

Lahore, Pakistan

City Information: Lahore

Population: Presently 15 million people approximately but the census is still due. Last census was carried out in 1996.

Area (km²): 1781.47

Climate: Lahore has a semi-arid climate, with extremely hot summers and cool winters. There is a monsoon season between July and September.

References:

- <http://www.pmd.gov.pk/cdpc/extrems/lahore.htm>
- https://www.worldweatheronline.com/lahore-weather_averages/punjab/pk.aspx

Main Economic Activities:

1. Industrial sector
2. Agriculture

City website: <http://thecommonwealth.org/our-member-countries/pakistan>



Country Information : Pakistan

Population: 200 million

Area (km²): 881,913

Economy and GNI/Capita

- Lower Middle Income [according to WB classification <http://data.worldbank.org/about/country-classifications> low, lower middle, upper middle and high income; GNI/Capita in USD]
- GNI/Capita: US\$1,380

Reference:

<http://thecommonwealth.org/our-member-countries/pakistan/economy>

Main Economic Activities

- Agriculture (notably cotton)
- Fisheries
- Forestry

Reference:

<http://thecommonwealth.org/our-member-countries/pakistan/economy#sthash.85eroFKV.dpuf>

<http://thecommonwealth.org/our-member-countries/pakistan/economy>

Government Agencies responsible for guidance on waste legislation

- Pakistan Environmental Protection Agency (EPA)

Reference:

http://epd.punjab.gov.pk/solid_waste

http://www.unep.or.jp/ietc/spc/activities/GPWM/data/T2/AB_4_P_PolicyAndReg_Pakistan.pdf

Classification of MSW

- Mainly households
- Commercial waste
- Restaurants
- Hospital waste
- C&D waste

MSW Generation

- 2090620.633 tonnes/ year
- 2090620633 Kg/ year
- 0.612 kg/capita/day

Reference:

http://epd.punjab.gov.pk/solid_waste

Collection Coverage and Type

- The collection efficiency of Lahore Waste Management Company is around 95%
- No source segregation takes place
- Mechanized system of sweeping on major roads
- Washing of major squares, underpasses, bridges and roadside walkways
- Door To Door (DTD) Collection of MSW
- Dedicated Service for the Collection and transportation of C&D Waste on full cost recovery basis
- Dedicated Service for the transportation of Infectious Hospital Waste to the disposal site

Waste Composition:

For waste characterization, urban waste was evaluated in five categories, and work was conducted on total 60 samples. Waste categories were titled as Low Income, Middle Income, High Income, Commercial and Institutions, and number of samples taken for each subgroup are respectively 12, 12, 12, 12 and 12. 44 of the samples are from model regions, while number of samples from random regions is 16. For characterization work, approximately 177.780 kg waste in total was taken to the work region, and by homogenous mixing, waste segregation work was conducted on approximately 7500 kg waste. Considering that waste density is 241 kg/m³ in average, segregation work was conducted on approximately 30-35 m³ waste. Average value by weight for total 66 waste characterizations conducted, were given in Figure 3.1. Results are in conformity with the characteristics of typical developing countries. Over 60% values, Biodegradable and Nylon, Textile, Diaper, Paper-Cardboard, Combustibles, Non-Combustibles are the important components following these.

