Chapter 7
Waste-to-Materials/Energy: A Need for Waste Management to Achieve Sustainable Development Goals

Rakesh Ashok Afre
https://orcid.org/0000-0002-7412-6437
Assam down town University, Guwahati, India

Gopal K. Upadhyay
Assam down town University, Guwahati, India

Sunandan Baruah
Assam down town University, Guwahati, India

Milind M. Kulkarni
Ajeenkya D. Y. Patil University, Pune, India

ABSTRACT

The increasing urbanization in India has led to the development of an environment that is characterized by the lack of proper management of solid waste. This issue contributes to the development of health hazards and the degradation of the urban environment. This chapter aims to provide a comprehensive understanding of the various parameters of solid waste management to achieve the sustainable development goals. Apart from this it aims to provide a comprehensive analysis of the current status of solid waste management and its conversions to various useful things. It also explores the various opportunities that can be achieved through the establishment of effective and efficient waste processing units.

INTRODUCTION

The management of municipal solid waste is a major concern for many countries around the world. This issue is why it is important to study it to find out what can be done better. The management of solid waste is a major concern for many countries around the world. Due to the large amount of waste that is

DOI: 10.4018/978-1-6684-8117-2.ch007

generated each day, it is very important that the government and private sectors work together to reduce the amount of waste. Some of the harmful substances that can be used in the treatment of municipal solid waste include pesticides, toxic chemicals, and medicines. In various countries, such as India, the management of solid waste is a major challenge due to the increasing population and the improving lifestyle. Despite the various development activities that have occurred in the country, the management of solid waste systems in India has remained the same (World Bank, 2018). This is because the lack of proper management of the waste has been identified as a threat to the environment and human health. According to the World Health Organization, the lack of proper disposal of solid waste can lead to various health issues (Malinauskaite et al., 2017). Studies have shown that proper utilization can be both desirable and not an option. In India, there is a problem with the segregation of construction and e-waste, as well as the proper disposal of plastic, industrial refuse, demolition debris, and commercial waste. In total, over 12 million tonnes of construction and demolition debris, as well as various other types of solid waste, are generated each year in India. It is very important that we properly utilize the waste that comes from our society. This is because it has a huge potential to transform into valuable resources and energy. There are various techniques that can be utilized to recover this resource, such as energy-from-waste conversion (Nanda and Berruti 2020). Various types of waste-to-energy technologies, such as biological and thermochemical conversion, can be utilized to transform municipal solid waste into various fuels. Incineration is the most common method of converting municipal solid waste into energy. However, it can also significantly reduce the volume of the waste.

In order to achieve the Sustainable Development Goals, it is very important that the management of solid waste (MSW) is carried out in a way that is eco-friendly (Rodić, L., & Wilson, D., 2017). There are various ways that can be used to convert the waste into useful products such as biofuels and nanomaterials. However, the major issue that needs to be resolved is the handling of biomedical waste, plastic waste, and e-waste (MSW rules, 2016). In wet/green waste, the abundant carbon atoms can be transformed into nanomaterials because of the presence of hydrocarbons. For instance, after heating a corn cobs and sugarcane bagasse in an inert gas atmosphere, the former gets converted to porous carbon, which can be utilized in the desorption or adsorption of greenhouse gases (Iwuozor et. al 2022). The management of solid waste (MSW) is expected to undergo significant changes due to various factors. Some of these include the increasing emphasis on the role that consumers play in the creation and treatment of waste, as well as the development of new technologies that treat it as a resource. Despite the various factors that have been identified as contributing to the increasing complexity of the waste management process, the challenges that remain are still significant. Some of these include the integration of the informal sector into the planning process for solid waste management in developing countries, the use of standardized definitions for waste, and the reduction of greenhouse gas emissions from solid waste. In less-industrialized cities, the informal sector has a wide variety of characteristics. As cities look to develop their solid waste management plans, they need to consider the various trade-offs that need to be made between the environmental and public health benefits of utilizing the services of the informal sector. One of the most effective ways to reduce the generation of solid waste is through the reduction of materials at the source. This can be done through the establishment of effective reuse opportunities at the household or community level (Shazwin and Nakagoshi, 2010, Yadav and Devi, 2009).

The chapter will focus on possible conversion of MSW and practical approach of utilization to day-to-day activities to achieve the sustainable development goals. This will help to students, teachers, researchers and industries as a reference guide and do implementation of various possible conversion/ utilization of MSW.