

## Optimization of Municipal Solid Waste Management in Peshawar Using Mathematical Modelling and GIS with Focus on Incineration

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**Abstract :** Environmentally sustainable waste management is a challenging task as it involves multiple and diverse economic, environmental, technical and regulatory issues. Municipal Solid Waste Management (MSWM) is more challenging in developing countries like Pakistan due to lack of awareness, technology and human resources, insufficient funding, inefficient collection and transport mechanism resulting in the lack of a comprehensive waste management system. This work presents an overview of current MSWM practices in Peshawar, the provincial capital of Khyber Pakhtunkhwa, Pakistan and proposes a better and sustainable integrated solid waste management system with incineration (Waste to Energy) option. The diverted waste would otherwise generate revenue; minimize land fill requirement and negative impact on the environment. The proposed optimized solution utilizing scientific techniques (like mathematical modeling, optimization algorithms and GIS) as decision support tools enhances the technical & institutional efficiency leading towards a more sustainable waste management system through incorporating: - Improved collection mechanisms through optimized transportation / routing and, - Resource recovery through incineration and selection of most feasible sites for transfer stations, landfills and incineration plant. These proposed methods shift the linear waste management system towards a cyclic system and can also be used as a decision support tool by the WSSP (Water and Sanitation Services Peshawar), agency responsible for the MSWM in Peshawar.

**Keywords :** municipal solid waste management, incineration, mathematical modeling, optimization, GIS, Peshawar

**Conference Title :** ICEESD 2016 : International Conference on Energy, Environment and Sustainable Development

**Conference Location :** Paris, France

**Conference Dates :** January 21-22, 2016