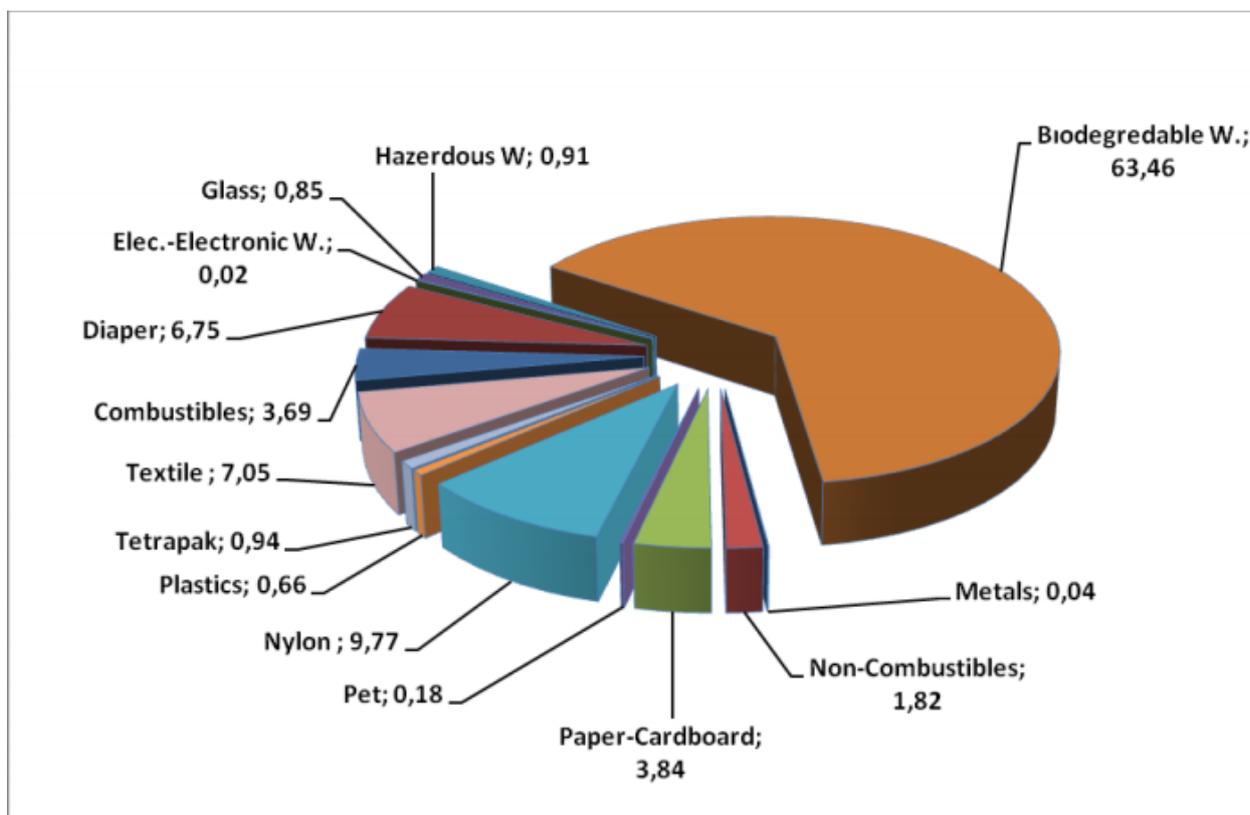


Figure 10: Lahore City Waste Characterization Average Value by Weight

Waste Management Practice

Lahore Waste Management Company (LWMC) in consultation with M/s ISTAC, designed the new SWM system for outsourcing. The experts of ISTAC studied existing system, identified the gaps and designed the system for outsourcing to improve the situation. Two Turkish companies were selected through international competitive and transparent bidding process. The total cost of the project is US\$ 320 million for seven years.

The city of Lahore is divided into two zones and two separate companies were selected for each zone. The M/s Albayrak is working in zone 1 and M/s Ozpak in zone 2.

The scope of outsourcing of SWM services includes;

- Manual Sweeping
- Mechanical Sweeping
- Mechanical Washing
- Waste Collection
 - Door to Door collection
 - Container based collection
- Waste Transportation to the Disposal Site

Waste Disposal strategy of LWMC

LWMC's vision is depicted in the figure with reference to its waste disposal strategy. The most preferred strategy to dispose of waste is waste reduction and recycling followed by biological and thermal treatment of waste, landfill gas (methane) capturing and then landfilling of remaining waste. Henceforth, making use of the 3R waste minimization strategy. The disposal of waste in landfill is the least preferred option in the context of sustainable waste management. The management hierarchy also explains the type of technologies to be used for treatment of waste. LWMC anticipates that its waste disposal strategy will lead it to efficient waste management operations, which are economically affordable, technically feasible and above all environmentally sound.



