Environmental Engineering and Management Journal

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu

"Gheorghe Asachi" Technical University of Iasi, Romania

A TECHNO-ENVIRONMENTAL COMPARISON OF MECHANICAL-BIOLOGICAL TREATMENT PLANTS USED FOR MUNICIPAL SOLID WASTE MANAGEMENT IN TÜRKİYE

Yıldız Odaman Cindoruk, Tuba Arıdil Ayten, Mahmut Kemal Korucu*

Bursa Technical University, Department of Environmental Engineering, Bursa, Türkiye

Abstract

This study compares two different mechanical-biological treatment plants used for municipal solid waste in Türkiye, which include anaerobic digestion as a biological process. According to the findings obtained from the technical analyses, the residue masses sent to the landfills were approximately 62% for Plant-A and 54% for Plant-B, compared to the incoming waste mass. The amounts of electrical power values obtained from the whole plants were 149 and 226 kWh/ton-waste, respectively. By comparison, only one of the plants was able to produce refuse derived fuel, accounting for approximately 10% of the total incoming waste mass in Plant-A. According to the findings obtained from the life cycle assessment, Plant-B demonstrated superior environmental performance in the vast majority of the impact categories. This advantage was primarily attributed to its higher electricity generation, particularly resulting from the anaerobic digestion. Conversely, mechanical processes contributed least to environmental performance, largely due to low material recovery effectiveness (approximately 2% package waste recycling) and high energy consumption. While landfill operations provided some environmental advantages, substantial burdens were identified in toxicity related impact categories. All observed differences in the technical and environmental performance of the two identical plants clearly highlight the need for further techno-environmetal analysis of similar systems.

Key words: Biogas, LCA, MBT, RDF.

Received: September, 2025; Revised final: January, 2026; Accepted: February, 2026

* Author to whom all correspondence should be addressed: e-mail: kemal.korucu@btu.edu.tr; Phone: +90 224 8081017