

Investigation of Waste Management Practices in Turkey with a particular focus on Interim Waste Storage Facilities

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The increase in population, the developments in urbanization and economy result in higher solid waste generation in every country (Mohsenizadeh *et al.*, 2020). Turkey with a population of 83 million along with a growth rate of nearly 14 per thousand as declared by the Turkish Statistical Institute (TUIK) in 2019; the amount of solid waste generation in the country is significant. The amount of both municipal and industrial solid waste generated nationally is approximately 65,000 tons between 2016 and 2018 (TUIK, 2019). The Ministry of Environment and Urbanization (MoEU), the main institution in charge of waste management has adopted a national “Regulation on Waste Management (RWM)” in accordance with the EU Waste Framework Directive (2008/98/EC) for safe and efficient waste management from generation to the final disposal. To this purpose, MoEU developed a waste management system enabling tracking of wastes from the waste generator to its final destination (*Figure 1*).

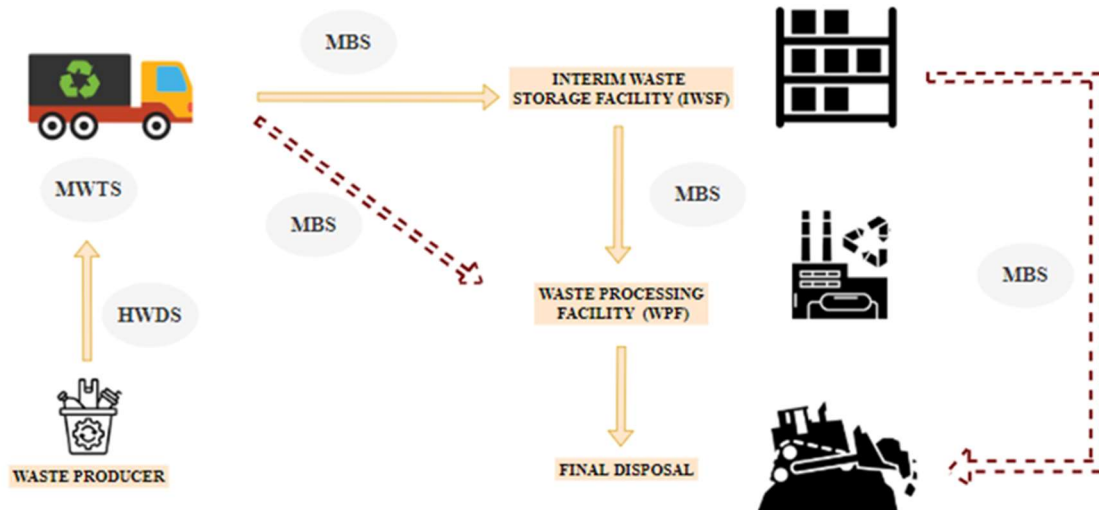


Figure 1. Schematic Representation of National Waste Management System in Turkey (HWDS: Hazardous Waste Declaration System; MWTS: Mobile Waste Tracking System; MBS: Mass Balance System)

The waste is first introduced to Hazardous Waste Declaration System (HWDS) by waste generator where information such as amount, type, hazard class is entered. Afterward, the waste is transported to Interim Waste Storage Facility (IWSF) or directly Waste Processing Facility (WPF) by licensed vehicles. Before its movement from one location to another, information related to the waste needs to be entered into the Mobile Waste Tracking System (MWTS). The transportation is taken care of with licensed vehicles. In order to accept wastes to an IWSF or a WPF, the information about the waste must also be entered into Mass Balance System (MBS). The final stop of the waste is a disposal facility, which may directly receive wastes collected in IWSFs or after they are further processed in WPFs.

IWSFs are defined as “the facilities where the waste is stored safely until the amount of it is reached a sufficient capacity before its transfer to WPFs and/or disposal plants” by the Notification on Interim Waste Storage Facilities. They are described as non-processing facilities, where regardless of the type of waste, maximum storage time is limited by six months. Among the other stops of wastes in the national management system (*Figure 1*), IWSFs are the most problematic; yet the least studied. During this study, a total of 12 site visits to IWSFs in four

different cities (namely İstanbul, Ankara, Bursa, and Kocaeli) between August and October 2019 were conducted. Even though IWSFs were described as a non-processing facility in the legislation, it was observed that the majority of these facilities function in contrary to their definitions. In other words, most of IWSFs process the waste similar to WPFs along with storing it; thus, they function as integrated interim storage facilities. These integrated IWSFs might include Refuse Derived Fuel Preparation Unit (RDF), Hazardous Waste Recovery Unit (HWR), Reuse and Recovery Equipments (R) and Waste Electrical and Electronic Equipment (WEEE), Collection and Sorting Unit (CSF), and Waste to Energy Unit (WTE) (

