Municipal solid waste (MSW) management strategies typically include a combination of three approaches, recycling, combustion, and landfill disposal. In the US approximately 54% of the generated MSW was landfilled in 2008, mainly because of its simplicity and cost-effectiveness. However, landfills remain a major concern due to potential landfill gas (LFG) emissions, generated from the chemical and biological processes occurring in the disposed waste. The main components of LFG are methane (50-60%) and carbon dioxide (40-50%). Although LFG poses a threat to the environment, if managed properly it is a valuable energy resource due to the methane content. Currently there are over 550 active LFG to energy (LFGTE) facilities in the US, producing renewable energy from LFG.

A major challenge in designing and operating a LFGTE facility is the uncertainty in LFG generation rate predictions. LFG generation rates are currently estimated using models that are dependent upon the amount of disposal history, moisture content, cover type, and the gas collection system, which are associated with significant uncertainties. The objectives of this research were to:

- Evaluate various approaches of estimating LFG generation and to quantify the uncertainty of the model outcomes based on case-study analysis,
- Present a methodology to predict long-term LFGTE potential under various operating practices on a regional scale, and
- Investigate costs and benefits of emitting vs. collecting LFG emissions with regards to operation strategies and regulations.

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Approved for distribution by Dr. Debra Reinhart, Committee Chair, on June 15, 2011.

The public is welcome to attend.