Chapter 13
Pioneering Zero Waste Technologies Within the Framework of Sustainable Progress

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ABSTRACT

Zero waste, as defined by the Zero Waste International Alliance (ZWIA) refers to the conservation of all resources by means of responsible production, consumption, reuse, and recovery of products, packaging, and materials without burning and with no substantial discharges to land, water, or air that threaten the environment, human health, or various other life forms. An estimated 11.2 billion metric tons of solid waste is collected every year worldwide, and approximately 5% of overall greenhouse gas emissions are caused by the decomposition of the organic elements of solid waste alone in the environment. It is projected that the production of municipal solid garbage will increase from 2.3 billion metric tons in 2023 to 3.8 billion metric tons by 2050. The predicted global direct cost of waste management in 2020 was $252 billion, which will be doubled by 2050. If we don't find a solution quickly, it may become unfixable and convert the earth into a "gas chamber.". Waste management using AI-driven technologies is sustainable because recycling of plastic produces hazardous chemicals.

1. INTRODUCTION

By introduction of 17 sustainable development goals (SDGs) for better future aimed for every citizen on this earth by 2030, the world has been at the forefront of sustainable development. In 2015, the United Nations Member States launched the Sustainable Development Goals (SDGs). The world is

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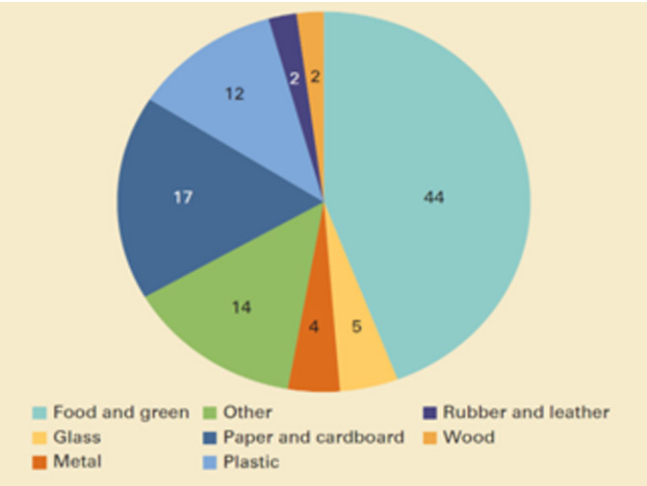
responding for poverty free society, abundant green energy and safeguards for environment. The public is at a turning point when it has to reconsider to improve access to sanitation in order to better achieve sustainable development goals (Orner and Mihelcic, 2018). The world population is continuing to grow exponentially making the human life difficult and putting huge pressure on natural resources and sustainability of planet. These challenges are related to our increasing unsustainable lifestyles, which include mass consumerism, aggressive greedy industrialization, rising energy demand, and the creation of urban trash. Societies are becoming increasingly conscious for the deleterious effects of human activities on ecosystems in response to these dangers. As a result, efforts to find sustainable methods of creating items for both daily usage and contemporary technical uses are required (Morone, 2020). There is an increase in garbage produced due to the world population's fast development (especially in metropolitan areas) and the rise in worldwide affluence that has coincided with it. India is presently the biggest contributor to plastic pollution in the world, releasing 9.3 million tonnes of plastic every year which is about 20% of the global plastic generated in the world. However, the Government of India has focussed on plastic waste management and AI driven technologies are being used to segregate different categories of plastic waste from municipal garbage, cut into pieces and are provided to the manufacturers for their re-use.

2. WASTE GENERATION

2.1 Municipal Solid Waste (MSW)

Over the past few decades, waste creation has skyrocketed globally, and there are no indications that this trend will abate. Globally, more than 2.3 billion metric tonnes of municipal solid waste (MSW) is produced every year, and by 2050, this amount is predicted to increase by almost 70%. The requirement for authorities to offer sufficient waste treatment and disposal services has increased due to the enormous amounts of waste generated on the planet (Figure 1).

Figure 1. Global waste composition in percentage



(World Bank,2023)