

# **WASTE MANAGEMENT**

## **DEVELOPMENT AND CURRENT STATE OF WASTE SECTOR**

### **Municipal Waste**

In accordance with Law on Environment, Solid Waste Management Regulation, Metropolitan Municipalities Law and Municipal Law; Metropolitan municipalities and municipalities out of adjacent zones and the highest civilian authority out of these zones are responsible for ensuring the disposal of domestic and domestic-type industrial solid waste while avoiding environmental damage, ensuring the maximal use of the landfills and ensuring the classification and separation of recyclable solid waste to contribute to the economy and taking relevant measures to ensure these.

Municipalities, while fulfilling their duties in collecting and transporting the solid waste to a great extent, can not show the required level of activity and attention in disposal within solid waste management. The great majority of the solid waste in the country are still not being disposed in accordance with the legislation. There exist many administrative, financial and technical reasons contributing to this existing situation. Especially unsanitary disposal, errors in selection of the disposal sites and the drawbacks in administration are causing ever increasing problems.

In solid waste production, primarily the amount of waste produced should be reduced. Moreover, the need for awareness raising in households for separation of waste at the source, to make it ready for collection, is ongoing.

Existence of many local administrative units in the same region makes it compulsory to have cooperation and coordination in solid waste services like in other infrastructural services. Local administrative union model applications, as promoted by the new legislation, come up as a facilitating bodies for realization of local-level environmental services. Within this framework, it is observed that the number of solid waste projects implemented by local administrative unions are increasing.

Solid waste in Turkey is generally discharged to unsanitary landfill sites in an uncontrolled manner.

Medical institutions are paying due attention on separation of medical waste from other solid waste at its source, transportation and temporary storage. Equally, municipalities as well have made progress in proper disposal of the medical waste. Yet bearing these in mind, many municipalities could not establish disposal sites adequate in number and technical aspects to date.

Studies on establishment of a nation-wide effective solid waste management system have been initiated. In this regard, Solid Waste Master Plan for the domestic-type waste is completed and further studies are ongoing for development of the National and Regional Waste Management Plan for other waste types.

“Solid Waste Master Plan Project”, implemented under coordination of Ministry of Environment and Forestry (MOEF) and Undersecretariat of State Planning

Organization in 2006, has aimed at establishment of unions between municipalities for solid waste disposal across Turkey, development of economically sustainable Regional Solid Waste Facilities and ensuring the implementation of the projects within a plan. As foreseen by the relevant legislation, plans are developed for the establishment of sanitary landfill sites, reduction of amount of produced solid waste, ensuring recycling, reduction of solid waste transport costs and use of transport sites equipped with appropriate technologies where deemed necessary; 16 type of projects are developed in this regard so as to provide guidance to municipalities.

