



Hazardous waste management in Turkey: current legislative requirements and future challenges

Cisem Yigit^a, Gulnur Maden^a, Nur Disa^a, Ozge Yilmaz^a, Abdullah Ogutverici^a, Emre Alp^a, Kahraman Unlu^a, Celal F. Gokçay^a, Filiz B. Dilek^a, Ozgur Dogan^b, Tanju Karanfil^c, Ulku Yetis^{a,*}

^aMiddle East Technical University, Department of Environmental Engineering, Ankara 06531, Turkey
Tel. +90 312 2105868; email: uyetis@metu.edu.tr

^bTÜBİTAK Marmara Research Center, Environment Institute, 41470 Gebze, Kocaeli, Turkey

^cClemson University, Environmental Engineering & Earth Sciences, Anderson, SC 29625, USA

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ABSTRACT

Turkey being a candidate country to European Union (EU) is in need of achieving approximation with EU Environmental Acquis including the Hazardous Waste Management. Alignment with the Waste Framework Directive (2006/12/EC) is already accomplished and the Hazardous Waste Directive (HWD) (91/689/EEC) has been almost fully transposed into National Legislation. Yet, there are still some discrepancies regarding the provisions needed for the EU's reporting requirements. This study aims at providing a detailed description of the information requested by reporting requirements in EU Hazardous Waste Legislation related to the implementation of the HWD in Turkey. Firstly, a comparison of the EU and Turkish hazardous waste legislations is done and discrepancies in Turkish Hazardous Waste legislations are identified. Then, the current state of implementation tools of the transposed reporting requirements is evaluated. Finally, a roadmap for the full and precise transposition and implementation of EU's Hazardous Waste Management Acquis is developed.

Keywords: Hazardous waste; Hazardous waste directive; Reporting requirements; Turkey

1. Introduction

Efforts towards the development of a proper hazardous waste management system in Turkey started after the ratification of the Basel Convention in 1994. As presented in Fig. 1, first legislative measure; Regulation on the control of hazardous waste (RCHW) came into force in 1985 right after the ratification of this convention. Nevertheless, the implementation and enforcement of the RCHW remained very low as the administrative capacity and the infrastructure were insufficient.

With the start of the accession period to EU in 2000, a significant progress has been achieved and several projects have been carried out in order to transpose and implement the EU waste legislation. At present, transposition of the acquis on waste management is well advanced. Alignment with the EU's Waste Framework Directive (2006/12/EC) is high and the transposition of the EU'S Hazardous Waste Directive (91/689/EC) almost is complete. However, further alignment is needed, on legislation regarding Special wastes (such as end-of-life vehicles, waste from electrical/electronic equipment) and landfills and waste incineration. Ensuring compliance with the EU's environment acquis also requires significant investments and a strong and

*Corresponding author.

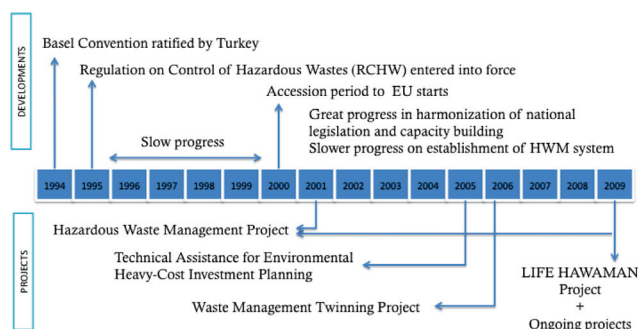


Fig. 1. Hazardous waste management development and improvement in Turkey.

well-equipped administration at national, regional and local level. Turkey is expected to develop plans for building up the necessary administrative capacity at national, regional and local level and required financial resources for the implementation of the EU Legislation. Preparations in this area are under way. As presented in Fig. 1, several projects have been carried out on strengthening of administrative capacity and developing plans for fulfilling the Turkey's obligation as regards the implementation of applicable environment acquis.

