SWEEPNET

The regional solid waste exchange of information and expertise network in Mashreq and Maghreb countries

COUNTRY REPORT ON THE SOLID WASTE MANAGEMENT IN

LEBANON

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Federal Ministry for Economic Cooperation and Development

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July 2010

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ACKNOWLEDGEMENTS

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CONTENTS

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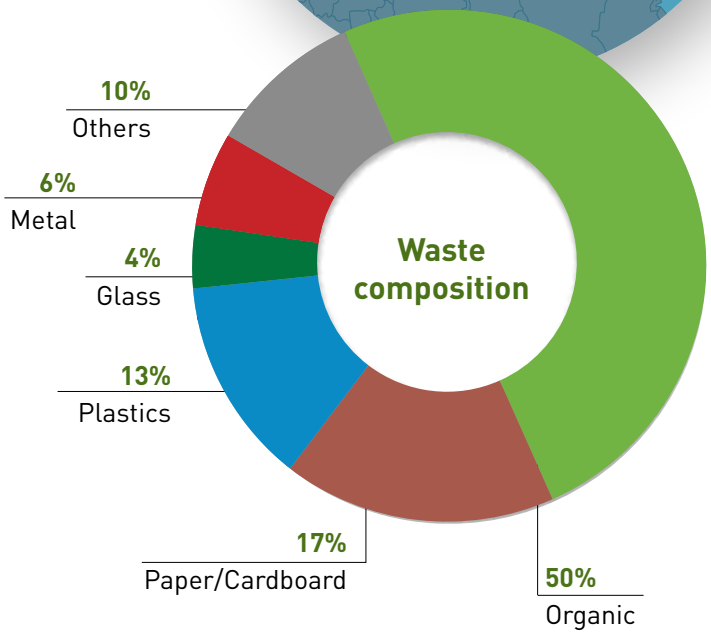
COUNTRY PROFILE ON THE SOLID WASTE MANAGEMENT SITUATION IN LEBANON

July 2010

BACKGROUND INFORMATION

• Population :	4.5 million (2009)
• Municipal solid waste (MSW) generation:	1.57 million tons (2009)
• Per capita MSW generation:	
urban areas	~ 0.85 - 1.1 Kg/day
rural areas	~ 0.7 Kg/day
• MSW generation annual growth:	1.65%
• Medical waste generation:	~ 25,040 T/year
• Industrial waste generation:	188,380 T/year
• Hazardous industrial waste generation:	3,380 T/year
• Agricultural waste generation:	-



TECHNICAL PERFORMANCE

• **Municipal waste**	
- MSW collection coverage :	
in rural areas	99%
in urban areas	100%
- MSW final destination:	
- Composted:	9%
- Recycled:	8%
- Landfilled :	53%
- Open-dumped:	30%
- Number of sanitary landfills	
- Under study:	-
- Under construction:	0
- Built:	3
- Operational:	3

• **Hazardous and industrial waste**	
- Number of treatment units/centers of industrial wastes (physical chemical treatment)	
- Under construction:	0
- Built:	0
- Operational:	0
- Types of treatment of medical waste:	60% of the waste is treated by autoclaving and shredding

LEGAL FRAMEWORK

General Legal Framework

- No specific legislative framework dealing directly with Solid Waste Management (SWM) ;
- Two decrees address the sector specifically:
  - Decree 8735 of 1974 assigning SWM as a municipal responsibility ;
  - Decree 9093 of 2002 providing municipalities with an incentive to host a waste management facility ;
- A Draft Law on Integrated Solid Waste Management under METAP (Mediterranean Environmental Technical Assistance Program) is still under review.

Legal framework related to specific waste types

- Law No. 64 (August 1988) regulating hazardous waste management ;
- Decisions on industrial wastes management issued by the Ministry of Environment (MoE) concerning the required environmental conditions to be respected by the industries ;
- Decree 8006 (June 2002) amended through Decree 13389 (September 2004), classifying the different healthcare waste categories and addressing their relative disposal conditions.

INSTITUTIONAL FRAMEWORK

Policy and planning

- Numerous government institutions: Ministry of Environment (MoE), Ministry of Interior and Municipalities (MoIM), Council for Development and Reconstruction (CDR).
- Overlapping responsibilities and unclear lines of authority.

Implementation and operation

- In Beirut, Mount Lebanon and Tripoli: CDR, and to a lesser extent, the MoE and the MoIM.
- In the rest of Lebanon: the municipalities.

The institutional structure under the draft Law on integrated SWM

- A single independent SWM board regrouping many stakeholders: responsible for planning and decision-making at the national level, as well as waste treatment.
- Local authorities (municipalities, unions of municipalities): responsible for the waste collection.

POLICY AND PLANNING

Variable Solid Waste Management (SWM) plans depending on the stakeholder:

- Municipal SWM Strategy for Lebanon prepared by the MoE in 2002.
- Waste Management Plan prepared by the CDR in 2005.
- The National Integrated Strategy for SWM in the country presented by the MoE to the Council of Ministers (CoM) in 2010.

FINANCIAL AND COST RECOVERY ARRANGEMENTS

SWM Financing

- Allocation of budget to waste management infrastructure from the CDR.
- Allocation of budget from a Municipal Fund.
- International loans and grants.
- Proper financing by the Municipalities.

SWM Costs

Costs of SWM vary greatly in Lebanon.

PRIVATE SECTOR INVOLVEMENT

In collection and transfer : highly involved.
In disposal and treatment : landfilling in Greater Beirut; constructing an anaerobic digestor in Saida, pressing and exporting recyclables (paper, plastics, and glass), recovering materials by Informal and semi-formal private sector, etc.

OPTIONS FOR IMPROVEMENT

- Issuing the policy/ legal/ institutional framework through the issuance of the Law on the ISWM ;
- Developing and issuing a specific implementable national policy and strategy ;
- Ensuring an efficient and cost effective implementation of private sector participation in the sector (competitive bidding, appropriate types of contracts ensuring possible project financing) ;
- Focusing on enhanced cost recovery and set the applicable decrees and the institutional framework for cost recovery ;
- Ensuring capacity development ;
- Enhancing public awareness ;
- Ensuring the institutional viability of any project in terms of commitment and support at both the national (CoM and Parliament) and local (municipalities) levels ;
- Ensuring political commitment in support to locally developed strategies ;
- Setting the mechanism for data management and sharing between the various stakeholders ;
- Establishing and support SWM networks, such as SWEEP-Net network ;
- Monitoring, in the medium and long term, the future implementation of the strategies, in order to identify the eventual gaps and needed adjustments and improvements.

	Cost for collection and transport	Total cost from collection to disposal
Greater Beirut and Mount Lebanon (excluding Jbeil)	USD 30 / ton	USD 130/ton
Zahleh and Tripoli	-	USD 45-50 / ton
Some rural areas	USD 10-18 /ton	USD 20-30/ ton

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LIST OF ACRONYMS

BOO	Build Operate and Own
BOT	Build Operate and Transfer
CAS	Central Administration of Statistics
CoM	Council of Ministers
CDR	Council for Development and Reconstruction
CP	Community Participation
DBO	Design Build and Operate
EIA	Environmental Impact Assessment
FCR	Finance and Cost Recovery
GB	Greater Beirut
GBA	Greater Beirut Area
GoL	Government of Lebanon
IKM	Information and Knowledge Management
ISWM	Integrated Solid Waste Management
IWM	Integrated Waste Management
MoE	Ministry of Environment
MoF	Ministry of Finance
MoH	Ministry of Health
MoI	Ministry of Industry
MoIM	Ministry of Interior and Municipalities
MoPH	Ministry of Public Health
NGO	Non-Government Organization
NSC	North-South Cooperation
OMSAR	Office of the Minister of State for Administrative reform
PA	Public Awareness
PM	Pontifical Mission (NGO)
PSP	Private Sector Participation
SSC	South-South Cooperation
NSC	North-South Cooperation
SWM	Solid Waste Management
TOR	Terms of Reference
WM	Waste Management
YMCA	Young Men's Christian Association (NGO)

1. EXECUTIVE SUMMARY

Lebanon has a population of 4.5 million people in 2009 that produces 1,570,000 tons of Municipal Solid Waste (MSW) per year. It is considered that the MSW generation per capita varies from around 0.7 Kg/p/d in rural areas to around 0.85 to 1.1 Kg/p/d in urban areas, with a national weighted average estimated at around 0.95 Kg/p/d. The foreseen increase in waste generation is estimated at an average of 1.65% across the country; this growth is however highly unevenly distributed.
Almost all of the MSW generated in Lebanon is collected by public or private haulers (99% in rural areas, 100% in urban); however, management varies from one area to another: 8% is recycled, 9 % is composted (several treatment plants already constructed will be put in operation soon, hence increasing percentage), 53% is landfilled and 30% is disposed of in open dumps.