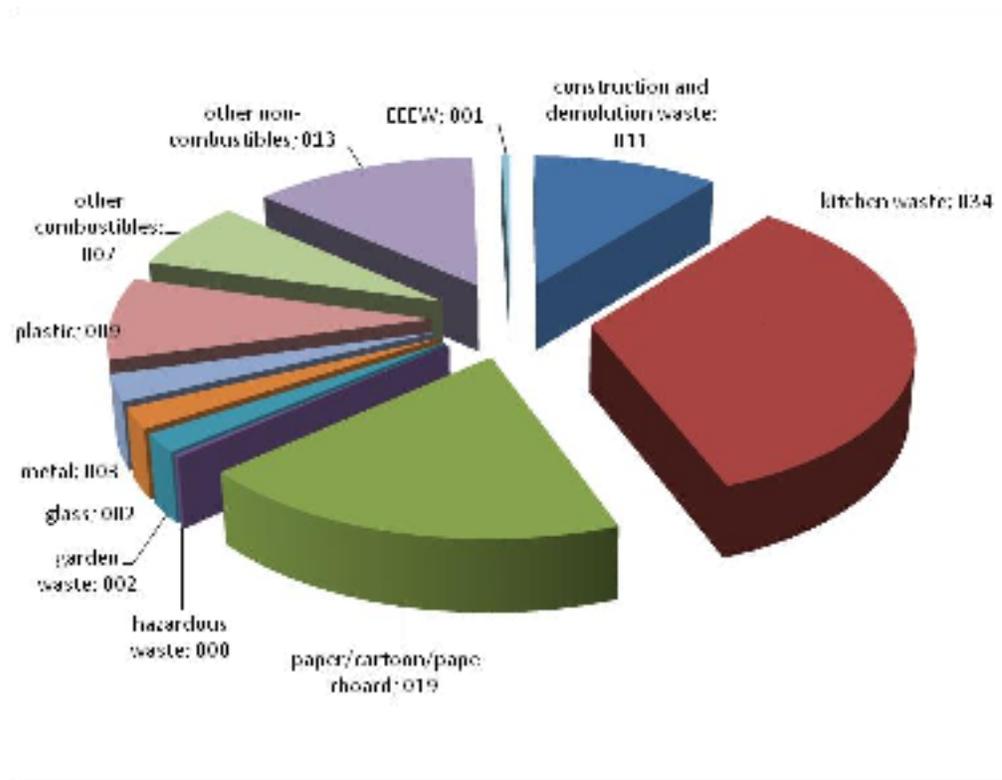
MOEF's estimation of domestic solid waste production in 2008, calculated through per capita waste estimates, is 26,8 million tons. 13,3 million tons of these wastes are disposed in sanitary landfills while 0,3 million tons are processed in compost facilities.

The number of sanitary landfill sites in operation have risen to 41 by 2009.

MOEF have carried out various regional fieldwork in 2006 in order to determine the domestic waste composition of households in Turkey in addition to solid waste surveys sent to cities that are representative of Turkey, including 16 metropolitan municipalities. In the light of the fieldwork and declared information on composition, solid waste projections are calculated for the use of all municipalities.

The outcome of these studies as 2008 municipal waste composition is shown in Figure 1.

**Figure 1: Composition of domestic waste (2008)**



## **Packaging Waste**

Necessary legal and technical arrangements are established in order to reduce the environmental pollution caused by the packaging waste as an important component in the solid waste in the country and to recover these as economical assets.

In accordance with the Control of Packaging Waste Regulation, packaging material producers are obliged to submit “Packaging Material Producer Application Form” and the market providers are obliged to submit “Market Provider Application Form” to the Ministry annually. Within the system defined under the regulation, since municipalities are responsible for waste collection as defined in Law on Metropolitan Municipalities and Law on Municipalities, responsibility of separation of the packaging waste at the source and its transportation are also given to province and district municipalities.

Separate collection of packaging waste at the source can be done through service procurement as well as being able to be carried out by the province and district municipalities themselves. In accordance with the regulation; collection, transportation and recycling of the packaging waste is prohibited for those except the licensed enterprises. Municipalities are responsible for developing packaging waste management plans which define how, when and in which way packaging waste will be collected and are obliged to carry out their work in this scope. Approval of the plans, prepared within the scope of packaging waste management plans format and submitted to MOEF, has started for the first time in 2008.

## **Medical Wastes**

Wastes produced in medical institutions are classified as medical wastes, hazardous wastes, domestic-type and packaging wastes; these are separated without mixing at the source and collected with special bags and boxes. In compliance with the regulation; medical wastes must be collected at the source in red-colored special bags with signs of “International Biohazard” and “Caution! Medical Waste” separately. Cutting and perforating wastes, as a sub-group of medical wastes, must be collected separately from other medical wastes in special boxes with the same caution signs made out of special plastic or laminated cardboard.

Wastes collected in medical institutions must be stored in temporary waste storage or containers until they are collected by the municipality.

Transportation of medical wastes from temporary storage sites and containers as well as small sources to disposal sites are being carried out by entities and enterprises as authorized by the municipalities.

According to 2006 data of Ministry of Health, the total number of hospitals in Turkey is 1.204 with a total number of available beds in these hospitals being 173.421. Calculations made taking into consideration of the occupancy rates according to cities reveal a daily estimate of 250 tons and an annual estimate of 91.323 tons of medical waste produced in ambulatory treatment and inpatient treatment institutions.