In 2004, the Ministry of Environment and Forestry (MoEF) initiated an information system for Environmental information (EIS) to serve as an important informant for environmental management in Turkey. The overall aim of the EIS is to maintain and improve the availability and quality of information needed to design and implement environmental policy. Further objectives of EIS are to reduce administrative burden, provide residents with environmental information and facilitate compliance with environmental legislation as well as contributing towards reporting environmental information. Currently, the system is under development with a need for a detailed assessment of the international reporting requirements and also for a gap analysis of these requirements in terms of the legal basis in the national legislation for providing this data.

The objective of the present article is to provide a detailed description of the information requested by reporting requirements in EU hazardous waste legislation related to the implementation of the Hazardous waste directive in Turkey. To this end; EU Acquis and Turkish hazardous waste legislation are compared and discrepancies in Turkish hazardous waste legislations are identified and finally the reporting requirements for the development of a sound hazardous waste management system in Turkey in compliance with EU Environment Acquis are described. The identified information is to be a part of the already existing EIS that will be plugged into the EU-wide integrated environmental reporting system.

2. Reporting requirements of EU acquis and national legislation

2.1. Overview of EU acquis reporting requirements on hazardous waste

Regulation on general principles of waste management and Turkish regulation on control of hazardous wastes (RCHW) uses four EU directives and a commission decision [1] as base: Waste Framework directive (2006/12/EC), Hazardous waste directive (91/689/EC), Landfill directive (1999/31/EC), Waste incineration directive (2000/76/EC) and European waste catalogue (Commission decision 2000/532/EC of 3 May 2000). There is one more regulation (Regulation EC/166/2006 of 18 January 2006 concerning the establishment of a European pollutant release and transfer register and amending council directives 91/689/EEC and 96/61/EC) focusing on the requirements of EU Acquis which is required for the full and precise transposition of EU's Hazardous waste legislation. In addition, a new directive (2008/98/EC) came into force repealing Directives 91/689/EEC and 2006/12/EC as of 2010. The comparison of aforesaid directives and the Turkish Regulations reveals that transposition has been achieved to a great extent. However, there are still some discrepancies regarding the provisions needed for the EU's reporting requirements.

2.1.1. Directive 2006/12/EC on waste [3]

Directive 2006/12/EC on Waste known as "Waste Framework Directive" requires Member States to take measures to encourage the prevention or reduction of waste production and its harmfulness, and to encourage the recovery of waste by recycling, re-use or reclamation, or the use of waste as a source of energy [2]. Member States are required to prohibit the uncontrolled disposal of waste, to establish an integrated and adequate network of disposal installations and to draw up waste management plans. Waste management plans must relate, in particular, to; the type, quantity and origin of waste; general technical requirements; any special arrangements for particular wastes; and suitable disposal sites or installations.

Waste is carefully defined in this directive and Annex I to the Directive sets out 16 categories of waste. The Directive specifies the issues to be covered in the waste disposal and recovery permit for the establishments carrying out these operations. All establishments or undertakings which collect or transport waste themselves or prepare wastes for disposal and recovery for others, must be registered with the competent authority and must keep records on the quantity, nature, origin etc of the waste [3]. Commission Decision 94/741/EC [4] provides the questionnaire to be used by Member States

when reporting to the Commission on the implementation of the Waste Framework Directive. The questionnaire covers the details of WMP (the date of adaptation/publication, start of application or last update, end of application; categories of waste and area covered) and total waste produced (recycled, incinerated with or without energy recovery, landfilled) [4].

