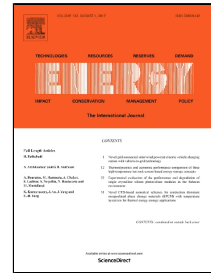


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Municipal waste management systems for domestic use

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Abstract

Every year, the average citizen of a developed country produces about half a tonne of waste, thus waste management is an essential industry. Old waste management systems based on the collection of mixed/sorted waste and transporting it a long way to disposal sites has a significant negative impact on the environment and humans. This paper will review the available waste management systems for households. Biological methods (such as composting or anaerobic digestion) and physicochemical methods (such as burning or pyrolysis) of waste utilization will be considered from the householder's point of view. The most important features of each system will be discussed and compared. Municipal waste management systems for domestic use could eliminate or significantly reduce the stage of waste collection and transportation. Additionally, they should not require special infrastructure and at the same time should allow garbage to be changed into safe products or energy sources with no harmful emissions. The aim of the work is to identify the best available waste disposal systems for domestic use.

1. Introduction

In ancient Athens each household was responsible for collecting and transporting its wastes. Residents were required to sweep the streets daily and remove the waste from the city. Minoans (3000-1000 BCE) placed their wastes, covered periodically with layers of soil, in large pits [1]. These practices basically are fundamentals of waste management nowadays. Most waste still ends up in landfill. However, before the industrial revolution the human population was about 1 billion people, now it is 7.5 billion. Before the demographic explosion humans could afford to simply take the trash somewhere out of the abode, today it is impossible. Mankind needs new solutions immediately.

Waste management systems based on the collection of waste and transportation to disposal sites are outdated. It has been estimated that collection costs range between 40 and 60 % of a community's solid waste management costs [1]. Moreover, garbage trucks are involved in more than 5 fatal accidents per 100 million miles travelled [2]. Elimination of waste collection could also prevent CO₂ emissions of 4.2 to 12 kg CO₂ per tonne of waste, depending on the types of vehicles employed in the various stages of waste transportation and the estimates of payload and average journey distances. It is suggested by Transport for London, that waste generated in the city travels a distance of 44 million kilometres on London's roads each year, releasing about 200,000 tonnes of CO₂ to the atmosphere. Moreover, this does not include the additional road miles incurred, and CO₂ emissions generated, through the transport of waste, principally to landfill sites outside of Greater London [3]. Furthermore, in 2013 there were 204 serious pollution incidents in UK caused by waste industry activities [4]. However, keeping raw garbage in the home before collection creates perfect conditions for infestation by rodents, insects and microorganisms that spread diseases. Hippocrates (ca. 400 BC) and Ibn Sina (980-1037 AD) already suggested a relationship between waste and infectious diseases [1].

It is estimated, that on average each citizen of European Union countries produces 475 kg of waste annually and US citizens about 730 kg [5,6]. The level globally of urban municipal solid waste

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