Medical Waste Control Regulation paved the path for implementation of alternative disposal technologies for the disposal of medical waste in Turkey. In this

framework, MOEF has instructed the municipalities to handle domestic solid waste and medical waste disposal in an integrated manner, to consider the medical waste disposal as a component and to prioritize sterilization as the best means of intermediate processing method as per country's circumstances. 12.681 tons of medical waste, corresponding to 14% of the total medical waste is sterilized and made innocuous by September 2008. Medical waste sterilization facilities taken into operation in 2008 is presented. Project design and licensing works are ongoing in many cities except these forementioned facilities.

### **Waste oils**

An approximate amount of 1,5 million tons of vegetable oil is consumed in Turkey annually. It is estimated that 150-300 thousand tons of fried waste vegetable oil is produced especially after frying processes. Used waste vegetable oils are causing 25% of the domestic wastewater pollution. Municipalities are given the responsibility for the collection of used frying oil from the residences as of 2008 in compliance with the regulations and in order to prevent contraction and clogging in wastewater collection systems (sewerage, collectors, etc.) caused by waste oils.

Currently, works on establishment of a system for collecting and processing waste oils are already ongoing. These works carried out under the provisions of Waste Oil Control Regulation are performing registration of waste oil producers, determination of waste oil types and quantities produced in various sectors in Turkey, transportation of waste oils, licensing of recycling and disposal facilities as well as control of the activities of these facilities and determination of illegal practices.

There are 21 enterprises licensed by MOEF to recycle waste oils. These enterprises' monthly activity reports and collected waste oil quantities as well as the quantity of sales of the products reclaimed through recycling, efficiency of recycling and wastes incurring as a result of recycling processes are evaluated and registered by MOEF.

Production of biodiesels from waste vegetable oils are predicated on with the regulation and licensing was made in this direction.

As the quantity of collected waste oils increase, illegal waste oil markets and uncontrolled use of these waste oils will be forestalled.

An environmentally-aware use of waste oils for energy recovery as an additional fuel in cement factories is encouraged. However refinement and regeneration of waste oils are more prioritized. Thus the aim is set at increasing the number of recycling and regeneration facilities and improvement of the conditions of 21 currently operating facilities.

Waste Oils Management Project is aimed at collecting and waste engine oil used in motor vehicles by licensed and authorized crews in proper manners in car service stations, oil stations and public vehicle maintenance stations; and ensuring processing of these with avoiding harm to nature or humans and establishment of appropriate collection system, determination of oil producing sources and awareness raising. The amount of collected waste engine oil and collection points have increased gradually since the initiation of the work in May 2004 and expanded to whole country.

Within the scope of these studies, 65.299 tons of waste engine oil is collected from 6.426 waste oil producers in a total of 79 provinces by paying 48.416 visits in 5 year timespan including October 2009 and these are recycled in licensed facilities either as product or energy. The number of enterprises contributing to organization is 85 and the quantity of engine oil served to market by these enterprises in 2008 is 199.835 tons.

63% of the waste oil collected in 5 years was collected from car service stations while 15% from industrial car parks, 11% from public institutions, 4% from municipalities, 5% from oil production facilities and 1% from the oil stations.

### **Waste Batteries and Accumulators**

The responsibility of collection, transportation, recycling and disposal of waste batteries and accumulators lies with the producers. In order to ensure separate collection of waste batteries from the domestic solid waste, a waste battery collection obligation is introduced for battery producers and exporters as per their quotas. An obligation is introduced for accumulator producer and exporters to collect waste accumulators as per defined deposit rates.

The responsibility for separate disposal of waste batteries from domestic wastes lies with the municipalities. Allocation of land for waste battery storage sites with impervious conditions, of which the establishment and operational costs will be born by battery producers, is also among the role and responsibility of the municipalities.