2.1.2. Council directive 91/689/EEC on hazardous waste [5]

The *Hazardous Waste Directive* sets up additional, more stringent rules than those found in the Waste Framework Directive taking account of the special nature of hazardous waste. The permit, authorisation, registration and inspection requirements under the Waste Framework Directive apply to the Hazardous Waste Directive. A “cradle-to-grave” approach to record keeping is required—from generation up to its final disposal, including any intermediate transfers. Moreover, it is prohibited to mix hazardous waste with hazardous or non-hazardous waste except for recovery and treatment operations under a permit according to Waste Framework Directive. When hazardous waste is transported it must be accompanied by appropriate documentation. The competent authority is required to draw up plans for the management of hazardous waste which may be part of the general WMP [5]. Commission Decision 96/302/EC specifies the format in which information on establishments carrying out hazardous waste disposal or recovery to be sent to the Commission [6]. Commission Decision 97/622/EEC provides a questionnaire from the Commission on the implementation of the Directive. This questionnaire checks out by yes/no questions whether the requirements that are specified in the Directive are met [7].

2.1.3. Council Directive 2000/76/EC on the incineration of waste [8]

Directive on the Incineration of Waste sets stringent operational conditions and technical requirements on waste incineration plants by means of emission limit values. All incineration and co-incineration plants require a permit for operation. The permit must specify the categories of waste which may be treated, the total waste capacity of the plant, and specify sampling and monitoring requirements. Where the incineration or co-incineration plant is to be used for the incineration of hazardous waste, the permit must also list the quantities of the different categories of hazardous waste which may be treated, and specific requirements concerning the hazardous waste. Wastewater discharges from the cleaning of exhaust gases also require a permit from the competent authority. Sampling and measurement

standards and procedures are defined, as well as safety back-up and public information requirements [8]. Commission Decision 2006/329/EC provides a questionnaire on the implementation of the Directive. Points that are mentioned in this questionnaire are generally about incineration and co-incineration processes, waste categories, emission limit values, measures on heat recovery, minimization, recycle, disposal of residues [9].

2.1.4. Council Directive 1999/31/EC on the landfill of waste [10]

Directive on the Landfill of Waste requires new and existing landfill sites to be tightly controlled under a detailed permitting procedure. The Directive lays down general requirements for all classes of landfills on location, water control and leachate management, protection of soil and water, gas control, nuisances and hazards, stability and barriers. Requirements concerning applications, conditions and content of permits for landfills are specified in the Directive. As a part of waste acceptance procedures the operator must inform the competent authority without delay if any waste is not accepted at the landfill. Control and monitoring procedures during the operational phase of the landfill are defined in the Directive, as are the measures to be taken during the closure and after-care phases [10]. Commission Decision 2000/738/EC contains the questionnaire for reporting on the implementation of the Directive. This questionnaire comprises type and quantity of wastes, as well as, total number of existing landfills (number of these landfills complying with the directive, number of landfills closed since 16 July 2001, number of landfills re-equipped, rest capacity) [11].

All the aforesaid Directives require communication of Member States to the Commission about the texts of the main provisions of national law which they adopt. In addition, the following commission decisions are to be considered by the Member States in meeting reporting requirements.

2.1.5. Commission decision 2000/532/EC—The European waste catalogue (EWC)

The *European Waste Catalogue (EWC)* is a hierarchical list that categorises waste under the Waste Framework Directive [1]. It is divided into twenty main chapters each of which has a two-digit code between 1 and 20. Most of the chapters relate to industry but some are based on materials and processes. Within the list hazardous wastes are signified by entries where the code is followed by an asterisk. Those that are ‘Absolute Entries’ (i.e., are always hazardous waste) are shown in red and the letter ‘A’ appears beside them. For some entries the judgment on whether they are hazardous depends on

the threshold of any dangerous substance that is present. These entries are 'Mirror Entries', they are coloured blue and the letter 'M' appears beside them. The European Waste catalogue is available.

2.1.6. Regulation (EC) No 166/2006 concerning the establishment of a European pollutant release and transfer register and amending council directives 91/689/EEC and 96/61/EC [12]

166/2006 is about every establishment or undertaking which carries out disposal and/or recovery of hazardous waste principally on behalf of third parties and which is likely to form part of the integrated network. It establishes an integrated pollutant release and transfer register at Community level in the form of a publicly accessible electronic database [12].