In the absence of a SWM strategy for the country, the SWM sector is marked by extremes: in Greater Beirut, a relatively advanced SWM system has been developed (Emergency Plan – currently around US$ 130 million per year). However, the system is mainly based on bailing, wrapping, multiple handling and landfilling, with insufficient sorting and little composting, and at costs which are substantially to the point that municipalities that participate in the system are being starved of funds for other municipal services. Outside Greater Beirut, waste management systems are generally characterized by rudimentary «collect and dump» approaches, except for few main cities and selected villages.

Despite the many attempts put in place by the various stakeholders in Lebanon, SWM still does not benefit from a well defined national policy and a specific and implementable legislative framework.

Management of solid wastes in the country still does not benefit from a well defined national SWM policy despite the various attempts and efforts put in place by the various stakeholders (MoE, CDR, MoIM) to set SWM plans. The 2010 National Integrated Strategy for SWM in the country that was presented by the MoE to the CoM consists of: (i) modifying the strategy issued by MoE in 2002; (ii) updating all the numbers and statistics of the 2002 strategy; (iii) dividing Lebanon into 4 service areas; (iv) rehabilitating old dumps; (v) replacing the previously foreseen technologies by a waste-to-energy technology equipped with humidity reduction means, and with electricity generation; (vi) building transfer stations to facilitate and to decrease the cost of transporting the waste.
To date, there is no specific legislative framework that deals directly with SWM in Lebanon. Although there are many legal instruments that bear on SWM, there are only two that address the sector specifically: Decree 8735 of 1974 assigns solid waste management as a municipal responsibility, and Decree 9093 of 2002 provides municipalities with an incentive to host a waste management facility.

In 2005, the MoE has presented a Draft Law on Integrated Solid Waste Management under the METAP programme. It was submitted to CoM on October 14, 2005, and is still under review. Following approval by CoM, the Draft Law will be presented to Parliament for ratification. The law in itself is not sufficient for the implementation of an integrated SWM system. Such implementation would necessitate, further to law approval,

the setting and issuing of the necessary applicable decrees, strategies and plans in the various domains. Numerous government institutions (MoIM, MoE, CDR...) are involved in solid waste planning and management in Lebanon, with overlapping mandates. and responsibilities and unclear lines of authority. This uncertainty concerning the institutional framework and responsibilities is a major obstacle for the implementation of an integrated SWM system. In recognition thereof, the Draft Law on integrated SWM brings the many stakeholders together into a single independent SWM Board responsible for planning and decision-making at the national level, as well as waste treatment.

Costs to government of waste management vary greatly in Lebanon. Explicit fees and costs recovery system for SWM do not exist in Lebanon. Lebanon suffers from major budget deficits in this sector. Financing of waste management infrastructure is currently achieved through four mechanisms: (i) allocation of budget to waste management infrastructure from the CDR; (ii) allocation of budget from a Municipal Fund through which government distributes monies to municipalities to meet capital and recurrent cost requirements; (iii) international loans and grants; and (iv) proper financing by the Municipalities for the operation of some treatment plants and sanitary landfills mainly outside GBA and Mount Lebanon, through local taxes and the Independent Municipal Fund.

No matter how successful the WM Strategy and National Plans, a valid Financing and Cost Recovery (FCR) System for WM is essential for the sustainability of WM activities. Accordingly, the draft law on ISWM in Lebanon and its legal framework provide venues for cost recovery for the WM in Lebanon by providing the adequate framework for the following: (i) setting up sources of financing; (ii) Cost Recovery for SWM, namely through direct at-source waste management fees, explicit fees on SWM, product charges on packaging wastes, fines from non-compliance activities; (ii) authority to Collect Waste Management Fees; (iii) non-fiscal incentives; and (iv) fiscal incentives such as tax exemptions on the purchase of recovered material or tax reduction on profits.

Financing of SWM currently comes from CDR allocations, municipal fund, international loans and grants, and municipalities proper funding. Explicit fees and costs recovery systems for SWM do not exist in Lebanon.

Private sector participation is a key element in SWM in Lebanon. MSW in main cities is effectively undertaken by private sector operators. In Greater Beirut and parts of Mount Lebanon, the quality of service performed by the private sector for waste collection and street cleaning as well as waste treatment is of relatively good level of urban cleanliness, but at costs which are quite significant. Outside Greater Beirut and Mount Lebanon, the quality of service by the private sector in the main cities is relatively acceptable but at costs which are substantially lower. Normally, the private sector in Lebanon is more effective than the public sector in SWM (both at the technical and financial levels). Insofar as recycling is concerned, informal and semi-formal private sector activity plays an important role throughout Lebanon and provides a means of livelihood for at least thousands of people. The extent of this recycling activity varies according to market conditions.

In this respect, the draft Law on Integrated SWM aims at encouraging Private Sector Participation (PSP) in WM activities. Therefore the law called for a decree that specifies procedures to be followed in the procurement of WM projects.

Public awareness and community participation in support of SWM are still weak in Lebanon. There is also still lack of knowledge from the public about the methods and ways for SWM. Equally important is the lack of awareness of regulations amongst personnel who are supposed to enforce them. . It is clear that there is an urgent need for public awareness on both the household and decision making levels in order to deve-

lop a good strategy and successfully put it in action. NGOs and solid waste networks (such as SWEEP-Net network) could play an important role in raising awareness through the transfer of information between their members, through awareness campaigns, etc.
Although several workshops have been organized by the MoE, international institutions, and other institutions to strengthen the capacity of personnel both at the national and municipal levels, and while a number of donors have provided extensive training and capacity building in the past in SWM services, there is still lack of sufficient understanding about management, technology, financing, and enforcement, monitoring, follow up and data and knowledge management. Also, a wide range of management skills are required at both the national and the municipal level. In particular, capacity development in contracting the private sector, in managing and monitoring private sector contracts as well as in technology assessment, is required. Equally important is the necessity to provide capacity building and training for decision makers.

With regard to industrial and medical wastes, Lebanon is still considered as one of the countries that lack adequate and well-operated infrastructure for their management and disposal, although significant progress in health care waste management has been identified during the past years. As a result, unresolved environmental problems has been accumulating for years now, which lead to major issues such as 1) Increased air pollution due to indiscriminate burning of the waste; and 2) Water and soil pollution due to inappropriate disposal of industrial and health care effluents and wastes.

A wide range of international organizations and donors are participating in the sector in the country, with activities and projects focusing mainly on: (i) feasibility studies for SWM projects, dumpsites rehabilitation, marketing of compost; (ii) development of national strategies and legal/institutional framework for SWM; (iii) provision of infrastructure for solid waste collection; (iv) closure of existing dumps; (v) execution of SW treatment facilities; (vi) strengthening and developing the capacity of stakeholders at both the national and local levels; and (vii) awareness programs to population.

SWEEP-Net can intervene at various levels in SWM sector, mainly in developing effective systems of knowledge management, training and capacity building and promotion of South-South and North-South cooperation.

The potential activities of SWEEP-Net network in Lebanon have been identified at the various levels: policy, legislative and institutional, planning, financing and cost recovery, private sector participation, technology application, public awareness and public participation, data management and others.

Developing comprehensive and effective systems of Knowledge Management at a national as well as at a regional scale remains central to the effective environmental management of the Mediterranean region. With internet increasingly available, networks such as the SWEEP-Net network will help to ensure that valuable knowledge is being linked via websites and that potential users know where and how to look for information.

Training and capacity building activities may be conducted through training workshops and e-learning activities, technical and advisory services, field missions and technical visits, development of guiding documents and studies, regular reports on waste management, support of awareness campaigns, and promotion of South-South and North-South cooperation and know-how transfer. Solid waste networks (such as SWEEP-Net network) could play an important role in training and capacity building.

