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Abstract
This paper reviews the global status of waste to energy (WTE) technologies as a mean for renewable energy production and municipal solid waste (MSW) disposal method. A case study of the Kingdom of Saudi Arabia (KSA) under this concept was developed. The WTE opportunities in the KSA is undertaken in the context of two scenarios: (1) incineration and (2) refuse derived fuel (RDF) along with biomethanation from 2012 to 2035. Biomethanation technology can proved to be the most suitable WTE technology for KSA due to (a) availability of high food waste volume (37% of total MSW) that can be used as a feedstock, (b) higher efficiency (25-30%) and (c) lowest annual capital ($0.1-0.14/ton) and operational cost. However, the need for large space for continuous operation might increase operational cost. The RDF has an advantage over incineration due to (a) less annual capital ($7.5-11.3/ton) and (b) operational cost ($0.3-0.55/ton), but the high labor skills requirements will most probably be a limitation, if appropriate training and related infrastructure are not scheduled to be included as a prerequisite. The incineration technology also proves to be an efficient solution with a relatively higher efficiency (25%) and lower operational cost ($1.5-2.5/ton). However, the need for treatment of air and waterborne pollutants and ash within the incineration facility can be the limiting factors for the development of this technology in KSA. In 2012, the power generation potential for KSA was estimated at 671 MW and 319.4 MW from incineration and RDF with biomethanation scenarios respectively, which was forecasted to reach upto 1447 MW and 699.76 MW for both scenarios respectively by 2035. Therefore, WTE technologies, could make a substantial contribution to the renewable energy production in KSA as well as alleviating the cost of landfilling and its associated environmental impacts. However, the decision to select between the two scenarios requires further in-depth financial, technical and environmental analysis using life cycle assessment (LCA) tool.

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