2.1.7. Directive 2008/98/EC on waste and repealing certain directives

Directives 91/689/EEC and 2006/12/EC are to be repealed by this Directive with effect from 12 December 2010 [13]. The Directive does not include any changes in reporting requirements.

2.2. Overview of Turkish legislation reporting requirements on hazardous waste

2.2.1. Regulation on general principles of waste management (July 5, 2008) [14]

Regulation on General Principles of Management which is basically in accordance with *Directive 2006/12/EC* requires lays down the general provisions on waste management. MoEF is entrusted with preparing WMP covering origin, quantity and type of wastes; provisions and technical requirements for appropriate waste management; special adjustments for particular wastes; appropriate recovery, temporary storage and disposal establishments; establishments, waste types and quantities that are exempted from permit; natural or legal persons permitted to carry out the waste management; estimated capital and operational costs of disposal and recovery installations; and appropriate measures to encourage rationalization of the collection, sorting and treatment of waste. Waste producers, recovery and disposal installations shall record the code of the waste stated in Annex-IV, the type, origin, quantity of waste, establishment where the waste is sent, type of transportation, and operations in accordance with Annex IIA and IIB [14].

2.2.2. Regulation on control of hazardous waste (March 14, 2005) [15]

Regulation on control of hazardous waste establishes a framework for hazardous waste management and

follows the general rules laid down in *Council Directive on Hazardous Waste*. Any establishment that carry out hazardous waste transport should have a permit and transportation must be accompanied by waste transport form. The Regulation specifies the permit issues to be covered for the establishments that carry out waste disposal and recovery operations. After recovery operations on the hazardous waste, if second raw material has been produced, quality of this material should be documented by the accredited laboratories. Any chemical, physical or biological transformation that aims to convert hazardous wastes into can inert form must also be documented. Trial incinerations have to be conducted in order to show that all the emissions are satisfying limit values. A report about this trial incineration must be submitted to MoEF. In the case of temporary storage of hazardous waste, permit must be obtained. All the establishments carrying out disposal operations must have a permit which covers all the plans, projects, reports, technical data and descriptions. Storage establishments must be constructed according to specific requirements indicated in the Regulation. All the data about the management of these establishments must be recorded. WMP must be prepared to satisfy appropriate management of hazardous waste. The establishments carrying out waste disposal must prepare a feasibility report on necessary measures to be taken after the closure of the facilities. Transboundary movement of wastes must be accompanied an international waste transport form. The waste codes in RCHW are fully transposed from European Waste Catalogue [15].

3. Gap analysis

After reporting requirements assessment of both Legislations, they are compared in order to determine the gap in between. EU Environment Acquis consists of two types of reporting requirements; first one is the reports that operators have to submit competent authority, and second one is the reports that Member States have to submit to the Commission. Since Turkey is not a member of EU yet, second type of reporting requirements are not discussed in this paper. The provisions which are not transposed to Turkish Hazardous Waste Legislation are asserted in Table 1.

4. Additional inputs of EIS for full transposition to EU

The responsibilities of MoEF regarding hazardous waste management are program—policy development, hazardous waste management planning and control