Lebanese experience with SWM has provided for a range of lessons learned at the various SWM components, which would, when properly assessed and taken into due consideration, lead to an improvement in the SWM sector.
Due to the highly critical phase, which the SWM sector has reached, it is now a national consensus, at

the political level, to address SWM as a top priority issue. Immediate action has been called for and political efforts are now directed towards setting and implementing the strategies on the grounds of ISWM principles, as well as providing effective waste management services in Greater Beirut and the rest of the country. The priorities are suggested as follows: (i) issue the policy / legal / institutional framework through the issuance of the Law on the ISWM; (ii) evaluate the previous strategies and plans of the government, in order to better set future strategies and plans; (iii) develop and issue a specific implementable national policy and strategy (with particular consideration to the adaptability of the technology selected to the local characteristics of each region in Lebanon, as well as to the site selection); (iv) ensure an efficient and cost effective implementation of private sector participation in the sector (competitive bidding, appropriate types of contracts ensuring possible project financing); (v) focus on enhanced cost recovery; (vi) set the applicable decrees for cost recovery, institutional framework; (vii) ensure capacity development; (viii) enhance public awareness; (ix) assess the objectives of proposed projects and concentrate on those projects that assure sustainability of results and that are in line with the national strategies and priorities as well as with the local conditions; (x) ensure the institutional viability of any project in terms of commitment and support at both the national (CoM and Parliament) and local (municipalities) levels; (xi) ensure political commitment in support to locally developed strategies; (xii) follow a "progressive coverage" for SWM schemes, starting with the implementation of a landfill (a prerequisite for any type of treatment) as a temporary phase; (xiii) set the mechanism for data management and sharing between the various stakeholders; (xiv) establish and support SWM networks, such as SWEEP-Net network; (xv) monitor, in the medium and long term, the future implementation of the strategies, in order to identify the eventual gaps and needed adjustments and improvements.

There is a need for immediate action to set an integrated system for SWM system in Lebanon. This shall begin with issuing coherent policy, legal and institutional frameworks and enhancing cost recovery.

2. INTRODUCTION

Table 1: Key Data

Population[1]	~ 4.5 million (year 2009)	
GNI per Capita (US$)	7,600 (year 2008)	
Municipal Solid Waste (MSW) Generated	~ 1.57 million tons (year 2009))	
Material Composition of MSW (%)	Organic	50 – 55 %
	Paper/Paperboard	15 - 17%
	Plastic	10 - 13%
	Glass	3 – 4 %
	Metal	5 – 6 %
	Other	10 – 12%
Per Capita MSW Generation (kg/p/d)	Rural	~ 0.7 Kg/p/d
	Urban	~ 0.85 - 1.1 Kg/p/d
	Weighted Average:	~ 0.95 Kg/p/d
MSW Collection Coverage	Rural	99 %
	Urban	100 %
Management of Waste (%)	Composted	9 %
	(several treatment plants already constructed will be put in operation soon, hence increasing percentage)	
	Recycled	8 %
	Disposed in Landfills	53 %
	Disposed in Dumps	30 %
	Other technologies	0 %
Growth in MSW Generation	1.65%	
Medical waste	Infectious waste	~ 5,040 Tons/year
	Hospital non risk waste	~ 20,000 Tons/year
Industrial waste	Industrial (non hazardous)	~ 185,000 Tons/ year (most of waste mixed with MSW)
	Industrial (hazardous)	~ 3,380 Tons/year (most of waste mixed with MSW)
Hazardous waste (other than industrial hazardous waste)	No data available other than the one stated here above (most of waste mixed with MSW)	
Agricultural waste	No data available	

1- No official population census in Lebanon since 1932. 4.5 million people is the figure foreseen by the MoE in the current strategies and plans, and could be considered a reasonable estimate since it is compatible with the various studies in Lebanon.

2.1. Environmental and Socio-Economic Overview

Lebanon has an area of 10,452 km^2. The country is mountainous; along most of the coast, fractured and deeply incised limestone mountains rise from a narrow coastal strip to over 3,000 meters. Inland, the mountains give way to the Bekaa valley, a major agricultural region, before rising again to the east of the valley towards the borders with Syria. Lebanon has a Mediterranean climate; rainfall amounts fall sharply inland from the coastal mountains.

The population of Lebanon is around 4.5 million people in 2009 and is mostly concentrated along the coast, particularly in the Greater Beirut and Mount Lebanon regions, where more than half of the population lives. GDP growth was 2.7, 11.7 and 19.5 % in 2006, 2007 and 2008, respectively. Services comprise approximately two-thirds of national GDP, with industry contributing about one quarter and agriculture about one tenth.

2.2. Waste Management Overview

MSW generation

An estimated 1.57 million tons of municipal solid waste was generated in Lebanon in 2009. While the majority of waste (exceeding 50 %; this percentage varying between urban and rural areas, as well as between summer and winter) is organic, paper/cardboard and plastics constitute a significant proportion, with glass and metal contributing largely too. A high moisture content is also prevalent in wastes, often exceeding 60%.

For the past 20 years, people were leaving the rural areas to live in the big cities like Beirut, Saida, Tripoli, which lead to a noticeable increase in the quantity of waste in Beirut and Mount Lebanon. The quantity of waste generated in these two areas (excluding caza of Jbeil) was assessed at around 2,400 tons/day in the summer of 2009, this number amounting to around 55% of the total waste in all Lebanon.

Based on waste management data obtained from the MoE as well as various studies undertaken in Lebanon, it could be considered that the MSW generation per capita varies from around 0.7 Kg/p/d in rural areas to around 0.85 to 1.1 Kg/p/d in urban areas. The average (over the country) could be estimated to around 0.95 Kg/p/d (assuming a weighted average between urban and rural areas). The high production rate of 1.1 Kg/p/d mainly corresponds to the region of Beirut and part of Mount Lebanon, due its the high economic development, the concentration of most economic and commercial activities leading to the inflow of population residing in the suburbs, as well as the presence of a high number of tourists.

The waste generation per mohafaza (according to MoE estimates) can be summarized as follows:

Table 2: Waste Generation per Mohafaza

Mohafaza	Daily Tonnage (Tons)	Percentage of Country
Beirut and Mount Lebanon	2500	58
South Lebanon and Nabatiyeh	650	15
North Lebanon	700	16
Bekaa	450	11
Total	4300	100

MSW collection

Municipal waste collection coverage is generally high, reaching or exceeding 99 percent of the population in both rural and urban settings; the quality of collection varies widely. In rural areas, contractors may not have the skills or equipment to effectively collect waste and municipalities do not have adequate enforcement capacity.

MSW disposal and valorization

The majority of municipal solid wastes (around 50 %) is managed in landfill sites that serve Greater Beirut and the central Bekaa valley. While the evolution of landfilling over open dumping is a positive development, leachate at the Naameh site serving Beirut is hauled for disposal in the Mediterranean. A small amount of waste is currently composted (about 9%) or recycled (about 8%). Although sorting facilities are available to serve the Greater Beirut and Zahleh as well as other regions, collection of recyclable materials is to a large extent carried out by scavengers operating at various waste collection sites in the urban areas. Estimates for the amount of waste recycled may in fact understate the actual importance of recycling since this activity is conducted in part by the «informal» sector whose activities are, by definition, difficult to quantify.

It is to be noted that a sorting plant in Zahleh, a composting plant in Jbeil, as well as small community based composting plants have been executed in selected villages through USAID financing. In addition, a number of small and medium sized sorting and composting pants have been implemented by the OMSAR through EU financing (fund of approximately 14 million Euros). In Saida, an anaerobic digester has been put in place by a private company to treat the municipal waste of the city, but remains however non operational.

Various projects have also been undertaken to rehabilitate waste disposal sites, namely Normandy, Beirut, Slayeb dump and Zahleh dump. However, several major dumpsites still require closure and rehabilitation as soon as new treatment facilities are put in place (such as Tripoli, Saida, Sour, Nabatiyeh and Baalbeck)

SWM sector indicators

To date, the status of SWM in Lebanon is as follows:

• **Municipal Waste:**

- ***MSW Collection Coverage***:

  99 % in rural areas;

  100 % in urban areas

- ***MSW Destination:***

  Composted ~ 9 % (several treatment plants already constructed will be put in operation soon, hence increasing percentage)

  Recycled ~ 8 %

  Landfilled ~ 53 %

  Open dumped ~ 30 %

- ***Number of sorting plants***:

  Under construction : 2 (Fayha' 300 t/d, Jbeil 60 t/d (construction expected for 2011))

  Constructed: 1 (Khiam 10 t/d)

  Operational: 3 (Qarantina and Amroussieh 2400 t/d; Zahleh 300 t/d)

- ***Number of sanitary landfills:***

  Under construction : (none)

  Constructed : 3 (Naameh and Zahleh (MSW), Bsalim (inert matters and bulky items)

  Operational : 3 (Naameh 2000 t/d, Zahleh 180 t/d, Bsalim 120 t/d)

- Number of composting plants:

Under construction: 4 (Minieh 60 t/d, Mishmish 10 t/d, Baalbeck 60 t/d (construction expected 2011), Nabatiyeh 120 t/d (construction expected 2011).

