



## Chapter 22

# Waste Management Practice in Malaysia and Future Challenges

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### ABSTRACT

*Malaysia current waste management systems are not able to solve the disposal rates. The reduction of waste through 3Rs programme (reduce, reuse, and recycle) is in precontemplation stage. The municipal solid waste (MSW) condition is mixed and wet. The landfill and Thermal Treatment Plant (incineration) are the current practices for the MSW disposal. Landfill created leachate while incineration released unhealthy gases. Incineration failed due to the improper management and high cost of the operation. Torrefaction is needed before it goes to the incineration to improve the high heating value (HHV). The MSW pyrolysis and gasification are able to convert into valuable products (bio-oil, biochar, combustible gases). Combustible gases can be used to feedback into the incinerator. The heat of the incinerator can be performed waste to energy (WTE), which is able to convert into electricity as a Feed-in-Tariff (FiT).*

### INTRODUCTION

The developing worldwide population and monetary extension are expanded now and again, these situations had noteworthy expanded the age of city simultaneously increased the generation of municipal solid waste (MSW) (Jouni Havukainen et al, 2017). Consequently, how to deal with the human waste can be challenging work. The current practice of waste treatment approach in Malaysia is through incineration and landfill (place where garbage dump)(Assamoi & Lawryshyn, 2012). Landfill is the foremost economy strategy but a final considered solution in the waste management because of the rise of the methane emission (Beylot, Villeneuve and Bellenfant, 2013), similarly leachate (liquid that drains or

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extracts soluble from a landfill) is polluting into the ground water (Othman et al, 2010). This situation has caused the global greenhouse gas (GHG) that warm up the atmosphere and affecting entire climate of cities. The MSW is burned (incineration) and converted into useable heat source to generate electricity (Paul Breeze, 2014). Carbon dioxide (CO<sub>2</sub>) emission from MSW incineration around 30% by approaching weight. As indicated by the environmental protection agency that the CO<sub>2</sub> factor of MSW incineration ought to be 25 g/MJ fuel (Johan & Mattias, 2004). The worldwide are begun searching for better alternative solution to decrease the amount of MSW being landfill. The other MSW treatment methods have been investigated such as mechanical heat treatment (Demirbas, 2005), mechanical biological treatment (Noor et al, 2013), in-vessel composting (Silvia et al, 2013), gas plasma (DongyanMu, et al, 2017), biodrying (Rajasekhar, et al, 2017), anaerobic digestion (Asha, Pawels and Haridasc, 2016), microwave pyrolysis (Undri et al, 2017), pyrolyzation (Serio et al, 2017), gasification (Shehzad, et al., 2018) and others. Despite the fact that there were a number of techniques to execute the MSW treatment, pyrolysis and gasification are one of the thought to change over the MSW into the bio-oil, bio-char and syngas by the recent researchers. Many researchers and specialists are working in the territory of pyrolysis to convert MSW waste into bio-fuel. This pyrolysis treatment has a productive transformation if compared to other convention incineration conversion technology. Various waste materials have been explored through the pyrolysis such as MSW (Shehzad, et al., 2018), seedcakes (Schaefer, 1975), straws (Karaosmanoglu & Tetik, 2012), woody biomass (Mohan et al, 2007; Aho et al, 2008). Bagasse (Demiral & Sensoz, 2008), wood (Asadullah, 2007) and others. Pyrolysis is turning into an increasingly attractive solution for MSW treatment because of its CO<sub>2</sub> contamination minimization impacts. During 21<sup>st</sup> Conference of Parties (COP21), Malaysia delegation proposed to lessen the Greenhouse Gas emanations (GHG) by 45% in 2030 (Alireza et al, 2016). A significant efforts and results have been made to deliver the biofuels from bio-oil generation (Johari et al, 2014). MSW treatment ready to apply the alternative method for grow exceedingly effective management practices without yielding ecological quality. Pyrolysis of MSW treatment can create bio-fuel with high fuel-to-encourage proportions. The MSW treatment should be identified an alternative solution to develop highly efficient management practices without sacrificing environmental quality. Thusly, pyrolysis and gasification have been accepting more consideration as an effective technique for changing over biomass and MSW into bio-oil, bio-char and syngas.

## **WASTE GENERATION IN MALAYSIA**

In recent years, population in Malaysia has increased simultaneously the waste generation is increased as presented in Table 1. Based on 2016, it was 32,939 tonnes of MSW waste is disposed each day in Malaysia. The waste generation is relied upon to rise and close to 41,035 tonnes by the year 2026 as predicted in Figure 1.

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