Table 1
Summary of gap analysis between EU Acquis and Turkish legislation

EU Acquis	Provisions
Directive 2008/98/EC on waste and repealing certain Directives	<ul style="list-style-type: none"> • <i>Article 20 states</i>, labeling of hazardous waste (<i>Article 19</i>) and record keeping (<i>Article 35</i>) is not necessary for separate fractions of hazardous waste produced by households as long as they are accepted for collection, disposal or recovery by a facility which has obtained a suitable permit or has been registered in accordance with Articles 23 (Issue of permits) or 26 (Registration). • Member States shall require any establishment or undertaking intending to carry out waste treatment to obtain a permit from the competent authority (<i>Article 23(1)</i>). • Member States shall ensure that the competent authority keeps a register of establishments or undertakings which are subject to exemptions from the permit requirements (<i>Article 26(c)</i>).
Directive 2000/76/EC on Incineration of Waste	<ul style="list-style-type: none"> • The permit application for waste incineration should include a description of the measures, a list of the quantities of the different categories of hazardous waste which may be treated, minimum and maximum mass flows of those hazardous wastes, their lowest and maximum calorific values and their maximum contents of pollutants, e.g., PCB, PCP, chlorine, fluorine, sulphur, heavy metals (<i>Article 4, 2</i>). • The competent authorities shall be informed without delay as soon as the emission limit values for air or water laid down in this Directive have been exceeded (<i>Article 11</i>). • Information covering administrative information on the generating process, the physical, and as far as practicable, chemical composition of the waste and all other information necessary to evaluate its suitability for the intended incineration process the hazardous characteristics of the waste, the substances with which it cannot be mixed, and the precautions to be taken in handling the waste about the waste should be available for the purpose of verifying, inter alia, compliance with the permit requirements specified in <i>Article 4(5)(Article 5(b))</i>.
Council Directive 1999/31/EC on Landfill of Waste	<ul style="list-style-type: none"> • Permit to be taken by landfills shall state at least the class of the landfill, requirements for the landfill preparations, landfilling operations and monitoring and control procedures, including contingency plans (Annex III, point 4.B) (<i>Article 9</i>). • The operator shall notify the competent authority of any significant adverse environmental effects revealed by the control procedures and shall follow the decision of the competent authority (<i>Article 12</i>).
Commission Decision 2000/738/EC questionnaire	<ul style="list-style-type: none"> • Amount of biodegradable municipal waste and other biodegradable waste (if possible broken down in waste streams) going to landfills for each year of the reporting period, is required.
Commission Decision 94/741/EC	<ul style="list-style-type: none"> • Details of waste management plans; date of adaptation/publication, start of application or last update, end of application are required (Part II.1.c).
Regulation (EC) No: 166/2006	<ul style="list-style-type: none"> • The operator of each facility that undertakes activities specified in Annex I above the applicable capacity thresholds specified therein shall report the amounts annually to its competent authority, along with an indication of whether the information is based on measurement, calculation or estimation. This information shall include information on releases and transfers resulting as totals of all deliberate, accidental, routine and non-routine activities. When preparing the report, the operator concerned shall use the best available information, which may include monitoring data, emission factors, mass balance equations, indirect monitoring or other calculations, engineering judgements (<i>Article 5</i>).

and monitoring of hazardous wastes. To fulfill these responsibilities, hazardous waste declaration, transportation and mass balance forms which give information about production and distribution of hazardous waste, hazardous wastes are collected from industries. Regular flow of information should be ensured in the first step of creating an information-rich database in the development of control mechanisms. These control mechanisms

can be realized with the electronic information system where all information is collected and integrated. In the framework of full compliance to the EU, in order to be able to meet hazardous waste management reporting requirements, the current situation of EIS should be improved according to conducted gap analysis. Current database of EIS with the required additional inputs and the data suppliers of the system are designated in Table 2.