Constructed : 3 (Tyr 150 t/d, Shouf Souayjani 26 t/d, Jbeil 80 t/d)

Operational: 5 (Bourj Hammoud 300 t/d, Ansar 10 t/d, Khiam 15 t/d, Khirbit silim 10 t/d, Taybe 10 t/d, Kabrikha 15 t/d)

- Number of other treatment systems:

Under construction : 0

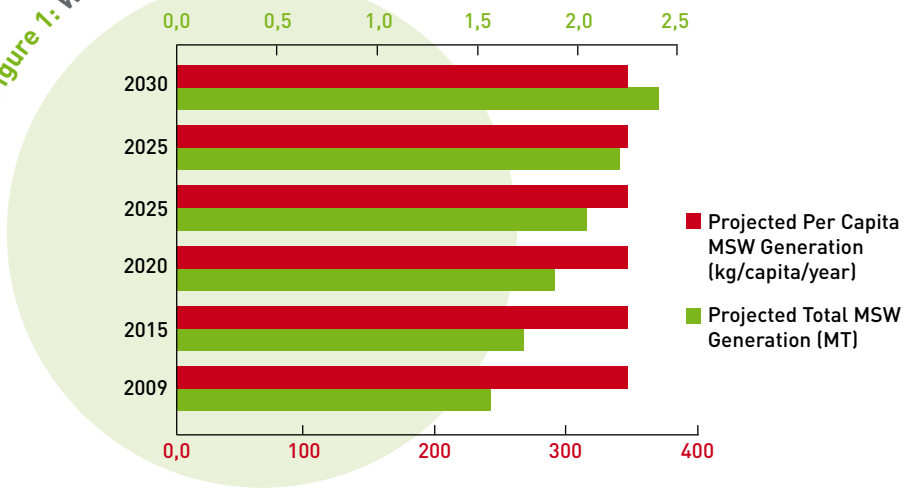
Constructed : 1 (Saida - anaerobic digestor 300 t/d)

Operational : 0

MSW quantity projection

Figure 1 projects waste generation for selected years between 2009 and 2035 based on an average increase rate of 1.65% per year (the details of this rate estimation are in Annex 1). On this basis, it is projected that waste generation would grow from 1.57 million tons in 2009 to 2.21 million tons by 2035 in the absence of actions to impact on waste generation.

Figure 1: Waste Generation Projection



3. CURRENT SOLID WASTE MANAGEMENT SITUATION

3.1. Policy, Legal and Institutional Framework

Policy framework

Management of solid wastes in the country still does not benefit from a well defined national waste management policy to define the overall tools or means for achieving goals and for combining forces between the key SWM players in the country (mainly MoE, CDR, MoIM, as well as MoF).
No national consensus was reached on a specific implementable SWM strategy despite the various attempts and efforts put in place by the various stakeholders to set SWM plans. Those plans are presented in section 3.2.

Legal framework

Local legislation

To date, there is no specific legislative framework that deals directly with SWM in Lebanon. A number of laws, decrees, and ministerial decisions govern environmental management in Lebanon, some dating back to the 1930s. Existing legislation consists of fragmented regulations not specifically dealing with solid waste.
Indeed, although there are many legal instruments that bear on SWM, there are only two that address the sector specifically: **Decree 8735 of 1974** assigns SWM as a municipal responsibility, and **Decree 9093 of 2002** provides municipalities with an incentive to host a waste management facility. The remaining elements of the legal framework either provide authority for entities to act with respect to municipal solid waste, or address other types of waste.

On the other hand, enforcement of these laws is relatively weak and responsibilities are not well-defined. Generally, the regulations lack clarity and precision, coordination between authorities is minimal, and enforcement is practically non–existent due mostly to staffing constraints, lack of proper training, low level of fines, and political interferences. Equally important is the lack of awareness of regulations amongst personnel who are supposed to enforce them (i.e. health inspectors, police officers, as well as the general public that is supposed to abide by them). In short, the lack of a proper effective solid waste legislation has lead to the consequence that the country suffers a lack of national leadership in the sector, and is definitely hampering the development of an organized SWM scheme in Lebanon.

A **framework law for the protection of the environment** was adopted in 1988 and amended in 2002 (Law 444, 8/8/2002), which defines the basis and norms for environmental protection, but which does not provide details of any regulations for the solid waste management.

In 2005, the MoE has presented **a Draft Law on Integrated Solid Waste Management** under the METAP programme. It was submitted to CoM on October 14, 2005, and is still under review. Following approval by CoM, the Draft Law will be presented to Parliament for ratification. The Draft law aims at:

- Reducing the quantity of wastes to be disposed of, to the lowest extent possible (landfilling of ultimate waste only)

- Assisting in the management of solid waste and the promotion of recycling and treatment facilities
- Promoting waste minimization, source separation, recycling, energy recovery, effective waste treatment facilities; while no specific treatment technology was favoured, the main requirement calls for a proven, cost-effective and certified technology.
- Setting up general policy for cost-recovery
- Specifying the institutional framework for SWM

However, the law in itself is not sufficient for the implementation of an integrated SWM system. Such implementation would necessitate, further to law approval, the setting and issuing of the necessary applicable decrees, strategies and plans in the various domains, in the aim of ensuring a sustainability of the system, in terms of:

- cost-recovery system
- well-defined institutional framework
- consensus, both at the national and local levels, on an agreed upon strategy.

At the time of preparation of this report, the time frame for issuing these laws and decrees is not clear. However, information obtained from the MoE expect the issuing of the Law on ISWM in June 2010. Previous experience is this respect is however not promising

In an attempt to encourage private sector participation, the draft law calls for the setting up of incentives to promote safe and effective waste management.

International treaties

Some of the international treaties that Lebanon has ratified have specific regulations pertaining to solid waste such as:

- **Basel Convention**; It regulates the movement of hazardous waste and obliges its members to ensure that such wastes are managed and disposed off in an environmentally sound manner. Lebanon ratified this convention in December 1994.

- **Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter**; Ratified by Lebanon in May 1973, it mainly prohibits the dumping of wastes in the Mediterranean Sea.

- **Protocol Concerning Mediterranean Specially Protected Areas and Protocol for the Protection of the Mediterranean Sea against Pollution from Land-based Sources**; Accessed by Lebanon in December 1994, these protocols ensure the sound management of protected areas of the Mediterranean by banning the dumping of wastes into the sea, and prevent, abate, combat and control pollution of the Sea area by discharges emanating from any land-based sources within their territories.

Institutional framework

Numerous government institutions (ministries or autonomous agencies) are involved in solid waste planning and management in Lebanon, with overlapping mandates and responsibilities and unclear lines of authority.

Although the legal framework clearly assigns the responsibilities of waste collection, disposal and management operations at the sub-national level to **municipalities** (according to Law No. 118 of 1977), represented by MoIM at the national level, MoE is also responsible for regulating the sector, establishing and monitoring environmental standards, developing SWM strategies and supervising waste management facilities. As a result, both **MoIM** and **MoE** have jurisdiction over MSW policy, legislation, strategy, and planning; and both have developed municipal SWM strategies for the country. On the other hand, the **CDR**

(a public authority established in early 1977 by Legislative Decree No. 5, whose role was later amended by several legislative decrees, in partial replacement of the Ministry of Planning, to be the government unit responsible for reconstruction and development), acting under authority of the Prime Minister, has been responsible for implementing an emergency waste management plan in the Greater Beirut area, has developed proposals for the upgrading of waste management elsewhere in the country, and has implemented several SWM projects throughout the country since the nineties. The **CDR** was also appointed by the Council of Ministers (CoM) in 2005 to propose a municipal SWM plan for Lebanon and to launch international tenders for this purpose.

At present, direct responsibility for MSW management in the Mohafaza of Beirut and much of the large area of Mount Lebanon, as well as Tripoli lies with the CDR, and to a lesser extent, the MoE and the MoIM. The role of municipalities in these areas is restricted to overseeing the work of a private company contracted by CDR for SWM services. In the rest of Lebanon, the municipalities currently constitute the main authority responsible for the collection and disposal of solid waste.

