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Waste-to-energy potential in the Western Province of Saudi Arabia
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Abstract
Waste-to-energy (WTE) is a viable option for municipal solid waste (MSW) management and a renewable energy source. MSW is a chronic problem in Saudi Arabia and more specifically in Saudi Urban areas. The MSW practices in KSA are simply done by collecting the waste and dumping it in open landfill sites. KSA is considering WTE as a potential renewable energy source that can contribute to electricity demand in the Kingdom. This research aims to assess potential contribution of WTE facility to meet electricity demand in the three main cities in the Western Province of Saudi Arabia and to provide an alternative solution to landfills. Three scenarios for WTE utilization were developed: Mass Burn, Mass Burn with recycling, and refused derived fuel (RDF) with biomethanation. The Mass Burn scenario implies full waste stream incineration; the Mass Burn with recycling scenario considers segregation of reusable materials and the waste leftover for incineration; while RDF with biomethanation considers segregation of general waste stream into inorganic and organic waste and utilizes organic waste for biomethanation and inorganic for RDF. The analyses were completed for Jeddah, Makkah, and Madina cities; with current total population of about 6.3 million. The results show that Jeddah has the potential to produce about 180 MW of electricity based on incineration scenario; about 11.25 MW based on incineration with recycling scenario; and about 87.3 MW based RDF with biomethanation scenario by the year 2032. These values and other two cities values are based on theoretical ideals and they help in identifying the optimal WTE techniques for each city. © 2015 The Authors

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