BY MARC ROGOFF AND BRUCE CLARK

STAYING INFORMED OF SOLID-WASTE DISPOSAL OPTIONS

A brief primer on what managers need to know about new conversion technologies

Since 2004, new solid-waste conversion technologies have emerged that may be a game-changer in some locales for solid-waste disposal. These technologies are being touted by their developers with claims that they produce essentially zero air emissions; reduce greenhouse gases; incur costs that are similar to landfilling; produce energy and marketable byproducts; and offer opportunities to "mine" closed landfills thus reducing local liabilities.

When faced with such claims, public officials ask them themselves: Are these offers too good to be true?

This article provides an overview of new solid-waste conversion technologies as well as a methodology that public officials can use to preliminarily assess the feasibility of this type of project. The article also builds on the lessons learned from more than 50 feasibility assessments of new waste-conversion technologies and provides some basic guidance on the technologies themselves.

The Current Picture

Communities without mass burn, waste-to-energy (WTE) plants have become totally dependent on landfill disposal. At the same time, privatization of landfills is increasing and in many cases, with more costly long-hauls to remote facilities. Tipping fees (i.e, gate fee or what the landfill owner charges a customer, typically per ton) are rising. Local government budgets are tight and everyone is looking at ways to reduce costs. Onto this scene enters the developer for a new waste-conversion plant. The proposal to local officials typically involves no up-front costs and all of the other claims mentioned previously. Since this is all new, many officials have no experience or road map to help them evaluate the claims.

Figure 1 provides a brief overview of methods that have recently been developed to use energy produced by converting solid-waste products. These methods are numerous and can be grouped in various ways.

Figure 1 also illustrates technologies that have been developed to try to extract different benefits from the processed waste stream, including these possible by-products:

- Gases for power production or feedstock for vehicular fuels.
- Basic chemicals for use as a raw feedstock.
- Compost and soil amendments.
- Slag (a hard material fused from inert materials) for road sub-base aggregate.
- Char or a charcoal-like substance from a pyrolysis process as a soil-building amendment.

Some of the common definitions for these new technologies are listed in Figure 2.

Key Feasibility Questions

A waste-conversion project can be one of the most complex public works projects considered by a community. Not unlike traditional, mass burn, WTE facilities, such projects should undergo a methodical feasibility assessment that seeks answers to key questions up-front.

This approach will assure the public and the decisionmakers that all relevant issues have been explored and a resolution reached before significant resources are expended on such projects.

Does the technology work? Assess: annual operating experience; scale-up issues; need for preprocessing of the waste stream; reliability of disposal.

What is the strength of the company? Assess: its business strength to secure capital; its intellectual property and patent rights for the technology.

Does the project fit with the community's current solid-waste program? Assess: recycling and disposal program; if a transfer system is needed; if modification of the solid-waste plan is necessary.

Can you provide waste supply for the project? Assess: legal or economic flow control; whether enough waste can be

FIGURE 1: Simplified Process Classification.

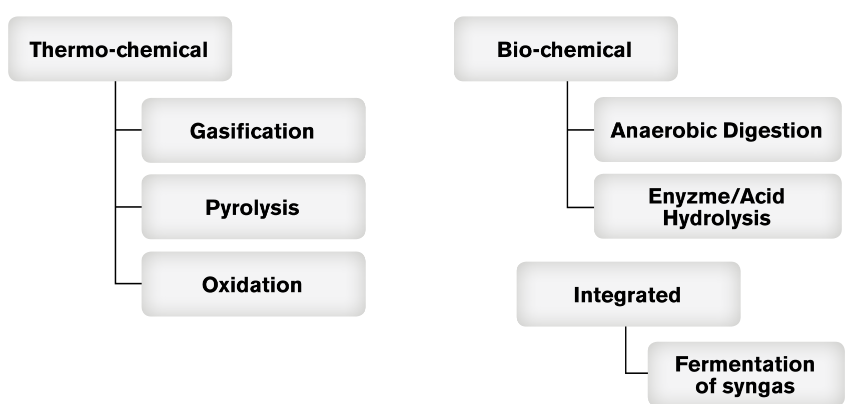

FIGURE 2: Common Terms.

COMMON TERMS	BRIEF DEFINITION
Anaerobic digestion	A biological process that takes place in a closed reactor vessel and allows microorganisms to feed on the organic fraction of the waste producing a biogas and a by-product that can be turned into compost. The biogas is typically combusted in an engine to produce electrical power.
Autoclave	Mixed solid waste is fed into a vessel where it is subjected to heat, pressure, and agitation causing the organic fraction of the waste (food scraps, fiber/paper, and vegetation) to break down into a pulp-like substance that has energy applications.
Gasification	Segregated waste is fed into a vessel and is indirectly subjected to high heat and a small amount of air. A syngas is produced that has such direct applications as powering a turbine or an internal combustion engine.
Hydrolysis	A technique that can involve acids or enzymes that are mixed with water and the waste in a reactor. These agents break down the waste materials into sugar compounds and a byproduct from the plant fraction known as lignin.
Pyrolysis	Segregated waste is fed into a vessel and is indirectly subjected to high heat. Practically all air is excluded from the reactor vessel resulting in producer gas that contains methane, carbon dioxide, carbon monoxide, liquid (oil), and a solid char.

provided by the community; if waste imports are needed.

What are the project's siting needs? Assess: if land is available with the proper zoning and setbacks; if needed utilities are available at a reasonable cost; if there is public buy-in for the project.

What kind of permits will be needed? Assess: air permits, local and state zoning and plan amendments.

Are markets available for the products and energy? Assess: if there is sufficient information to predict plant outputs from the technology selected; if markets exist for by-products.

What are the costs? Assess: calculate the project's short-term and long-term economic impacts through Pro Forma modeling to develop accurate capital and operating costs for the project, to determine if funds are available to cover operating costs; and to determine if tipping fees are required.

Will there be financing risks? Assess: the role of government agencies in the process; whether taxpayers could be on the hook for risks of loan.

What happens if system fails? Assess: which local agency would control the solid-waste system; where waste would go if plant had to be shut down; who would be responsible for extra costs incurred in a system failure or extended shutdown.

What's Ahead

The market of new waste-conversion technologies is rapidly evolving with new facilities being announced and operating data on pilot facilities beginning to be received to fill in the current gaps with operating history. This will allow better due diligence.

By asking the right questions, decision makers can take steps to ensure that what is being promised is what they will receive. PM

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