Annual amount of batteries supplied to market in Turkey is approximately 10.000 tons while annual amount of accumulators is 74.000 tons. Within the scope of inventory studies realized under the framework of regulation, total amount of registered waste batteries equals 200 tons, total amount of waste accumulators equals to 45.476 tons in 2007. Total amount of waste accumulator collected in accordance with the regulation corresponds to 67% of the accumulators supplied to the market in 2007, total amount of collected waste batteries corresponds to 2% of the batteries supplied to the market in 2007.

### **Hazardous Waste**

Due to the priority given in the current state to production, product quality and costs given in production industry in Turkey, waste reduction and recycling maintained a secondary role. However developing environmental protection awareness over time, legal sanctions, difficulties faced in waste disposal and most importantly increasing significance of environmental protection measures in production in international trade have placed use of clean technologies and waste reduction in an important position.

Efforts for reuse and recycling of hazardous wastes often focus on wastes that require simple technologies for collection and disposal. The most striking example of this could be recycling of barrels and silver. Waste markets are established under the chambers of commerce, by Union of Chambers of Commerce and Commodity Exchanges of Turkey (TOBB) with the support of MOEF, in order to reduce the amount of industrial waste and allow their reuse.

As of 2008, there are 3 disposal facilities in Turkey for hazardous waste through incineration. Capacities of these facilities are inadequate in meeting the needs of industry.

Except these, a pilot scale facility which received license for recycling hazardous wastes through gassification with a capacity of 29.000 tons/year is put into operation in İstanbul Kemerburgaz. Moreover some cement factories are accepting hazardous wastes as alternative fuels for purposes of energy recovery. Due to technological inadequacy of stack gas treatment systems in cement factories in eliminating stack gases that are produced as a result of hazardous waste incineration, these factories are only able to accept certain types of wastes. Among these are used tyres, I. and II. category waste oils, paint sludge, solvents, plastic wastes etc. Energy recovery license is being distributed to allow the use of hazardous waste in cement kilns as an alternative fuel with 24 facilities already in possession of this license. Some of the hazardous wastes are also exported to be disposed in incineration facilities abroad.

Production industry in Turkey is annually producing more than 20 million tons of waste. Approximately 1.12 million tons of this amount is made up of hazardous wastes. 8% of this amount is being recovered, 47% is being disposed and 45% is being reused.

Approximately 80% of the established capacity of 6 facility licensed by MOEF for the disposal of industrial waste is currently in use. 5.586 tons of ash and slag coming from incineration facilities are disposed in sanitary landfills.

Provision of services by hazardous waste facilities in regions of high population density and high industrialization rates in Turkey is advantageous both in terms of costs, utility and to keep the environmental loads at minimum.

## **INSTITUTIONAL FRAMEWORK**

According to the constitution of Republic of Turkey; improving environment, preventing environmental pollution and protecting environment is a duty of all public institutions and citizens.

Institutions responsible for waste management as per their fields of work are as follows.

1. **Ministry of Environment and Forestry (MOEF):** The main duty of MOEF is to define policies and principles in most general terms aiming at protecting the environment, preventing and reducing pollution, organizing the relevant legislation and ensuring its implementation.

Responsibilities of MOEF in terms of waste management: These can be summarized in terms of preparation of by-laws and national regulations, producing policy and strategy for waste management, organization of nation-wide actions on waste management, research, coordination of waste management plan preparation, taking precautionary measures, defining technical standards, licensing, monitoring, regulation, keeping track of given licenses, data collection, exportation of wastes, release of permits regulating hazardous waste import and transportation of these wastes over Turkey and ensuring the continuation of trainings.

2. **State Planning Organization (SPO):** Undersecretariat of SPO under Prime Ministry is responsible for preparing Development Plans, medium-term and annual programmes and annual investment plans. In this regard, SPO is developing macro policies for waste management and taking relevant measures to ensure coherence of

legal and institutional arrangements with these policies. Moreover, the projects of central administrative institutions and the projects of municipalities that need foreign loan are appraised by SPO and the feasible one are included into public investment portfolio.

