Advances in Mechanical Biological Treatment

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Overview

Legislative mandates and other factors are providing incentives for the development of a number of processes aimed at decreasing the amount and modifying the characteristics of waste disposed in landfills. Major efforts in this area have been achieved in some countries that belong to the European Union. This discussion reviews the legislative changes that have been made in some industrialized countries and presents some of the latest advances and considerations related to technologies for mechanical biological treatment (MBT). Additionally, changes in waste composition affect the operation and performance of landfills, and the effects of these changes are discussed.

Legislative Changes

In the EU, current legislation favors resource recovery and other types of waste processing operations that achieve substantial reductions in the organic content of the waste, and also favors materials recovery so that the amount of waste requiring disposal is minimized.

In the United States, waste diversion goals and regulations favor implementation of materials recovery and organics recycling facilities (e.g., composting).

Effect on MBT Systems

MBT systems have the potential to divert substantial percentages of the municipal waste stream from landfill disposal. The market for MBT systems will be stimulated and, therefore, sound system designs and methods of specification and procurement will be required so that the interests of the communities are protected.

In the short term in Western Europe, the demand for MBT systems likely will outstrip the supply of qualified and experienced system suppliers; thus, care in vendor selection will be required.

Technologies need to be economically feasible, as well as technically and environmentally viable; thus, one emphasis is to develop methods of processing to optimize capital and operating cost per unit of throughput. The reduction of the time constant of biological processing, while not sacrificing system performance, is one means of achieving cost reduction.

Optimum processing requires knowledgeable scientific judgments (e.g., microbiology, engineering) related to: 1) types and extent of pre-processing (mechanical recovery of recyclables and removal of contamination) versus those for back-end processing (e.g., composting); 2) optimal integration of unit operations; and 3) judicious use of water in systems utilizing biological processing.

Some of the new designs involving MBT utilize biological processing to simply remove the moisture from the organic fraction of the waste and then the relatively dry fraction is processed for use as fuel. Coordinated investigations are required to ascertain the overall environmental and economic impact of these designs.

Demand for recovered materials may become saturated as more emphasis is placed on diverting greater percentages of materials from land disposal. Additional marketing effort is or will be required to keep demand for materials consistent with the supply.

Characteristics of residues from the new generation of MBT systems will be different than those in the past, e.g., higher inert content.

Contamination of the waste feedstock is an issue that must be addressed due to health and safety and product quality concerns; thus, methods of monitoring waste and product characteristics will have to be developed or expanded.

An ability and capacity to model unit operations for the purpose of accurately estimating system mass and energy balances (and subsequently system economics), based on fundamental engineering principles, is a valuable tool in developing and evaluating alternative system designs.

Effect on Landfill Disposal

Efforts to produce low, organic-content residues for disposal will result in substantial changes in the composition and other characteristics of wastes requiring land disposal. Landfill design and operations may have to be modified to accommodate the changes in characteristics and to optimize landfill operations and costs.

Quantities of wastes requiring landfill disposal will be reduced, thus affecting the economics of landfill operations over the period of change.

Conclusions

Waste characterization will take on more importance as more MBT systems are implemented and due to the needs of the market place for high quality products. Emphasis will be placed on supply of economical MBT systems. New performance criteria and acceptance test methods will be needed so that suppliers of MBT systems will deliver facilities that will meet the specifications and cost expectations of the communities.