This uncertainty concerning the institutional framework and responsibilities is a major obstacle for the implementation of an integrated solid waste management system. In recognition thereof, the Draft Law on integrated SWM brings the many stakeholders together into a single independent SWM Board responsible for planning and decision-making at the national level, as well as waste treatment. Local authorities (municipalities, unions of municipalities, or groups of the two) will be responsible for the waste collection. The SWM Board, which will be responsible for the waste management, will be headed by MoE, and shall include members from relevant public authorities as well as well as the private sector (academics, consultants) and NGOs.

The draft Law aims at setting the responsibilities of the various entities involved in SWM as presented in Table 3.

Table 3: Responsibilities of Various Stakeholders Involved in SWM According to Draft Law on ISWM

Entity	Responsibilities
Waste Management Board	• Developing National Waste Strategy • Developing National Waste Management Plans • Authorizing waste Management plans, facilities, and waste generators
MoE	• Establishing Waste Management Standards and Guidelines • Participation in the National strategy and plan through the Waste Management Board (headed by MoE) • Approval of EIA and SEAs (Strategic Environmental Assessment) • Authorization of waste management facilities and waste generators environmental permits • Establishing/ implementing waste management programs • Information management • Supervision and inspection of compliance
MoIM	• Participation in the National Strategy and plan through the Waste Management Board • Coordinating and assisting in the development and implementation of local waste management plans • Establishing/ implementing waste management programs
Local Authoities	• Participation in the National strategy and plan through the Waste Management Board • Proposing and implementing local waste management plans for non-hazardous municipal waste • Establishing / implementing waste Management programs • Management of waste collection
CDR	• Assistance in procurement of WM projects upon request • Assistance in the development of WM plans upon request
Private Sector/ the Public	• Abiding by laws, regulations and guidelines on waste management • Prohibition of littering, illegal bumping and burning • Participation in the National strategy and plan through the Waste Management Board • Participation in the development and implementation of local waste management plans • Participation of facility and generator management plans

3.2. Strategy, Action Plans and Priorities

These SWM plans were variable depending on the stakeholder's view, starting from the plans set, through the CDR and the MoIM, during the nineties, to those set by the MoE in 2002, the CDR in 2005, or the strategy set by MoE in 2010.

In 2002, the MoE prepared, through the United Nations Development Programme (UNDP), a Municipal SWM Strategy for Lebanon, which outlined a number of alternatives, without however providing any specific guidance.

In 2005, the CDR prepared a Waste Management Plan for the whole of the country. This plan has been approved by the CoM in June 2006, but is still waiting to be implemented, due to lack of financing and objection from some communities regarding foreseen site locations. The plan consists of dividing Lebanon

into four service areas as follows: 1) Beirut and Mount Lebanon, 2) South Lebanon and Nabatieh, 3) Northern Lebanon and Akkar and 4) Bekaa, Baalbech/Hermel. The plan foresees that sorting and composting facilities be built in each of the 26 cazas, with only eight disposal sanitary landfill sites being constructed (2 per service area), in addition to Bsalim for inert materials to serve GBA and Mount Lebanon.

In March 2010, the MoE presented to the CoM a national integrated strategy for SWM in the country with a policy framework for a 25 years contracting period starting from the first half of 2014. The plan consists of the following:

1) Modifying the strategy issued by MoE in 2002
2) Updating all the numbers and statistics of the 2002 strategy
3) Dividing Lebanon into 4 service areas
4) Rehabilitating old dumps during the execution of the strategy, in function of the availability of the alternative treatment facility
5) Replacing the technologies previously foreseen in the plans set in the past 13 years, which consisted of sorting, composting and landfilling, by a waste-to-energy technology equipped with humidity reduction means, and with electricity generation, resulting in a reduced percentage of ultimate wastes.
6) Building transfer stations to facilitate and to decrease the cost of transporting the waste, taking into consideration that waste collection shall be the responsibility of the municipalities.
7) This plan will start during the second half of 2010 and will end in the second half of 2013, during which period a number of actions should be taken concerning:
   - Rehabilitation of the Saida dump
   - Identification of those firms that comply with the ToRs to be prepared by MoE and CDR for the provision of the treatment services
   - Extension of the period of operation for Tripoli and Naameh landfill
   - Issuance of the legal framework which was prepared by MoE after final review
   - Preparation of bidding documents
   - Construction phase
   - Operation phase.

With regard to the MoE stategy, it is to be noted that, at the time of preparation of the report, it has not been possible to acquire detailed information pertaining to the technical aspects of the strategy, the specific characteristics of the foreseen treatment technologies, as well as the required investment and operation.

The immediate priorities as identified in the sector are suggested to be as follows:

- Issuing the Draft Law on Integrated Solid Waste Management, in order to set the necessary legal and institutional framework, and hence define the leadership in this sector.
- Approving specific implementable national policy and strategy for an integrated SWM scheme (with particular consideration to technology assessment and site selection).
- Approving the national integrated strategy for SWM in the country with the policy framework for a 25 years period as prepared by the MoE in March 2010 (with the necessary adjustments and improvements particularly concerning the adaptability of the technology selected to the local characteristics of each region in Lebanon – as detailed elsewhere in this report).
- Implementing the approved Waste Management Strategy by ensuring the necessary funding through various possible schemes and types of contracts. Although projects for Greater Beirut and the major cities could be considered as a priority (particularly that the lifetime of the Naameh landfill site serving Greater Beirut is being continuously extended each time the capacity is reached, and that the landfill in Tripoli is not a sanitary landfill, etc), the projects for the remaining parts of the country should not be delayed.

- Setting the applicable decrees for cost recovery, institutional framework, following the approval of the Draft Law on Integrated Solid Waste Management, in the aim to ensure the sustainability of the system.
- Ensuring the rehabilitation of the dumpsites spread all over the country by ensuring the necessary funding, following the implementation of the corresponding solid waste treatment facilities.

3.3. Planning and Investments

While great investments have been made to develop MSWM facilities in GBA and, more recently, in other urban poles such as Tripoli, Zahleh and Saida, there is still no overall long term strategy for solving the MSWM problem in Lebanon.
The most significant investment initiatives are the following:

- Emergency Plan for Greater Beirut and part of Mount Lebanon
- World Bank-financed Solid Waste and Environmental Management Project (SWEMP), which closed at the end of 2003
- Implementation of Saida anaerobic digester
- Projects for the rehabilitation of some waste disposal sites
- USAID financing for some sorting and composting plants
- Execution of a number of sorting and composting plants through the OMSAR under EU financing.

The Solid Waste Emergency Plan for Greater Beirut has been developed and implemented through the CDR. The plan has involved the issuance of contracts to private sector companies (Sukleen and Sukomi) to undertake all aspects of the management of solid waste in the Greater Beirut area. The system uses a full range of street sweeping, collection, sorting (manually and mechanically – facilities are currently under-sized), bailing and wrapping, recycling, composting (only around 13% of the waste is treated in the composting plant) and landfilling. The major part (around 80%) of the waste is taken to the Naameh landfill where it is deposited. However, the system is over-specified and performance is insufficiently linked to payment, with the result that there is an over-reliance on landfilling, variable results in composting, low levels of recycling and high net costs. Annual cost to the public is in the region of $US 130 per ton of waste handled.

The **SWEMP** initiative was intended to support SWM activities outside Greater Beirut. However, the project implementation has been difficult and the initiative was scaled back before closing at the end of 2003. A landfill had however been sited and is being operational in Zahleh in the central Bekaa valley, serving Zahleh and 18 of the 33 surrounding villages. Other foreseen landfills have however not been implemented within the scope of the SWEMP project.

In Saida, an **anaerobic digester** has been implemented by a private company aiming at treating the municipal waste of the city (capacity 300 tons/day extendable to 450 tons/day). However, this plant is not operational yet mainly due to contractual and financing problems.

Sorting and composting plants have also been financed by USAID for large communities as in Zahleh (sorting capacity 300 tons/day) and Jbeil (composting capacity 80 tons/day – construction expected in 2011), as well as for small communities in selected villages in South Lebanon.

In addition, a number of **small to medium sized sorting and composting plants** have been established through the OMSAR under EU financing (fund of approximately 14 million Euros).