Table 2
Reporting requirements and gap analysis according to EU legislation

Number of directive	Reporting requirements according to the directives	Nature of the data required in EIS (+ = present data, × = required data)	Data supplier
Directive 2006/12/EC of the European Parliament and of the Council of 5 April 2006 on waste (of effect 2010)	• Prevention of waste	×	Producer
	• Recycling	+	
	• Energy recovery	×	Firm disposing waste
	• Waste management plans for waste to be disposed/recovered	×	Firm disposing waste
	– Type	+	
	– Quantity	+	
	– Origin	+	
	– Technical requirements	×	Firm disposing waste
	– Special methods for certain wastes	+	
	– Proper disposal facilities	+	
	– Person responsible from waste management	+	
	– Appriessed cost of recovery and disposal operations	×	Firm disposing waste
	– Measures taken for collection, separation and treatment of waste	×	Firm disposing waste
	– Measures taken for violations of plans	×	Firm disposing waste
	• Disposal permits—for waste		
	– Type	×	MoEF
	– Quantity	×	MoEF
	– Technical requirements	×	MoEF
	– Security measures	×	MoEF
	– Disposal facility	×	MoEF
	– Treatment method	×	MoEF
	• Recovery permits	×	MoEF
	• Permits of the facilities except for facilities performing off-site disposal and off-site recovery of waste	×	MoEF
– rules necessary for all activities—waste type and quantity	×	MoEF	
– reason of exemption from permit	×	MoEF	
• List of the firms transporting waste Atlk (broker/dealer)	×	MoEF	
• Disposal facilities—for waste	×	Firm disposing waste	
– Type	+		
– Quantity	+		
– Nature	+		
– Final destination	×	Firm disposing waste	
– Frequency of collection	×	Firm disposing waste	
– Form of transportation	×	Firm disposing waste	
– Treatment method (Annex-1)	×	Firm recovering waste	
– Disposal and recovery methos (Annex-2) [3]	+		

(continued)

Table 2 (continued)

Number of directive	Reporting requirements according to the directives	Nature of the data required in EIS (+ = present data, × = required data)	Data supplier
Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives	• Permit of waste treatment facility—for waste		
	– Type	×	Waste treatment plant
	– Quantity	×	Waste treatment plant
	– Operation and method allowed according to the waste type	×	Waste treatment plant
	– Technical requirements	×	Waste treatment plant
	– Safety measures	×	Waste treatment plant
Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste	– Monitoring/control operations [13]	×	Waste treatment plant
	• Measures in waste recycle	×	Firms incinerating waste
	• Waste minimization, recovery and disposal measures	×	Firms incinerating waste
	• Capacity of incineration plant	×	Firms incinerating waste
	• Sampling, measuring procedures (maximum and minimum flowrates of hazardous wastes, calorific values)	×	Firms incinerating waste
	• Mass of all types of wastes	×	Firms incinerating waste
	• Waste generating process	×	Firms incinerating waste
	• Chemical composition	×	Firms incinerating waste
	• Measurement frequency	×	Firms incinerating waste
	• Comparison of the emission to the air and water, process flow diagram for the facilities having capacity more than 2 tonnes/h, [8]	×	Firms incinerating waste
Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste	• Responsible operator	×	Landfills
	• Class of landfill	×	Landfills
	• Type and total quantity of waste which can be landfilled (capacity)	×	Landfills
	• Waste type	+	
	• Origin	×	Landfills
	• Quantity	+	
	• Technical requirements	×	Landfills
	• Identity of waste producers	+	
	• Definite place of waste in field (for hazardous wastes)	×	Landfills
• Which waste is accepted and by where is it accepted [10]	×	Landfills	

5. Conclusion

The comparison of the Turkish and EU indicates that the current legislation in the hazardous waste sector partially corresponds to the requirements of the EU directives. Since, 166/2006/EC (*Concerning the establishment of a European Pollutant Release and Transfer Register and amending Council Directives 91/689/EEC and 96/61/EC*) which broadly centres on reporting requirements

come into force after revision of RCHW in 2005, transposition to Turkish Regulations are not conducted. Although transposition studies on hazardous waste are implemented to great extent, it is seen that there are still weaknesses. However, MoEF has initiated some studies on filling the gaps in landfill and incineration of waste and as a result of these studies some draft regulations have been already prepared.

The following steps should be followed to improve the current hazardous waste management system with the most proper way for our country.

- to determine of the geographic and sectoral distribution of hazardous wastes,
- to choose the best disposal method for different type of hazardous wastes,
- to supply the supervision and reporting requirements of MoEF by improving the current environmental information system (ÇBS),
- to support the inventory and supervision studies by determining the hazardous waste generation factors valid for Turkey,
- to increase the efforts regarding “minimization of hazardous waste” which is one of the bases of the Basel Convention by waste prevention and minimization studies in chosen sectors are aimed.

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