AN INTERNATIONAL ASSESSMENT: TRANSFORMING MUNICIPAL SOLID WASTE TO ECONOMICALLY VIABLE ENERGY

Hamed Zamenian, Tom Iseley, Matt Ray, Jake Rardin, and Bugra Aslan

Construction Engineering Management Technology
Purdue School of Engineering and Technology
Indiana University – Purdue University Indianapolis

Abstract

The world population is increasing daily, and waste is rising proportionally. The increase of the population, health development, economic growth and shifting population from rural life to urban life has made waste for municipalities an infrastructure concern. Currently, Municipal Solid Waste (MSW), commonly known as trash or garbage, is one of the challenging problems for municipalities. There have been three particular ways for discarding MSW: landfilling, burning, and recycling. The usual method for waste disposal has been landfilling which handles 54.3% of produced MSW in U.S. (Environmental Protection Agency, 2010). According to the United Nations Environmental Program (UNEP),"The increasing volumes of waste being generated would not be a problem if waste was viewed as a resource and managed properly" (2001). We can produce more waste; on the other hand we can generate more energy from that waste. Waste to Energy (WTE) technology is a green opportunity to continue the path of human ingenuity and technological advancement. The WTE goal defines a new solution that can efficiently deal with substantial percentages of waste, while also creating energy as a co-product. This study will evaluate common WTE technologies that are currently available: pyrolysis, gasification, plasma arc gasification, and anaerobic digestion. Pyrolysis, gasification and plasma arc gasification are all thermal decomposition technologies that can treat waste material in elevated temperature conditions; anaerobic digestion is a biological treatment process. Incineration is also a current WTE technology that is classified as a thermal treatment option but it is not environmentally friendly. Also, existing national and international technology providers will be discussed and their technologies in industry will be assessed while considering MSW as a feedstock and energy as a co-product.