3. **Undersecretariat of Treasury:** It has a role in following up and finalizing credit negotiations where external financing is provided for the waste related projects.
4. **Ministry of Health:** It has a role in monitoring and ensuring coherence with respect to its mandate on public health.
5. **Ministry of Interior:** It is responsible in the process with respect to its mandate in developing, monitoring and controlling policies regarding local authorities.
6. **Ministry of Finance:** Ministry of Finance is responsible for tax arrangements, tax collection and follow-up. As regards this, it is responsible for preparing the legal arrangements for financing the waste management.
7. **Ministry of Industry and Trade:** It is responsible for supporting and controlling establishment of large and small scale industries, preparing standards for industrial products or publishing prepared standards, controlling the quality of industrial assets or to get this control done.
8. **Directorate-General of Bank of Provinces:** It is providing technical support to municipalities for the solid waste projects run by municipalities. It provides financing for solid waste management projects on municipality's request and be a credit guarantor.
9. **Ministry of Transport:** It is responsible for establishment and development of transport and communication systems and services as per country's needs. Authorization documents for waste transportation is given by Ministry of Transport and Communication.
10. **Turkish Standards Institution:** Among other responsibilities, it is responsible for preparing standards for waste management services.
11. **Local Authorities:** The most important task on protection of environmental quality is given to local authorities. Local authorities, also entrusted with the task of waste management within the framework of laws and regulations, are obliged to ensure the implementation of legal arrangements and take appropriate measures for ensuring a healthy environment for citizens to live within their territories of responsibility.
12. **Sectoral Unions:** Union of Chamber of Commerce and Commodity Exchanges of Turkey, Union of Chambers of Turkish Engineers and Architects, Chambers of Commerce, Chambers of Trade and sectorally established bodies like Turkish Cement Manufacturers' Association, Union of Lime Producers are responsible for delivering information and carrying out studies on enforcement and control on issues like sectoral approaches to implementation of the legislation.

## **LEGAL FRAMEWORK**

The most important aspects of provisions of laws related to waste is summarized below:

**Law on Environment no. 2872:** Article 8 - “It is prohibited to discharge all sorts of waste and residue directly or indirectly into receiving environment, storing them or being engaged in a similar activity.”

**Law on Amendments in Law on Environment no. 5491:** Amendment in Article 11 - “Metropolitan municipalities and municipalities are responsible for establishing domestic solid waste disposal facilities, ensuring their establishment, operating them or ensuring their operation.

Those who benefit or will benefit from this service are liable for sharing the costs of investment, operation, maintenance and improvement to be carried out by responsible authorities.

Municipality collects solid waste collection, transportation and disposal fees from those who benefit from this service in accordance with the tariffs to be decided upon by the municipal council.

The fees collected in relation to this clause can not be used for services other than those related to solid waste”

**Law on Metropolitan Municipalities no. 5216:** Article 7 - “...planning solid waste management, ensuring its planning; providing services for revalorizing, storage and disposal of the solid wastes and excavation residues other than separation of solid waste at the source and its transportation until transfer station and to establish facilities for their fulfillment...”

**Municipal Law no. 5393:** Articles 14 and 15 - “...carrying out or ensuring accomplishment of collection of solid wastes, their transportation, separation, recycling, disposal and storage...”

**Law on Municipal Revenues no. 2464 (ÇTV):** Article 97 - “Waste producers’ participation to waste management services is ensured with polluter-pays principle.”

**Turkish Penal Code no. 5237 :** With articles 181 and 182, penalties are established regarding polluting the environment with intent or negligence, penal sanctions up to jail sentences are foreseen for the responsables.

## **SIGNIFICANT SECTORAL POLICIES**

Waste problem is accepted as a priority for Turkey and policies are being developed to overcome this problem.

Development plans are the main tools for coordination of public policy in Turkey. In this regard, plans are one among the main policy documents on solid waste.

Significant policies regarding solid waste management, as they are reflected in 9th Development Plan, are given below:

“In domestic type solid waste management, separation, collection, transportation, recycling and disposal phases will be considered as a whole in technical and financial terms; sanitary landfill method with low investment and operational costs as the most suitable solid waste disposal technology will be preferred.

Production of non-domestic wastes will be reduced, collection relevant to waste type and country's circumstances, transportation, recycling and disposal systems will be established.

