Non-CO_2 Greenhouse Gases: Methane

Source/Sectors: Wastes/Landfills

Technology: Other options for methane reductions related to landfills (A.5.1.7)

Description of the Technology:
Landfills are the largest anthropogenic source of methane emissions in the United States. Key reduction options for methane emissions from landfills are reduction of the amount of organics deposited into landfills, and energetic use or flaring of landfill gas (Lucas *et al.*, 2006).

In addition to direct gas use, electricity generation, anaerobic digestion, composting, mechanical biological treatment, and increased oxidation, there are other technological options available to reduce methane emissions from landfills, they include:

- Optimize and enhance landfill gas formation – Moisture is pivotal for biological activities. An increase of moisture content and enhancement of moisture movement accelerate the speed and increase the completeness of conversion of organics to landfill gas. Consequently, control of moisture (e.g., by infiltrating water or leachate) enables control over landfill gas production and probably emissions (de Jager *et al.*, 2001).
- Waste treatment in bioreactors (the sustainable landfill) – An alternative to traditional sanitary landfill is waste treatment in a bioreactor in which biological, chemical, and physical processes occur in a controlled way. In this approach waste is deposited in relatively small and shallow compartments with an impermeable bottom liner. The waste filling period is kept short, one year at maximum, to prevent the on-set of methanogenesis before the top liner is installed. After the installation of the top liner, biological process in the waste is accelerated through infiltration and recirculation of leachate (Delhotal *et al.*, 2006; de Jager *et al.*, 2001). They are currently two bioreactor processes - anaerobic and aerobic. Hybrid bioreactors employ both methods (US Climate Change, 2005)
- Aerobic landfilling or aerobic pretreatment – Maintaining aerobic conditions in the landfill or the aerobic pretreatment is a way for reducing methane emissions. One option to maintain aerobic conditions is to inject compressed air, 3 to 7 bar, into the landfill and position several extraction wells in strategic locations to collect the product gas mixture. If aerobic pretreatment is practiced, the biodegradable organics are converted to carbon dioxide and the waste will have less or negligible methane formation potential after landfilling (de Jager *et al.*, 2001).
- Source reduction – Methane is the end-product of waste degradation in landfills. Reducing the amount of degradable waste landfilled will reduce methane emissions. It can be achieved from practices such as waste prevention, recycling, composting, fermentation, or waste incineration (de Jager & Blok, 1996).

Effectiveness: Fair

Implementability: Fair

Reliability: Fair

Maturity: Fair

Environmental Benefits: It reduces methane emissions.

Cost Effectiveness: None reported.

Industry Acceptance Level: Fair

Limitations: None reported.

Sources of Information:

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