Table E-1 Comparison of Solid Waste Management (SWM) Technology Options

SWM Technology	Advantages	Disadvantages
Landfill	▪ Provides ultimate disposal ▪ Landfills universal; compatible and currently required with all other technology options for residual waste ▪ Ability to derive landfill gas byproduct for industrial use, power production ▪ Future will include bioreactor landfills; operated to minimize environmental impact while optimizing waste degradation ▪ Costs incurred incrementally as landfill expands	▪ Costs have increased with liner, LCRS systems and stricter regulations ▪ Public siting issues (not as significant for existing landfills) ▪ Long postclosure care obligations and unknowns ▪ Long-term restrictions on site land use
Produce/ Burn RDF	▪ Considerable experience with RDF ▪ Manageable, uniform waste size ▪ Uniform size can aid in materials recovery ▪ Processing offers potentially smaller furnace, low excess air, higher efficiency ▪ Furnace may be fairly "modest" stoker grate design, compared to more robust mass burn systems ▪ Air pollution control systems proven effective ▪ 80 – 90% volume reduction	▪ Shredder governs system availability ▪ Fuel preparation space required ▪ Furnace sensitive to metals, glass and inerts ▪ Processing costs and time can be significant ▪ Relatively high capital and high O&M costs, compared to other, non-burn options
Fluidized Bed Burning RDF	▪ Capital costs of fluidized bed combustion systems competitive with mass burn ▪ Successful application to sewage sludge and coal mining waste (anthracite coal); some applications to MSW ▪ Offers good gas/solids mixing at uniform temperatures; aides burning out of low grade fuel ▪ 80 – 90% volume reduction	▪ Limited scale-up experience in the U.S. ▪ Extensive pre-processing of fuel required ▪ Uncertain as to how effective FBC will be on heterogeneous MSW/RDF fuel ▪ Special requirements for ash disposal ▪ Relatively high capital and high O&M costs, compared to other, non-burn options

SWM Technology	Advantages	Disadvantages
Mass Burn WTE	▪ International market share increasing; slight trend up in U.S. (outside CA) ▪ Trend toward greater shop fabrication ▪ Minimal pre-processing of waste ▪ Waste volume reduction by 90% ▪ Vendors/technology widely available ▪ Production of steam and/or electricity ▪ Air emissions well controlled	▪ High capital and O&M costs ▪ Significant APC required ▪ Special requirements for ash disposal ▪ Operator expertise required ▪ Public perception sometimes negative ▪ Diversion Credits in California are currently not allowed for new plants
Materials Recovery (mixed waste MRFs)	▪ Conservation of landfill capacity ▪ Minimizes environmental impacts and disposal costs over MSW combustion ▪ MRFs ahead of MSW combustion minimizes fouling from metals (aluminum and ferrous iron), glass and inerts ▪ Offers wide array of separation technologies ▪ Compatible with composting, landfilling and MSW combustion (to a degree) ▪ Can be cost-effective given application ▪ Diversion from landfills generally ranges from 10 to 30% of total incoming waste stream	▪ Removal of a significant portion of recyclables from mixed waste requires high degree of processing ▪ Direct collection of recyclables costly ▪ Removal of some recyclables will detract from potential CTs
MSW Composting	▪ Interest driven by landfill closures/space limits, overall costs for waste disposal, support for recycling ▪ Provides potentially valuable product ▪ Integrates with landfilling and materials recovery/recycling ▪ Can be enhanced by combination with sludge composting where sludge disposal is needed, providing better economy of scale for operations	▪ Revenue stream uncertain, given product value and variability of markets ▪ Still requires waste size reduction and some degree of waste separation/processing ▪ Open windrow technology at appropriate scale is cost-competitive with landfilling and relatively less costly compared to CT ▪ More odor potential with MSW than with wood and yard waste composting only. ▪ Product quality and public perception issues possible with co-composting with sludge

SWM Technology	Advantages	Disadvantages
Pyrolysis/ Gasification	▪ Offers same potential as does coal gasification and liquefaction, as a substitute for natural gas and oil ▪ Suggested that particulate emissions and any heavy metals pyrolyze in the char, reducing environmental emissions ▪ Pyrolysis off-gas can be recycled; equipment is expected to need less energy than conventional combustion ▪ Significant volume reduction comparable to other conventional combustion technologies	▪ Difficulty controlling reactions and high moisture and ash levels in MSW/RDF produce low char/gas quality ▪ Commercial markets for products not established ▪ Few commercial systems world wide ▪ Requires extensive waste processing ▪ Little experience with MSW suggests uncertain reliability and, arguably, higher maintenance and costs (compared to other thermal options)
Anaerobic Digesters / Bioreactors	▪ Technically feasible to convert organic wastes to pipeline quality fuel gas ▪ Capable of producing refined compost ▪ RefCoM proof-of-concept facility successful (operated for 7 years) ▪ Large-scale operating experience on MSW at Valorga facility in Spain becoming available ▪ Waste Management chose Anaerobic digestion for Edom Hill, Palm Desert, CA (scheduled completion, late 2007)	▪ MSW waste applications limited to source separated or segregated organic materials ▪ Greater application experience to sewage sludge ▪ Processing/ materials separation required, particularly if not segregated ▪ Requires highly homogeneous (“clean”) waste ▪ Very limited large-scale operating system experience with curbside collected MSW

Notes:

CT	Conversion technology
LCRS	Leachate collection and removal system
MRFs	Materials recovery facilities
MSW	Municipal solid waste
O&M	Operation and maintenance
RDF	Refuse-derived fuel
SWM	Solid waste management
WTE	Waste-to-energy