

# Landfills Emit Greenhouse Gases?



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## Introduction

Actually, and with development economical and industrial, the waste disposal represents a serious problem if biogas emissions are not controlled [1]. Broadly, landfills are the most common, simple and economic methods to dispose the wastes [2]. The term 'landfill' is used herein to describe a unit operation for final disposal of MSW on land [3]. The cheapest method, in term of exploitation and capital cost, is landfilling comparatively with other methods (incineration, composting, etc) [4,5]. This method produces biogas emissions into the atmosphere. Decomposition of solid wastes may cause environmental problems, more especially if the biogas emissions are not controlled. Biogas is the pollutant that is characteristic of municipal solid wastes (MSW) landfills [6,7]. Over the last decade much attention has been paid to the biogas emitted by MSW landfills. MSW contains hazardous substances, vehicle maintenance products, mercury-containing waste, certain detergents, personal care products, pharmaceuticals, garden pesticides, batteries and many other industrial wastes [8]. Landfill biogas (LFG) is produced by microbial degradation of organic matter under anaerobic conditions [9,10]. Biogas is produced in different environments such as:

- i) In sewage sludge,
- ii) In biowaste digesters during anaerobic degradation of organic materials, and
- iii) In landfills [11].

Biogas production depends on the wastes features and age, the available organic biodegradable carbon content and climatic conditions [12]. The LFG content is typically composed of 55-65% v/v methane, 40-45% v/v carbon dioxide, 5-15% v/v nitrogen and 1% v/v for trace compounds (VOCs and odorant compounds) [13-20]. According to [11], amounts of VOCs and odorants compounds are low compared to methane. The methane effects on climate change are the reason for concern over its high growth rate [21]. Methane has a global warming potential that estimates to be 23 times greater than that of carbon dioxide [22,23]. According to IPCC (2001), more than 10% of methane originates from MSW landfills. According to Wuebbles & Hayhoe [21], besides carbon dioxide and water vapor, methane is the most abundant and reactive greenhouse gas in the atmosphere [21]. The formation of formaldehyde (CH<sub>2</sub>O), carbon monoxide (CO), and ozone (O<sub>3</sub>)

in the troposphere is due to the oxidation of methane by hydroxyl (OH) in the presence of NO<sub>x</sub> in sufficiently high level. Furthermore, in the stratosphere methane can affect the concentrations of both water vapor and ozone [21]. Both methane and trace compounds (VOCs and odorant compounds) reduce the quality of air local [11]. Some VOCs despite their low concentrations may exert adverse effects on environment and to human health [24-26]. LFG increase risks of cancer and congenital malformations for local residents and for landfill workers [10,17,24]. The following group of compounds are found in LFG:

- i) Aromatics,
- ii) Heterocyclic compounds,
- iii) Ketones,
- iv) Aliphatics,
- v) Terpenes,
- vi) Alcohols, and
- vii) Halogenated aliphatics [27,28].

## Conclusion

According to the literature mentioned above, the landfill is a source of gases. These gases are:

- a) CO<sub>2</sub>
- b) CH<sub>4</sub>
- c) VOC
- d) Odorants compounds

These compounds (carbon dioxide, methane, and some volatile organic compounds) are considered as a greenhouse gases. These gases can affect negatively our atmosphere, environment, human health, and terrestrial and aquatic ecosystems.

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