Formal Waste Sector

Lahore Waste Management Company (LWMC) is a PPP company operating in Lahore. In addition to handling the waste in Lahore, it is associated with the different projects. A brief discussion is given as follows:

a) Generation of biogas from solid waste

Currently LWMC is further exploring into the potential of generation of biogas from cattle's dung, for this plant has been set up at Dunya Pur (Chak 342 & Chak 327) and Ichogil. The aim is to generate biogas and provide it to the residents of the respective villages.

b) Compost Formation

LWMC after entrusting Lahore Compost with the composting project has set up its first composting plant at Mahmood Booti under an agreement with the City District Government Lahore (CDGL). This is the first public - private project in Pakistan on such a large scale in the area of Municipal Solid Waste (MSW) recycling.

The purpose of the project is to produce organic fertilizer from solid municipal organic waste. It uses state of the art aerobic windrow type composting technology to produce organic fertilizer. The compost is instrumental in reducing environmental degradation of the soil by replenishing organic content in the soil. Decomposition of solid municipal organic waste mainly results in methane emissions. Composting reduces methane emissions into ambient air and atmosphere and contributes towards sustainable development.

The objective of the project is to help in achieving the objectives of combating climate change under UNFCCC by reducing significant amount of greenhouse gas (methane) emissions and contributes to the regional and national sustainable development.

c) Refuse Derived Fuel

LWMC signed an agreement with the M/s DG Khan cement in August 2011 for sale of waste. M/s D G Khan cement has built a Refuse Derived Fuel (RDF) plant for processing of 1000 tons of municipal waste. RDF is largely combustible components of municipal waste such as plastics and biodegradable waste. DG Khan Cement uses RDF in its cement plants as an additive fuel with coal.

d) Waste Treatment and disposal site/Landfill:

In order to prevent the disposal of waste haphazardly in and around Lahore, now proper sites have been identified for waste treatment and disposal. One dumping and landfilling site is Lakhodair and the other one is Mehmood Boti. Arrangements are being made to recover biogas from the available organic waste.

e) Using Bio-degradable bags for waste collection

In order to fight the emerging issue of plastic pollution caused by the plastic bags which eventually end up in the landfills or are a source of havoc for aquatic life due to its flow to the main streams of water; LWMC in collaboration with Business Dynamics Pvt. has introduced biodegradable bags for the collection and transport of waste. These bags are readily bio degradable and thus do not lay unattended at the landfill sites for years.

f) Separate Collection system for recyclables

It is shown that 21.2% of all recyclable waste in Lahore is recycled and it generates an amount of Rs. 271 million (US dollars 4.5 million) per year through the informal sector. However, if the recycling practice is owned by the formal sector, it can save an amount of Rs.65 million by reducing the collection cost. For this, a pilot project of installing dual bin system has been set up in a specific area of Lahore i.e Shadman and Upper Mall. The major objective of this project is to reuse the waste and conserve the natural resources at the source of generation.

g) Using C&D waste for construction of pathways

A dedicated service for the collection of construction and demolition (C&D) waste has been introduced. The collected waste may be sold for the filling / leveling of low lying areas and /or for the construction of roads etc. Undergoing the present practices of construction it is estimated that C & D waste generated from these activities would be approximately 350 – 400 tons / day. Further option to recycle C&D will also be explored. C&D waste is collected and transported on full cost recovery basis by keeping in mind the following objectives:

- To avoid intermixing of C&D waste into household/street waste;
- To ensure in time collection of C&D waste; and
- To improve the aesthetics of the city
- Reusing the C&D waste

Informal Waste Sector

Informal sector makes up a large portion of waste sector. In rural areas traditional practices continue to be followed today, but the nature of village waste has changed and scavengers now collect new waste (principally plastics, glass and paper) on an informal basis throughout Pakistan wherever the quantities available offer sufficient (if often very little) profit.

As the city has grown, traditional waste disposal practices are dumping in open spaces poses a serious problem. The public sector is mainly involved in overall solid waste management throughout Pakistan. As Pakistan is moving towards further urbanization and industrialization, new types of discarded material started to be used in low-income urban areas. Similarly, major cities of Pakistan, like Karachi, Lahore, Rawalpindi, and Faisalabad has potentially the greatest waste collection, transportation and disposal problems and the public sector cannot tackle this problem alone. There is strong need to gradually involve private sector in the solid waste management by offering incentives. There is no organized private sector of waste collection and recycling in operation in Pakistan. Although, there are success stories by NGOs and private sector like Waste Buster. While, now there is realizations on the part of municipalities to privatize solid waste collection and transportation and establishment of composting plants but it requires transparency in the award of contracts to private parties on Build, Operate and transfer (BOT) basis.

