatment of wastes for safe disposal to landfill, basic concepts of landfill system and applicable design and monitoring guidelines

**Module 10: Developing technical feasibility studies and project reports for implementing integrated solid waste management programs** – waste characterization, developing design intent, selection of technologies, developing the conceptual plans, estimation of utilities and land requirement, evaluating environmental impacts, sizing of units (collection, segregation, treatment and storage), estimation of CAPEX and OPEX and resources and permissions required

**Module 11: Case studies** – large industrial townships, captive thermal power plants, oil and gas industry, chemical process industry and engineering and manufacturing industry etc.,



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