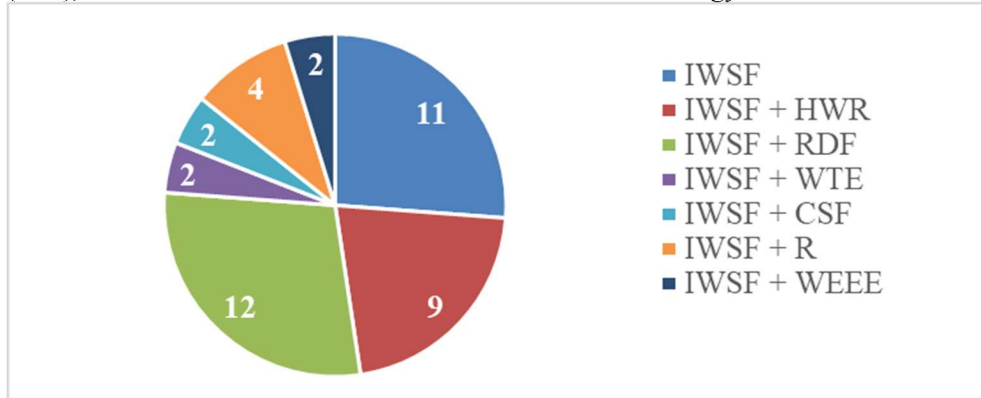


Figure 2).

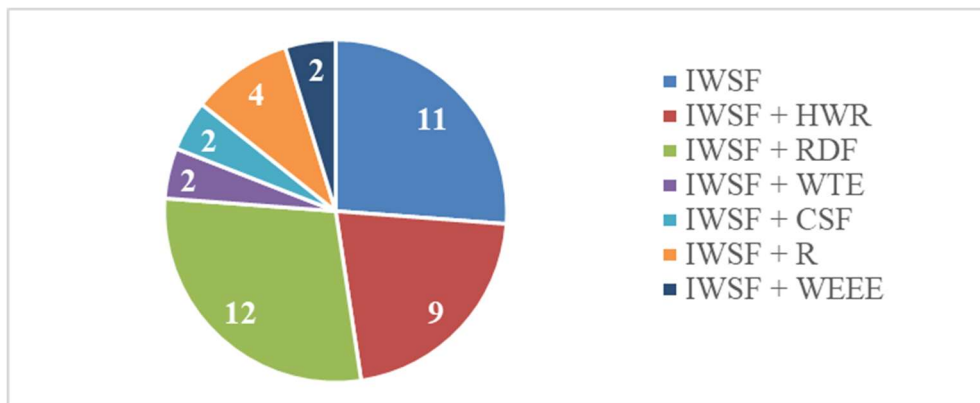


Figure 2. The distribution of IWSFs and integrated IWSFs (HWR: Hazardous Waste Recovery Unit; RDF: Refuse Derived Fuel Preparation Unit, WTE: Waste to Energy Unit; CSF: Collection & Sorting Unit; R: Reuse and Recovery Equipments; WEEE: Waste Electrical & Electronic Equipment)

Out of 42 licensed IWSFs, only 11 of them serve as sole IWSFs, while 31 of them are integrated IWSFs, which corresponds to 74% of IWSFs. Among the integrated facilities, 12 IWSFs with RDFs have the largest share which is higher than the number of sole IWSFs. Therefore, it would be right to state that the storage areas function as stockyards of several WPFs. These integrated systems lead to diverse problems such as fires, several incompliances with the notification on IWSFs in terms of physical conditions, and the misuse of MBS by analyzing the one-year data (between October 2018-October 2019) obtained from MBS by the permission of MoEU.

This article attempts to deliver solutions to the managerial and operational problems of integrated IWSFs. For this purpose, both improvements on the current system and a recommendation for more efficient waste management and waste tracking systems are proposed. This study provides a detailed example and natural evolution of the waste management system in a developing country and may serve well to the authorities.

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