

*Briefing on Alternative Solid Waste Conversion Technologies*  
For

**MRWMD**  
**Monterey Regional Waste Management District**

*February 16, 2007*

The District has requested that SCS Engineers (SCS) present to the Board a 15 to 20 minute Powerpoint presentation on promising solid waste conversion technologies and related items of interest to the District. This will be followed in March by another presentation by SCS on the status of these technologies in California and related regulatory implications. The Feb. 16 presentation outline follows:

A. Summary of Promising New Technologies & Overview of Major Elements

- Technologies:
  - Thermal (primary focus)
  - Physical / Chemical
  - Biological

B. Overall Benefits and Drawbacks of the Technologies to the MRWMD

- Primary Benefits of the Technologies
  - Diversion
  - Power Production
  - Emissions
  - Efficiency
- Identified Drawbacks to the Technologies

C. Review of Estimated Capital and Operational Costs

- Preliminary Costs Provided by Vendors
- Factors Affecting Cost Estimates

D. The Tough Questions to Ask Vendors / What They Don't Tell You

## DEFINITIONS

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**PYROLYSIS:** Decomposition of a material by heat in the absence of oxygen.

Pyrolysis is an endothermic reaction (net heat consumed rather than releasing heat energy) so it is easier to control than an exothermic reaction (like direct incineration) and allows more efficient separation and cleaning of gases for reuse. Thus, pyrolysis can be an initial reaction stage in a gasification system.

**GASIFICATION:** Conversion of material directly, or of products resulting from pyrolysis, into *syngas* using steam, air or oxygen.

**SYNGAS:** Synthesis Gas (or *syngas*) is composed of hydrogen, carbon monoxide, carbon dioxide, with minor amounts of methane, and possibly nitrogen, and can be combusted to produce power or as a building block for other feedstock chemicals.

**PLASMA ARC:** An ionized gas that results when a basic gas is passed through an electrical arc struck between two electrodes. The electrodes are constructed into a torch that directs the plasma arc. The intense heat created can be used to treat many materials, including MSW.

**DIGESTION:** Reduction of solid organic waste materials through decomposition by microbes, accompanied by evolution of gases (*biogas*) and liquids. The process may be aerobic (with oxygen) or anaerobic depending on whether air is introduced to the process.

**HYDROLYSIS:** A chemical reaction in which water reacts with another substance to form two or more new substances. In relation to MSW, hydrolysis refers to an acid-catalyzed reaction of the cellulose fraction of the waste (i.e., paper, food waste, yard waste) with water to produce sugars.

Additional processing steps are sometimes used to convert the sugars to ethanol, an alternative fuel.

**DEPOLYMERIZATION:** Permanent breakdown of large molecular compounds into smaller, relatively simple compounds, involving application of heat and pressure.

**FEEDSTOCK:** The raw material that is intended to be converted by the process into other useable materials. Depending on the process, the feedstock may require significant pre-processing to remove undesirable materials.

**SLAG:** A relatively hard and inert material that is a by-product of some thermal conversion technologies. The material may have various uses as a substitute for road base aggregate and various building materials.

**INERT:** A material that exhibits a relatively high tendency to resist leaching of its chemical ingredients.

**TCLP TEST:** Toxicity Characteristic Leaching Procedure (TCLP) where a solid waste is leached in an acid solution for 18 hours and the resulting "leachate" is analyzed. If the concentration of certain pollutants in the leachate exceeds a standard in the rules, it is a hazardous waste (unless otherwise exempted).

**REACTOR:** The vessel (may be enclosed or partially open) that provides a contained space for the reactions between the feedstock, conversion elements and a heat source (if used).

**CHAR:** An intermediate carbon material produced in the pyrolysis of organic material. Char reacts with carbon dioxide and steam in the gasification process and is partially converted to syngas.

**BY-PRODUCT:** A material, solid, liquid, or gaseous resulting from the conversion of the feedstock that may or may not have re-use potential.

**THROUGHPUT:** The verifiable capacity of the conversion system to process the feedstock on a continuous operational basis, usually expressed in tons per day.

**PRE-PROCESSING:** The physical techniques that are required to prepare the feedstock for the specific process. This can include segregation of inorganics & bulky items, size-reduction or drying).