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E waste biorefineries: A way forward towards biobased economies

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The current world population of 7.2 billion is estimated to increase by 1 billion by 2025 with an annual growth rate of 1%. In the Asian, Middle East, African and Latin American countries, most of this increase will happen due to fast population growth and urbanization. As a result, the average rate of municipal solid waste (MSW) production will increase from 1.2 to 1.4 kg per capita per day in next 15 years across the world. Similarly, the energy demand is growing significantly in developing world, especially in Asia at an annual rate of 3.7% by 2025. The MSW can be a valuable source of biomass, recycled materials, energy and revenue if efficiently and wisely managed. The promises for the conversion of MSW to energy are abundant and can include a wide range of waste sources, conversion technologies, and infrastructure and end-use applications. Several waste-to-energy (WTE) technologies, including pyrolysis, plasma arc gasification, anaerobic digestion (AD), fermentation, incineration, gasification and refused derived fuel (RDF) have been developed to produce energy and value-added products in the form of electricity, transportation fuels, heat, fertilizers, and chemicals. However, there are certain limitations associated with each WTE technology, as it is difficult for an individual process to achieve zero waste concept and competes with other renewable energy sources like wind, and solar. An innovative solution to these limits is to select the WTE technologies based on the country's waste composition and generation rates and integrate them under waste biorefinery concept. A waste biorefinery will be a group of WTE technologies producing chemicals, fuels, power, products, and materials from different fractions of MSW such as food, plastic, paper, cardboard, fat contents waste, etc. at one platform; similar to an oil refinery. This abstract aims to examine the value of waste biorefineries in developing nations as a solution to MSW landfill problems and as a source of renewable energy production.

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