



Effective Utilization of Municipal Solid Waste as Substitute for Natural Resources in Cement Industry

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Abstract

The aim of this study was to evaluate the municipal solid waste (MSW) composition of Peshawar city and its affective utilization for energy purpose in the cement industry. A total 14 days consecutive testing of MSW samples was conducted for winter and summer periods for the purpose of evaluation of the waste composition followed by calculating its heating values. Compliance level of MSW at source was determined which was based upon the questionnaire distribution followed by the financial analysis and feasibility evaluation of the project. The results revealed that the average waste composition of the samples consists of organic waste contents (20.72%), combustible items (37.86%), readily saleable items (20.95%) and other miscellaneous waste items (20.46%). Moreover, the samples were then tested for the evaluation of calorific value and it was found that the heating value of MSW is recorded up to 35513 KJ/Kg whereas; the value for coal is around 38000 KJ/Kg. These findings revealed that the replacement of coal by MSW may be more efficient and might be effectively utilized in the production of cement as the energy production of MSW and coal is nearly same. In addition, the utilization of MSW as a replacement of coal has a great potential of enhancing the service life of the landfills. Besides, NPV analysis of this study revealed that the project is worthwhile to be implemented as it shows high returns regarding financial aspects.

Keywords: Municipal Solid Waste; Management Practices; Environmental Concerns; Dumping Areas; Calorific Value; Natural Resources.

1. Introduction

Currently, Pakistan is facing environmental problems and is under energy crisis. The country is also facing social concerns which are due to the mismanagement of MSW. These issues have achieved a greater level of alarming dimensions. Improper MSW management not only leads to environmental degradation but also attributes to the public health risks [1]. The enormous amount of waste being generated is due to the rapid industrialization, urbanization, over population, non-utilization of waste as a resource and improper MSW management from source to destination. The MSW generation rate is directly related to the socio-economic activities of the people. Higher social and economic activities lead to greater generation of MSW [2]. In urban areas, the expected population would be six billion people till 2050 [3, 4]. Prediction shows that the global population may reach up to nine billion by 2050 [3, 5]. Moreover, according to the assessment, the developing states may face 99% and 55% of population growth and urbanization rate respectively [3, 5, 6]. With the rapid pace of urbanization, the expected growth in rural and urban population may reach up to 34%

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