- Chouf Swayjani : sorting and composting plant – capacity 26 ton/day
- Fayhaa (Tripoli) : sorting plant – capacity 300 t/d
- Jbeil (Mount Lebanon): sorting plant – capacity 60 t/d
- Ansar (Nabatiyeh): sorting and composting plant – capacity 10 ton/day
- El Khiam (Marjeyoun) : sorting plant – capacity 10 ton/day
- Michmich – Akkar : sorting and composting plant – capacity 10 t/d
- El Minieh – North : sorting and composting plant – capacity 60 ton/day
- Tyre (south) : sorting and composting plant – capacity 150 ton/day
- Baalbeck – Bekaa : sorting and composting plant – capacity 60 ton/day (construction expected in 2011)
- Nabatiyeh : sorting and composting plant – capacity 120 t/d (construction expected in 2011)
- Qabrikha (Nabatiyeh) : composting plant – capacity 15 t/d

Various projects have also been undertaken to rehabilitate waste disposal sites. These include the stabilization of organics and the use of the stabilized material in land reclamation (Normandy, Beirut), the closure and plantation of the dump (Slayeb dump, Chouf), as well as the elimination of the dump by excavating and transporting the wastes to the new landfill (Zahleh dump, Central Bekaa).
The current planning and investment context of SWM in Lebanon is summarized in Annex 5.

3.4. Finance and Cost Recovery

Waste management financing

Financing of waste management (treatment and collection) is currently achieved through four mechanisms:

(i) The Council for Development and Reconstruction may allocate budget directly from the Government through the treasury of the MoF to cover the construction of solid waste treatment plants (sorting or composting plants). The MoIM then deducts these costs from the amount owed by the Municipal Fund to the various municipalities and union of municipalities

(ii) The government through the Council for Development and Reconstruction may allocate budget directly from the Municipal Fund which was established under the supervision of the MoIM (e.g., operation of SW facilities and landfills in Greater Beirut area)

(iii) International loans and grants (e.g., construction of SWM plants funded by SWEMP, USAID, as well as by the EU through the OMSAR)

(iv) Proper financing by the Municipalities for the operation of some treatment plants and sanitary landfills mainly outside GBA and Mount Lebanon (e.g., operation of Zahleh sanitary landfill), through local taxes and the Independent Municipal Fund. The purpose of the Independent Municipal Fund (IMF) is to give municipalities a share of 10 % of all the bills collected by the central Government through "Electricité du Liban", the water authorities and different taxes collected by the National authorities.

Explicit fees and costs recovery system for SWM do not exist in Lebanon. Lebanon suffers from major budget deficits in this sector.

SWM costs

Costs to government of waste management vary greatly in Lebanon. It is clear that the collection and disposal costs depend very much on the organization of the different management activities.
In Greater Beirut and Mount Lebanon (excluding Jbeil), the cost per ton for collection, transport, treatment and disposal of municipal waste is estimated at around USD 130/ton of which about USD 30 / ton is related to collection and transport. In 2010, CDR is currently paying around 130 million USD/year (including

waste collection and treatment, as well as street sweeping in Greater Beirut area) from the Independent municipal fund.

Outside the Greater Beirut and Mount Lebanon area, waste management costs (collection and disposal) are substantially lower. They are around USD 45-50 / ton in Zahleh and Tripoli, and around USD 20-30/ ton in some rural areas with disposal in open dumps.

These overall costs (USD/ton) are summarized hereafter:

Table 4: Cost of SWM per Ton

	Greater Beirut	Zahleh	Tripoli	Other rural areas	Small units
Collection	25	17	18[4]	10-18	5
Sorting	26	10	-	-	-
Bailing	16	-	-	-	-
Wrapping	13	-	-	-	-
Landfilling	52 (from 0 to 400,000 ton/year)	5[2] [3]	29		
	38 (from 400,001 to 500,000 ton/year)				
	45 (› 500,001 ton/year)			-	-
Composting	30 [1]	-	-	-	33[5]
TOTAL	**130**				

(1) Including hauling from sorting facilities to composting plants

(2) This figure constitutes the operational cost. For full cost recovery, the cost would be 15-20 $/ton

(3) The tipping fee being currently paid by the other 18 surrounding municipalities transporting the waste to Zahleh landfill is around 10 $ / ton (partial cost recovery only). It is to be noted that the remaining 17 municipalities are disposing of their waste in a haphazard manner due to shortage of money and the lack of a law enforcing disposal into sanitary landfills

(4) Including sweeping; collection and sweeping: 2,300,000 $/year (i.e. around 18$/ton based on 350 tons/day)

(5) On a Build-Own-Operate (BOO) basis

Investment and operational costs of the proposed treatment technologies

In this regard, the "Country Environmental Analysis Report on Municipal Solid Waste Management (Draft version No. 5, February 28, 2010)" has been prepared. The results may be summarized hereafter.

With regard to the 2005 base CDR plan, the total investment cost (including design, VAT, contingencies and land acquisition) for sorting and composting facilities (one in each of the 26 cazas) as well as disposal sites (8 sanitary landfills without sorting and composting) is estimated at USD 400 millions. The CDR plan results in a need of a disposal fee of USD 7-40 per ton dependent on the size of the plants in the concerned region. In addition to that a gate fee in average for sorting and composting plants of USD 20 per ton of waste to reach a Financial Internal Rate of Return (FIRR) of 10% has to be added.

The possibility of using the incineration technology for Greater Beirut to reduce the volume of waste to be finally disposed has also been considered in the report. The investment cost is very high, and the needed disposal fee would be USD 105 per ton for reaching a FIRR of 10%.

Implementation of the full CDR Plan will be quite costly for the Government and the investment cost varies between USD 400 - 695 million depending on which technical solution would be chosen. The operation cost expressed as USD per ton is 6 - 72 and the gate fee, in order to reach a FIRR of 10%, varies between USD 7 – 105 per ton (depending on the adopted solution).

As for the operational costs, which in total will amount to about USD 50 million per year in case of separate sorting and composting plants and sanitary landfills, they mainly require a cost recovery plan to secure that the facilities will be operational. It is not likely that the GoL will cover the operational cost, which is why a gate fee must be introduced and paid for by the clients, and a system for collection of the fee must be introduced. The cost recovery plan should be agreed upon before the implementation of the WMP would be started.
Concerning the strategy developed by the MoE in 2010, it has not been possible to acquire data pertaining to the technical aspects of the strategy and the specific characteristics of the foreseen treatment technologies, as well as the required investment and operation costs, which lead to the impossibility of carrying out precise estimates. However, a preliminary estimate will result in a cost per ton relative to waste-to-energy- systems exceeding 100 USD/ton and an investment cost exceeding 700 million USD. In addition, the implementation of the treatment project will normally be on a BOT contract basis with a 25 years contracting period.

As a conclusion, waste-to-energy technologies such as incineration may be a relevant option for the GBA, but other less expensive technologies, such as composting and landfills, could be considered for other regions, and particularly rural areas.

Financing and cost recovery in draft law

The draft law on ISWM in Lebanon and its legal framework provide venues for cost recovery for the WM in Lebanon by providing the adequate framework for the following:

- Setting up sources of financing;
- Cost Recovery for Solid Waste Management;
  The investment and operational cost of waste service providers and facility operators for Solid Waste can be recovered through several sources including but not limited to:
  - Direct at-source waste management fees (e.g., waste user charges) including tipping fees at various waste transfer, treatment and disposal facilities collected by local authorities or their designated agents working under license, franchise, contract or concession agreements
  - Product charges on packaging wastes
  - Fines from non-compliance activities in accordance with this law and its standard decrees of application; and
  - Other sources of cost recovery to be determined by decrees ratified by the CoM based on the proposal of the MoF and the MoE.
- Authority to Collect Waste Management Fees
- Non-Fiscal Incentives
- Fiscal Incentives: In an attempt to encourage PSP, the law calls for the development of fiscal incentives to promote safe and effective waste management. These can be established, for instance, as follows:
  - Tax Exemptions on the Purchase of Recovered Material
  - Tax Reduction on Profits - Enterprises or private entities, including NGOs, waste generators, waste holders, and facility operators, and service providers that are recognized to perform beneficial waste management activities shall be awarded a tax reduction on profits.

The implementation of the foreseen SWM strategies requires ensuring the necessary funding for both investment and operation costs, through various possible schemes and types of contracts (such as BOT contracts).

On the other hand, it is thus mandatory to pinpoint the fact that evaluating the sources for the recovery of the recurrent costs of waste management is futile without analyzing the affordability of such services as well as the willingness-to-pay of the Lebanese public. However, in the absence of willingness to pay studies for SWM services in Lebanon, the affordability of such services is examined based on various reports previously established.

One disadvantage of the lack of special fees allocated to the SWM sector and the corresponding cost recovery practice is that, even if the residents comply with their duties and pay municipal taxes, they are rarely aware that they are paying for waste management services.
Explicit fees on solid waste management services are thus an essential component of an orderly waste management which cannot be avoided on the long run in Lebanon. On the one hand, such charges contribute to increasing responsible behaviour of waste producers (whether households or free economy) in the sense of the "polluter pays principle".