Financing of MSW

Government of Punjab (GoP) finances the Lahore Waste Management Company for the waste services. Revenue is generated by charging the private societies and commercial markets against the services provided by LWMC and this is mentioned in the bill of Water and Sanitation Agency (WASA). A significant portion of the annual budget is allocated to LWMC for carrying out activities to cater to the municipal solid waste.

Waste Management Challenges

LWMC is currently facing many challenges; a few of them are mentioned below:

- Financial Constraints (Lack of funds and hesitation of donor agencies to invest money in a third world country)
- Institutional/governance challenges (Lack of proper framework)
- Policy gaps
- Political influence
- Other challenges such as limitations of human resources, technical capacity
- Unawareness among common masses
- Inefficient waste collection system resulting in low waste collection efficiency;
- Poor Institutional capacity;
- Poor planning and inefficient operations;
- Un-reliable Data for planning;
- Absence of reliable monitoring tools;
- Outdated Vehicles and Equipment;
- In-efficient Operation and Maintenance System;
- Insufficient Legal and Regulatory Framework;
- Lack of Awareness and Education

Technical Assistance

Technical assistance in the following domains is required:

Domains	Assistance
Public, City Officials and Waste management Staff	Training and Capacity building, peer- to-peer learning and raising awareness among the masses

Developing robust waste management plans , replicating the model in other cities and introducing initiatives	Technical assistance and further guidelines for strengthening the processes
Different on-going projects	Share best practices, highlight success stories

MSW Sector Overview: Country Level - Pakistan

General description and overview of common practice

In Pakistan, Solid Waste Management (SWM) has long been a neglected sector due to lack of strong commitment on the part of government to introduce institutional and management reforms for managing urban waste on the basis of internationally accepted standards and norms. In this context, the government has established Lahore Waste Management Company (LWMC) on 19th March 2011 with a vision to improve and modernize the SWM services in Lahore. This model of effective waste management has been replicated in other cities of Pakistan too and now the efficient collection and disposal of waste is trending in this country and efforts are being made to exploit the energy potential of MSW.

Waste Generation (per capita/year)

Solid waste generation in Pakistan ranges between 0.283 to 0.612 kg/capita/day and the waste generation growth rate is 2.4% per year.

Waste Composition:

Physical Composition of Waste (% weight)

Items	GWA	FSD	KRI	HYD	PWR	BNU	QTA	SBI
Plastic & Rubber	5.00	4.80	6.40	3.60	3.70	5.30	8.20	7.70
Metals	0.30	0.20	0.75	0.75	0.30	0.30	0.20	0.00
Paper	2.50	2.10	4.10	2.40	2.10	3.30	2.20	2.00
Card board	1.80	1.60	2.40	1.50	1.90	1.60	1.30	1.40
Rags	3.20	5.20	8.40	4.70	4.30	2.30	5.10	5.30
Glass	1.50	1.30	1.50	1.60	1.30	1.20	1.50	2.40
Bones	3.20	2.90	3.00	2.00	1.70	0.20	2.00	0.80
Food Waste	14.70	17.20	21.00	20.00	13.80	16.30	14.30	8.40
Animal Waste	1.00	0.80	3.00	5.80	7.50	2.40	1.70	4.00
Leaves, grass etc.	12.80	15.60	14.00	13.50	13.60	14.70	10.20	14.50
Wood	0.80	0.70	2.25	2.25	0.60	0.50	1.50	1.00
Fines	47.50	43.00	29.70	38.90	42.00	45.40	44.00	44.80
Stones	5.70	4.60	3.50	3.00	7.30	6.50	7.80	7.70

Source: EPMC Estimates 1996

Typical Composition of Solid Waste in Pakistani Cities (%)