In order to identify the urban infrastructure needs regarding environmental protection across the country, urban infrastructure master plan and financing strategy will be prepared to define the municipalities' needs for infrastructure like drinking water system, sewerage, wastewater treatment plant and solid waste disposal.

Capacities of the municipalities will be developed in terms of planning, project design, implementation and operation of environmental infrastructure services.

Technologies and systems that are most suitable to country's circumstances will be preferred in establishment, maintenance and operation of water, wastewater and solid waste infrastructure aiming at environmental protection.

Financial and technical consultancy services that will be provided to municipalities for urban infrastructure investments will be activated.

Through using environmentally friendly techniques in the industry, more efficient production will be achieved by increased efficacy of raw material use and thus wastes will be reduced.”

## **RELATION OF THE SECTOR WITH SUSTAINABLE DEVELOPMENT**

Increase in production followed by increase in consumption brought an increase in life standards of the society along with an increased amount and changed composition of solid waste. Elimination of generated solid waste with least damage to environment especially became a major problem for the big cities. Solid waste management which covers control of urban solid waste and works regarding introducing healthy and economical solutions to this issue have taken its place among development priorities as regards providing services with international standards to urban citizens and protection of environmental quality.

### **Policies aiming at preventing and reducing hazardous waste**

Considering the waste management hierarchy, it is evident that waste reduction and prevention will enhance the lifetime of sanitary landfills. Thus there are ongoing works to reduce the amount of materials that give waste a hazardous waste character. For example; works on reducing the carbon amount existent in electronic wastes are proceeding. On the other hand, some restrictions are introduced with regulations on use of heavy metals in batteries. Additionally, in a booklet published on domestic hazardous waste, hazardous materials used in households are defined and their non-hazardous substitutes are presented to the general public.

Environmental protection awareness which actively developed after 1993, legal sanctions, difficulties in waste disposal and most importantly increased importance of the production related environmental protections measures in international trade have placed use of clean technologies and waste reduction in an important position.

Efforts in reuse and recycling of hazardous waste are concentrating on wastes that require simpler technologies for their collection and use. Waste markets established in the country, which are enabling recycling, need to be improved.

Especially in chemicals sector in Turkey, there are trainings open to everyone as organized by trade associations and chambers of commerce. These trainings specifically focus on transmitting knowledge and applications of waste management systems, development of waste management plans and waste reduction for small and medium-sized enterprises.

### **Recycling and Recovery Facilities**

Licensing of enterprises for separation and recycling of packaging material waste was first initiated in 2003. In the four year period between 2003 to 2007, the number of licenses given to separation facilities by MOEF reached 81 and that of recycling facilities reached 56. Among the licensed recycling facilities, 18 are paper, 6 are glass, 55 are plastic, 3 are metal and 2 are composite wastes recycling facilities.

According to 2007 data, there are 52 facilities which recover hazardous wastes especially through recovery of energy and solvents. Total capacity of hazardous waste recovery facilities are approximately 800.000 tons/year and their existing used capacities are approximately 121.000 tons/year.

There is a total of 13 facilities that carry out recovery of lead from waste accumulators dispersed in 10 cities.

Ankara, İstanbul and Bursa are the cities that have ongoing works regarding the use of landfill gas from sanitary landfills in Turkey. Gaziantep Metropolitan Municipality has also started studies in this regard.

### **Radioactive Wastes and Environmentally Conscious Management**

The only low-level radioactive waste processing facility in Turkey was established in 1989. Primarily, equipment containing radioactive components are supposed to be sent to country of origin for disposal however in the case of unavailability of this transfer, equipments are required to be handed in to the forementioned facility. In such a case, transportation process should be realized through companies with radioactive waste transfer license or under the liability of the responsible staff for protection from radiation, working for companies which hold license to use and maintain radioactive equipment in full compliance with the relevant regulation.

Transfer responsible of the companies with radioactive waste transfer license or the responsible staff for protection from radiation of the companies with radioactive equipment use and maintenance license are liable for transport safety and security of the transferred material during each radioactive waste transport, packaging, loading, unloading and during the transfer of radioactive waste.