With regard to the proposed explicit fees for SWM, a phased implementation could be foreseen starting from a partial cost recovery at the initial stage (corresponding, for instance, to a recovery of operation costs) to a full cost recovery at a later stage, depending on the affordability of the population to pay these fees.

3.5. Private Sector Participation

Private sector participation is a key element in SWM in Lebanon. MSW in main cities is effectively undertaken by private sector operators.

In collection and transfer

In Greater Beirut and parts of Mount Lebanon, the quality of service performed by the private sector (Sukleen) for waste collection and street cleaning is of high level of urban cleanliness, but at costs which are quite significant. These relatively high costs are mainly due to the type of contract award on a non-competitive basis[2]. Outside Greater Beirut and Mount Lebanon (such as Tripoli and Zahleh), the quality of service by the private sector in the main cities is relatively acceptable (although with lower quality than Greater Beirut and Mount Lebanon) but with at costs which are substantially lower[3].

In treatment and disposal

Private sector is also largely involved in SW disposal and treatment.

- International contractors (Radians-USA) have also been involved (1999-to date) in the reclamation of a waste dump site in the Normandy area along the Beirut waterfront. The contract was awarded through competitive bidding by SOLIDERE, the company responsible for the development of Beirut Central District.
- The private operators SUKOMI waste treatment and SUKOMI Landfills perform bailing, wrapping, haulage and landfilling in Greater Beirut;

2- In fact, the Sukleen contract was awarded in 1994 for one year through competitive bidding, and was then extended for five years, with the collection area being expanded to reach the current size. Sukleen's contract has expired as of 31 December 2000 and has, since then, been periodically renewed awaiting the selection and appointment by the GoL of an operator for these services by means of an international bidding process. The waste treatment and landfilling contracts were directly awarded in 1998 for 10 years to SUKOMI (contract of landfilling based on BOT). These contracts are being annually renewed.

3- In Tripoli, the private sector participates in waste collection (Lavajet) and disposal (BATCO) through competitive bidding. In the city of Zahleh, the private sector participates as well in waste collection and disposal through competitive bidding.

- In Saida, the private participation has been involved in the construction of an anaerobic digestor to treat the municipal waste of the city, based on a BOO contract. However, although already constructed, this plant is still not operational due to many difficulties, suspensions and delays;
- Local private waste management companies have been involved in the construction and operation of some composting plants, which have been implemented in some villages through financing from the USAID and the EU (through OMSAR).
- Some examples of recycling firms are: SICOMO and SOLICAR for recycling paper and cardboard, ELIE DEBS company for recycling plastics, LEEDS for recycling HDPE and LDPE, and SOLIVER for recycling glass. Recycled metal is pressed and sold to exporters because there are no local foundries to work with reclaimed metal.
- Informal and semi-formal private sector activity plays an important role in waste recycling throughout Lebanon and provides a means of livelihood for at least thousands of people. Recycling networks are created through a system of waste pickers and materials traders operating to recover materials before they are collected from points of generation or storage, and after disposal in a waste disposal facility.

Normally, the private sector in Lebanon is more effective than the public sector in SWM (both at the technical and financial levels), due to the fact that the municipalities lack the necessary means, resources and skills. This is also, most often the case, not only at the level of rendering services but also at ensuring open, transparent and competitive procedures contract award.
However, the absence of a reliable procurement procedure for waste management projects may lead to some failures, difficulties or delays.

The draft Law on Integrated SWM aims at encouraging Private Sector Participation (PSP) in WM activities. Therefore the law called for a decree that specifies procedures to be followed in the procurement of WM projects. The decree supports PSP through the following:

- Identification of Waste Management Activities: WM activities are defined to include the construction, operation, maintenance, modernization, repair, expansion, control, monitoring, and post-closure care of new or existing WM facilities as well as delivery of a service (waste collection, waste transport and transfer, waste treatment).
- Identification of institutional responsibilities regarding privatization
- Identification of a reliable procurement procedure for waste management projects
- Setting up requirements from contractors
- Developing criteria for awarding of contracts:
- Specification for minimal core contract terms

Table 5: MSW Overview in Main Cities

MSW overview in main cities				
Region	**MSW Daily Tonnage (Tons)**	**MSW Collection Operator**	**MSW Disposal Operator**	**Type of Treatment**
Greater Beirut & Mount Lebanon (excluding Jbeil)	2,400	Private sector (Sukleen – Local operator)	Private sector (Sukomi – Local operator)	Sorting (1500 t/d in Qarantina and 900 t/d in Amroussieh) [1], Bailing and wrapping (Qarantina and Amrousieh) [2], Composting (300 t/d in Coral) [1], Disposal in sanitary landfill (2000 t/d in Naameh(2) and 120 t/d of inert matter and bulky items in Bsallim).
Caza of Zahleh (partly – City of Zahleh and 18 surrounding municipalities)	180	Private sector – (Local operator)	Private sector – (Local operator)	Sorting, disposal in sanitary landfill
Tripoli	350	Private sector (Lavajet)	Private sector (Batco – local operator)	Disposal in a rehabilitated landfill[2] (but with no liner)
Cazas of Saida and Jezzine (partly)	300	Private sector (NTCC – local operator)	Private sector (NTCC – local operator)	Disposal in open dump[2] at shore

(1) Decision regarding closure after set up of new treatment facilities depends on type of technology adopted

(2) Facilities will be closed as soon as a new set of treatment facilities becomes operational

3.6. Public Awareness and Community Participation

Current situation and initiatives taken

Public awareness and community participation in support of SWM are still weak in Lebanon. It had previously been introduced in identifying landfill sites locations in projects financed by the World Bank, the European Union or other donor agencies, and in support of some waste management operations. Public participation in solid waste planning has also been introduced as a component during the preparation of EIAs for SWM facilities. These public awareness actions were undertaken by NGOs, consultants, service providers and municipalities.

There is also still lack of knowledge from the public about the methods and ways for SWM, with the vast majority of local population still seeing in composting, landfilling or incineration the only measures and solutions for SWM. Only few are inclined to consider or abide by the 3Rs principle (Reduce-Reuse-Recycle). It is clear that there is an urgent need for public awareness on both the household and decision making levels in order to develop a good strategy and successfully put it in action.

Equally important is the lack of awareness of regulations amongst personnel who are supposed to enforce them.

Previous attempts for public awareness campaigns were not sufficient and not sufficiently effective. Some attempts to implement the sorting at the source in some zones in Beirut were not of great success. Better results were achieved with sorting at the source in some rural villages, further to an initiative undertaken by a local NGO in Bsharre and in Arabsalim to promote sorting and recycling of waste products by encouraging the local communities to sort waste at source into dry and wet components. However, these NGOs were later faced with the problem of marketing the recyclables.

In general, the poor results of the campaigns may be due to the following:

- There are high levels of public suspicion about solid waste management facilities in Lebanon
- The population did not perceive the effective positive outcome of their participation. No correlation has been identified between the campaigns and the benefits to the SWM implementation on the one hand and to the population on the other hand (technical, environmental, financial, etc)
- No direct benefits for the population were identified
- Failure in the adoption till this date of a strategy for the SWM and in the implementation of a SWM system and facilities.
- Lack of technical skills and human resources to manage this problem, particularly at the local level

It is essential to point out that several workshops have been organized by the MoE and several NGOs to promote public awareness and community participation, which is considered a major factor in the development of an integrated solid waste management system.

Annex 8 summarizes the main activities undertaken for public awareness and community participation in the SWM sector.

Recommendations

The awareness campaigns should:

- Be accompanied with the approval of an integrated SWM framework (policy, legal, institutional, specific plan and strategy with the consent of the various parties, cost recovery system, etc)
- Concentre on the negative impacts of the current poor SWM in some of the regions (negative impacts of open dumping and leachates on health, environment, surface and groundwater, etc.
- Concentrate on the fact that the objectives of the ISWM projects are sustainable
- Encourage media to focus on the issue,
- Share all the strategies and plans with the public and communities to create a circle of trust between them and the government
- Develop a communication strategy and/or communication programs in the media or in the press: no specific and sustainable strategy are identified, and little action is identified in this sector.