Composition	%
Food Waste	8.4% to 21 %
Leaves, grass, straw, Fodder	10.2 % to 15.6 %
Fines	29.7 % to 47.5 %
Recyclables	13.6 % to 23.55 %

Source: EPMC Estimates, 1996

Collection Coverage

Collection coverage is limited to only a number of big cities of Pakistan and the waste management model of LWMC is being replicated in other districts. Similarly, other metropolitan cities of Pakistan have also signed MOU with international contractors to manage the waste generated on regular basis. In Pakistan, solid waste is mainly collected by municipalities and waste collection efficiencies range from zero percent in low-income rural areas to 90 percent in high-income areas of large cities. The proportion of waste collected is much less in many other areas of the country, particularly in poorer areas, where the only means of solid waste disposal is often informal scavenging by people and animals, natural biodegradation and dispersion, burning at the primary point of disposal, and local self-help for disposal to informal (technically illegal) dumping sites.

Waste Treatment and Disposal

The waste is disposed of within or outside municipal limits into low-lying areas like ponds etc., without any treatment except recyclable separation by scavengers. The land is also hired/leased on long-term basis for disposal. Moreover, the least mitigating measures have also not been reported by any municipality.

Treatment and disposal technologies such as sanitary landfilling, composting and incineration are comparatively new in Pakistan. Crude open dumping is the most common practice throughout Pakistan and dumpsites are commonly set alight to reduce the volume of accumulating waste, hence adding to the air pollution caused by the uncovered dumped waste itself.

The practice of sanitary landfilling is still in its infancy in Pakistan and the first site has been developed at Lakhodair. At present, there are no landfill regulations or standards that provide a basis for compliance and monitoring, but national guidelines for these standards are being prepared by the Consultant under National Environment Action Plan (NEAP).

Number of Landfills/MSW Disposal rate (tonnes/year)

Only one landfill located at Lakhodair site is operational, having an area of 63 hectares and comprising of six lots. A total of 2500 tonnes/day waste is dumped on Lakhodair landfill site. A number of other landfills have been constructed in other parts of the country but are not operational at the moment.

Waste Disposal Practice

No	Cities	Existing Number	Dumps Size	Recyclables Separation	Treatment Plant	Mitigating Measures	Proposed landfill site
1	Gujranwala	3	-	Scavengers	Nil	Nil	Nil
2	Faisalabad	4	-	Scavengers	Nil	Nil	Nil
3	Karachi	Many	-	Scavengers	Nil	Nil	Nil
4	Hyderabad	Many plots	-	Scavengers	Nil	Nil	Plg stage
5	Peshawar	1(on lease)	5 acres	Scavengers	Nil	Nil	Nil
6	Bannu	2	-	Scavengers	Nil	Nil	50 K, Purchased
7	Quetta	1	-	Scavengers	Nil	Nil	Nil
8	Sibi	Many Fields	-	Scavengers	Nil	Nil	Nil

Source: EPMC Estimates, 1996

Recycling Rate

Under the present system, the municipalities are not carrying out any type of recycling activity. What happens normally is that the main recyclable items like paper, plastic, glass and metals are retained by the people themselves, which are later sold to street hawkers/waste dealers for recycling.

Whereas the recyclable mixed with discarded waste are picked up by the scavengers who make 2 to 3 trips of different dumps and earn Rs 80 to 150/day. As a whole, however, according to the estimates the amount of recyclable varies from 1,000 tons/years in Sibi to 513,743 tones/year in Karachi.

The total income works out to be Rs 5,056.5 million per year. Assuming a net expenditure on the collection, storage, separation etc as 50%, the net incomes expected to to be Rs 2528.3 million per year.

