

## INTEGRATED MANAGEMENT OF SOLID WASTES FOR NEW YORK CITY

Nickolas J. Themelis

Stanley-Thompson Professor, Earth and Environmental Engineering

Director, Earth Engineering Center, Columbia University

New York, NY 10027, U.S.A.; e-mail: [njt1@columbia.edu](mailto:njt1@columbia.edu)

### ABSTRACT

This report presents the results of a study that examined alternatives to landfilling the municipal solid wastes (MSW) of New York City. Detailed characterization of the wastes led to their classification, according to materials properties and inherent value, to “recyclable”, “compostable”, “combustible”, and “landfillable”. The results showed that the present rates of recycling (16.6%) and combustion (12.4%) in New York City can be increased by

a) implementing an automated, modern Materials Recovery Facility (MRF) that separates the blue bag stream to “recyclables” and “combustibles”, and b) combusting the non-recyclable materials in a Waste-to-Energy (WTE) facility. Combustion of wastes to produce electricity is environmentally much preferable to landfilling. An advanced technology for combustion is that used in a modern Waste-to-Energy plant (SEMASS, Massachusetts) that processes 0.9 million metric tons of MSW per year, generates a net of 610 kWh per metric ton of MSW, recovers ferrous and non-ferrous metals, and has lower emissions than many coal-fired power plants.

### INTRODUCTION

Economic development is accompanied by greatly increased use of materials and generation of wastes. Solid wastes are classified into municipal (residential and commercial), industrial, and construction and demolition wastes. Because of high population densities and scarcity of land, integrated management of solid wastes is specially needed in urban centers located in coastal areas or islands, such as New York City. Integrated waste management requires that MSW be separated into a number of streams, which can then be subjected to the most appropriate method of resource recovery. Separation can take place either at the source, i.e. households or businesses, or at Materials Recovery Facilities (MRFs). The principal means for managing the various streams of MSW are:

- **Recovery of materials:** Paper, plastics, metals, and glass can be recycled to produce similar materials.
- **Recovery of energy:** Recoverable energy is stored in chemical form in all MSW materials that contain natural or man-made organic carbon. The combustion of organic compounds in Waste-to-Energy plants generates electricity and steam.
- **Biochemical or thermal conversion:** The natural organic components of MSW (food and plant wastes, paper, etc.) can be composted *aerobically* (i.e., in the presence of air) to generate carbon dioxide, water, and a compost product that can be used as soil conditioner. *Anaerobic* digestion produces methane and a compost product; this method provides an