

Municipal Solid Waste Management Using Life Cycle Assessment Approach: Case Study of Maku City, Iran

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Abstract : This paper aims to determine the best environmental and economic scenario for Municipal Solid Waste (MSW) management of the Maku city by using Life Cycle Assessment (LCA) approach. The functional elements of this study are collection, transportation, and disposal of MSW in Maku city. Waste composition and density, as two key parameters of MSW, have been determined by field sampling, and then, the other important specifications of MSW like chemical formula, thermal energy and water content were calculated. These data beside other information related to collection and disposal facilities are used as a reliable source of data to assess the environmental impacts of different waste management options, including landfills, composting, recycling and energy recovery. The environmental impact of MSW management options has been investigated in 15 different scenarios by Integrated Waste Management (IWM) software. The photochemical smog, greenhouse gases, acid gases, toxic emissions, and energy consumption of each scenario are measured. Then, the environmental indices of each scenario are specified by weighting these parameters. Economic costs of scenarios have been also compared with each other based on literature. As final result, since the organic materials make more than 80% of the waste, compost can be a suitable method. Although the major part of the remaining 20% of waste can be recycled, due to the high cost of necessary equipment, the landfill option has been suggested. Therefore, the scenario with 80% composting and 20% landfilling is selected as superior environmental and economic scenario. This study shows that, to select a scenario with practical applications, simultaneously environmental and economic aspects of different scenarios must be considered.

Keywords : IWM software, life cycle assessment, Maku, municipal solid waste management

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