Potential for Waste Recycling

No	City	Recyclable Ratio	Ann. Amount Tons	Gross Income Rs (Million)	Net Income Rs (Million)
1	Gujranwala	17.20	42,518	352.5	176.7
2	Faisalabad	18.10	50,189	547.4	273.7
3	Karachi	26.55	513,743	3,515.6	1,757.8
4	Hyderabad	16.55	48,444	269.5	134.7
5	Peshawar	15.30	37,147	232.2	116.1
6	Bannu	14.20	10,800	7.4	3.7
7	Quetta	20.50	23,247	127.2	63.6
8	Sibi	19.60	1,000	4.7	2.4
	Total		727,088	5,056.5	2,528.3

Source: EPMC Estimates, 1996

Waste management of Organic fraction (composting, anaerobic digestion)

The waste is disposed of within or outside municipal limits into low-lying areas like ponds etc., without any treatment except recyclable separation by scavengers. The land is also hired/leased on long-term basis for disposal. Moreover, the least mitigating measures have also not been reported by any municipality.

Treatment and disposal technologies such as sanitary landfilling, composting and incineration are comparatively new in Pakistan. Crude open dumping is the most common practice throughout Pakistan and dumpsites are commonly set alight to reduce the volume of accumulating waste, hence adding to the air pollution caused by the uncovered dumped waste itself.

The practice of sanitary landfilling is still in its infancy in Pakistan and the first site has been developed at Lakhodair. At present, there are no landfill regulations or standards that provide a basis for compliance and monitoring, but national guidelines for these standards are being prepared by the Consultant under National Environment Action Plan (NEAP).

There is also need that the Government of Pakistan should put forward a clearly opted policy of waste recovery, as well on composting. Compost is considered an attractive product because of its possible use as a soil conditioner for agricultural use.

There is a need for establishment of at least one windrow composting plants in each province to promote composting. However, most of the composting plants built by the private sector that have already been established do not operate efficiently at full capacity. Sales revenues usually hardly cover operating expenses, let alone depreciation costs.

Energy Recovery Rate

Waste to Energy (WtE) is now considered as a reliable and renewable form of energy that has become the basis for many of the most successful Solid Waste Management Systems (SWM) in Europe and the United States. In the light of the existing national energy vacuum, the Government of Punjab is vigorously exploring viable, holistic energy generation.

Converting waste to energy has always been of prime importance for LWMC. For this, LWMC has concentrated its efforts to make use of waste in order to create some RER. A Letter of Interests (LOI) was issued to Punjab Power Development Board (PPDB) for renewable energy project to a consortium of local and two Chinese Firms. China ENFI Engineering Corporation (ENFI) made a visit to the project site and came with a proposal of generating 40MW energy. ENFI will submit the feasibility report by July 2017.

City Level

Aimed at improving Waste Management in General

LWMC is doing wonders in this domain and that's the main reason we want Lahore to compete as a clean city in CCAC Initiative.

Aimed at addressing Climate change and reducing SLCPs through waste related activities

Different projects such as composting are being done in order the climate change and reduce SLCPs through waste related activities

Country Level

Aimed at improving Waste Management in General

The Planning & Development Division at the federal level and Planning & Development Departments at the provincial levels are responsible for the preparation of development plans and allocation of resources. At the federal level, the Ministry of Environment is responsible for the development of policies and programmes under the environment theme. The Pakistan Environmental Protection Agency (PEPA) and provincial EPAs are the main regulatory bodies for the implementation of Pakistan Environmental Protection Act 1997.

In Pakistan, municipal governments are usually responsible agency for solid waste collection and disposal, but magnitude of the problem is well beyond the ability of any municipal government. Under the recently devolved local government system, the Town/Tehsil Municipal Administration (TMAs) are responsible for the solid waste collection, transportation and disposal. However, TMAs are unable to cope with continuously increasing volumes of municipal waste due to inadequate funds, lack of rules, regulations and standards, lack of know how on the subject, lack of expertise and lack of collection vehicles and equipment.

Aimed at addressing Climate change and reducing SLCPs through waste related activities

- National environmental action Plan (NEAP)

City Level

Legislation governing MSW management

- Pakistan Environmental Protection Agency (EPA)
- Solid Waste Management in City District Government Lahore (CDGL)
- Tehsil Municipal Administrations (TMA)
- Section 11 of the Pakistan Environmental Protection Act prohibits discharge of waste in an amount or concentration that violates the National Environmental Quality Standards.
- Draft Hazardous Substances Rules of 1999.
- Islamabad Capital Territory Bye Laws, 1968 by Capital Development Authority Islamabad
- Section 132 of the Cantonment Act 1924 deals with Deposits and disposal of rubbish etc
- Provisions contained in the Local Government Ordinance, 2001

Guidance for MSW management (after legislation, before inspection activities)

- Guidelines for Solid Waste Management presented by Environmental Protection Agency

Inspection activities/supervision and enforcement of legislation

- LWMC inspecting the activities of International contractors
- Third Party Monitoring & Validation (TPMV) inspecting the working of the contractors hired by LWMC.

