Journal of Applied Geochemistry
Vol. 14, No.3 (2012). pp 337 - 350

MUNICIPAL SOLID WASTE – A POTENTIAL LATENT RESOURCE FOR NON-CONVENTIONAL ENERGY IN INDIA: NEEDS AND CHALLENGES

Srikanth Srigiri and M. Vikram Reddy*
Department of Ecology and Environmental Sciences Pondicherry University, Puducherry, India
E-mail:sriknr1@gmail.com; prof.mvikramreddy@yahoo.com

Abstract

This paper presents an overview of various technologies - gasification, pyrolysis, anaerobic digestion, and ethanol fermentation of physico-chemical and biological nature used in conversion of biomass-waste including Municipal Solid Waste (MSW) to an array of high value, green fuels such as ethanol, biodiesel, bio-methane and hydrogen that can produce clean, renewable energy. The biomass, municipal, agricultural and industrial component useful for energy production includes green waste, food waste, wood, paper, and other organics, plastics and tires. These components are converted to non-renewable energy, with potential benefits and applicability to MSW management, reducing environmental (air water and soil) pollution in urban India. The conversion technologies recover energy from MSW, after shredding, grinding, and drying, which is required to create a more homogeneous feedstock for some of the thermal technologies. However, such conversion technologies can be a potential source of air and water contamination releasing leachates that can pollute groundwater. Conversion technologies would bypass these deleterious environmental effects. Biological technologies that include aerobic composting and anaerobic digestion involve biological conversion of biodegradable organic materials into energy in the absence of oxygen. However, thermal conversion technologies differ from biological technologies by involving thermal breakdown of solid materials into a gaseous constituent. The processed energy is supplied to a reactor, either in gasification or pyrolysis, while some technologies utilize both the methods. The gas generated is syngas that can be utilized in boilers, gas-turbines, or internal-combustion engines to create electricity. Pyrolysis is a thermal conversion technology that uses an indirect external source of heat. When one ton of MSW is combusted through waste to energy conversion process, it generates 550 kilowatt of electricity (net); however, MSW when diverted from a landfill to a waste to energy facility, 1.25 ton CO_2 equivalent is produced per ton of MSW. Moreover, waste to energy facilities converting MSW to energy is shown to produce lower air emissions compared to coal-fired power plants.

Keywords: Biomass-waste, Gasification, pyrolysis, RDF, Anaerobic digestion, Ethanol fermentation, Thermal technologies, Biological technologies, Composting, Non-renewable energy, Environmental pollution.

*Corresponding author