National Level

Legislation governing MSW management

The Government of Pakistan enacted the Pakistan Environmental Protection Act (PEPA) in 1997, which is the most recent and updated legislation on environment. It provides a framework for establishing federal and provincial Environmental Protection Agencies federal and provincial Environmental Protection Agencies (EPAs). One of the functions of Pak-EPA is to assist the local councils, local authorities, Government Agencies and other persons to implement schemes for the proper disposal of waste so as to ensure compliance with the standards established by it.

- Pakistan Environmental Protection Agency (EPA)
- Section 11 of the Pakistan Environmental Protection Act prohibits discharge of waste in an amount or concentration that violates the National Environmental Quality Standards.
- Draft Hazardous Substances Rules of 1999.
- Islamabad Capital Territory Bye Laws, 1968 by Capital Development Authority Islamabad
- Section 132 of the Cantonment Act 1924 deals with Deposits and disposal of rubbish etc
- Provisions contained in the Local Government Ordinance, 2001

Guidance for MSW management (after legislation, before inspection activities)

- City District Government
- SWM Guidelines in Pakistan

Inspection activities/supervision and enforcement of legislation

- Different Ministries in Pakistan

Current Projects or Activities Aimed at Reducing SLCP Emissions

In Pakistan, alternative and renewable energy (ARE) projects have definite prospects for development as carbon offsetting initiatives. Being a clean source of energy, the ARE projects are best suited for CDM and can earn CERs. The Government of Pakistan (GoP) has taken up a broad spectrum of initiatives for the development of AREs in the country and seeks projects to address the CDM pertaining to sustainable development and should apply to CDM Executive Board as per the guidelines of UNFCCC for get CERs and earn carbon revenues.

To accelerate and streamline activities related to the REs, the Government of Pakistan has authorized Alternative Energy Development Board (AEDB) to act as a focal body of the federal government with mandate of one window facility for ARE development in the country. The GoP approved Policy for Development of Renewable Energy for Power Generation, 2006, in which it specified constitution of Joint Management Committee (JMC) for sale and management of CERs earn through renewable energy projects. The JMC comprise of power purchaser, power producer and AEDB. 18 RE projects have been registered for 1.3 million CERs annually, and 29 RE projects are in process of registration for 1.6 million CERs annually.

I. Biomass/Waste to Energy

Eight projects have so far been registered with CDM Executive Board for various biomass / waste to energy applications which include generation of electricity from bagasse and biomass, composting of solid waste and replacing conventional fuel with biomass. A total of 553,825 CERs have been approved for these projects.

There are a number of ARE projects that are pursuing development of projects under CDM. They are at preliminary stages of completing procedural requirements in this regard.

II. Landfill Project

In order to prevent the disposal of waste haphazardly in and around the major cities, now proper sites have been identified for waste treatment and disposal. One dumping and landfilling site is Lakhodair, which is under the custodianship of LWMC and the other one is Mehmood booti. Arrangements are being made to recover biogas from the available organic waste. Moreover, Lakhodair landfill site is the only operational landfill site in Pakistan and it is registered with UNFCCC under the Clean Development Mechanism (CDM).

[\[http://www.aedb.org/index.php/ae-technologies/carbon-credit/clean-development-mechanism-cdm\]](http://www.aedb.org/index.php/ae-technologies/carbon-credit/clean-development-mechanism-cdm)

Key Stakeholders

- Community
- TMAs
- Government of Punjab
- City District Governments (CDGs)

Additional Useful Information

For more useful information, consult the following documents:

- Brief on Solid Waste Management in Pakistan
- Guideline (draft) for Solid Waste Management

Contacts

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