3.7. Capacity Building and Training Requirements

Although several workshops have been organized by the MoE, international institutions, and other institutions to strengthen the capacity of personnel both at the national and municipal levels, and while a number of donors have provided extensive training and capacity building in the past in SWM services, there is still lack of understanding about management, technology, financing, and enforcement, monitoring and follow up. Also, a wide range of management skills are required at both the national and the municipal level. In particular, capacity development in contracting the private sector and managing private sector contracts is required. Equally important is the necessity to provide capacity building and training for decision makers.

With respect to policy/legal/institutional issues, focus should be on preparation of SWM legal frameworks at the national level, and on knowledge and application of the legal framework, as well as enforcement and monitoring at the municipal level. Several additional aspects of waste management are necessarily captured within this, since capacity development on legal frameworks requires that issues such as financing and cost recovery, private sector participation, community awareness and participation, and data and knowledge management are also addressed, as well as institutional structures for delivering SWM services.

Enhanced knowledge of the various technologies that might be applied to waste management is required at both the national and municipal levels, which will also benefit from training in computer use for waste management purposes.

A shortage of suitably trained staff at both the national and municipal levels is also noted. A significant example would be that of the MoE, which is partly responsible for the monitoring of waste management facilities. However, the Ministry is currently understaffed and has no possibility to carry out a meaningful and effective monitoring. It had since long been decided to increase the number of staff, but nothing much had happened. Recently however, a wide range of needed positions have been posted. While this process may still required some time due to administrative procedures, its initiation is nonetheless a major positive step towards achieving the desired staffing goals. It is of paramount interest that the MoE promptly obtains the staff resources needed to carry out the supervision of waste management in Lebanon.

Annex 9 summarizes the capacity building and training requirements in Lebanon.

4. INDUSTRIAL AND HAZARDOUS WASTE MANAGEMENT

Generation of industrial and hazardous waste

Wastes generated by industries can be classified into 2 main categories:
- Non-hazardous wastes having the same characteristics as the municipal wastes;
- Industrial wastes having the characteristics of hazardous wastes as referred to in the Basel convention.

Table 6 : Generation of Industrial Solid Waste by Category in Lebanon

Category	Quantity (ton/year)
Hazardous waste	3,338
Non-Hazardous waste or	54,692
Construction and Demolition waste	73,000
Putrescent waste	57,820
Total	**188,850**

More details on the industrial waste generation are presented in Annex 10.

Legal framework

The current legal framework for hazardous waste is primarily defined as follows:
- Hazardous wastes are regulated under Law 64 dated back to 1988.
- Lebanon has ratified one main international convention dealing directly with the issue of hazardous waste, the Basel Convention on the control of trans-boundary movements of hazardous wastes and their disposal.
- Decisions on industrial wastes management issued by the MoE concerning the required environmental conditions to be respected by the industries.

The MoE is relying on the classification referred to in the Basel Convention and is using the characteristics of the hazardous waste mentioned therein to give permits for the import of materials into Lebanon. The materials types are classified into 3 lists as follows:
- Green list; containing the non hazardous materials that are acceptable and can be imported into Lebanon.
- Orange list; containing some hazardous materials with a possibility of recycling them.
- Red list; containing all other hazardous waste, such as lead, zinc, fly ashes, asbestos, etc.

It is to be noted that all materials listed in the orange and red lists are not allowed to be imported in Lebanon.

Management of industrial and hazardous waste

It is essential to note that, in the absence of a well-defined legislation and more stringent controls, most of the industrial and hazardous wastes are being mixed with the municipal wastes and collected in waste collection trucks.

5. MEDICAL WASTE MANAGEMENT[4]

Generation of healthcare waste management (HCWM) in lebanon

The quantity of healthcare (risk and non-risk) wastes generated in Lebanon is presented in Table 7. It is however to be noted that, after treatment, the disposal of medical wastes is carried in the municipal waste bins.

Table 7 : Estimated Hospital Risk and Non-Risk Waste Generation in Lebanon (Tons/Day)

Year	Hospital risk waste	Hospital non-risk waste	Total
1998	10.81[1]	43.24	**54.05**
2000	11.32	45.28	**56.60**
2005	12.46	49.84	**62.30**
2010	13.81	55.24	**69.05**

(1) This estimate has been based on an average hospital risk waste generation of 1.5 kg per day per occupied bed.

Source: (CDR & ERM, 1998)

Legal framework

Recently, Lebanon has enacted key legislation on Health Care Waste Management - Decree 8006 (dated 11/06/02) amended through Decree 13389 (30/09/04). This decree classified the different HCW categories and addressed their relative disposal conditions.

Lebanon has also ratified two main international conventions dealing indirectly with the issue of HCWM, the Stockholm Convention on persistant organic pollutants and the Basel Convention on the control of transboundary movements of hazardous wastes and their disposal.

Table 8 summarizes the legal framework pertaining to healthcare waste management in Lebanon.

Table 8 : Summary of the Lebanese Legal Framework in Relation to the Health Care Waste Management

Legal Text	Date	Title
Law 64	1988	The Law of Environmental Preservation Against Harmful and Hazardous Waste Pollution
Law 387	1994	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal
Law 444	2002	The Framework Law for the Protection of the Environment
Decree 8006	2002	Determination of the Categories of Health Care Waste and Ways of Disposal off
Law 432	2002	Stockholm Convention on Persistent Organic Pollutants
Decree 13389	2004	Amendment of the Decree 8006/2002

4- This section is based on the "Report on Demonstrating and Promoting Best Techniques and Practices for Reducing HCW to Avoid Environmental Releases of Dioxines and Mercury" dated April 2010 (Study financed by UDPD and GEF to the benefit of the MoE).

The permitting mechanism for infectious healthcare waste treatment facilities was established by Decree 13389. According to this decree, HCW should be treated before disposal of at specialized treatment facilities, licensed by the MoE.
The MoPH has developed accreditation standards and guidelines for acute hospitals in Lebanon grouped into 38 discrete sections; Section 38 addresses waste management and contains 8 standards. The weight of any single section has little overall significance on the accreditation system – i.e., a hospital may fail the waste management section and yet score well overall.

Medical waste management

Lebanon is still considered as one of the countries that lack adequate and well-operated infrastructure for management and disposal of HCW. As a result, unresolved environmental problems has been accumulating for years now, which lead to major issues such as : 1) Increased air pollution due to indiscriminate burning of the waste; and 2) Water and soil pollution due to inappropriate disposal of health care effluents and wastes.

In recent years, Lebanon has made significant progress in health care waste management (HCWM). In 2003, HCW treatment started with two service providers; Arc en Ciel (AEC), and EnvSys. AEC is a Lebanese NGO that began providing HCWM services in 2003. It purchased and installed a wet-type autoclave in Hotel Dieu Hospital in Beirut, one of Lebanon's largest private hospitals. Hotel-Dieu de France treatment facility currently treats the wastes generated solely by the facility. EnvSys, a Lebanese company specialized in HCWM, operated autoclaves on mobile units servicing hospitals. Recently, AEC bought the two mobile units of EnvSys and stabilized them in two locations: one in Zgharta (North Lebanon) and the other in Jisr El Wati (Beirut) The unit cost for the transportation and treatment of HCW ranges between 0.55-0.60 USD/kg as charged by AEC.

In 2004 and 2005, the MoE granted 3 licenses for healthcare waste treatment by incineration; however, these licenses were not renewed till date. The other 7 licenses issued by MoE are for HCW treatment facilities using autoclaves.
Currently, there are two on-site (located at Clemenceau Medical Center (CMC) and Haykal Hospital) and five off-site operating autoclaving/microwaving treatment centers distributed all over the country. All the off-site treatment centers are operated by AEC.

Table 9 presents the number of healthcare facilities treating their infectious wastes according to MoE licenses. MoE is currently revising five Environmental Impact Assessment (EIA) reports for potential new non-burn treatment facilities.

Table 9 : Healthcare Facilities Treating their Infectious Wastes

	Private Medical Laboratories	Public Hospitals	Private Hospitals ((Short-stay
Total Number	171	30	129
No. of HCF treating their wastes	3	6	42
of HCF treating their wastes %	2%	20%	32%
(No. of Beds (Effective		1255	9667
No. of Beds with treated infectious wastes		612	4532
(of Beds with treated infectious wastes (effective %		49%	47%

Hospitals are reluctant to pay for waste treatment. Whether they can afford it or not, hospitals are not accustomed to the notion that the "polluter pays" and need to be made aware of their environmental responsibility. Enforcement of basic HCWM practices will require incentives and good will. Any given hospital has the option of buying the service from a local service provider or buy and operate its own unit on site. Existing waste treatment technologies are not adequately monitored. The efficiency of waste treatment using autoclaves has not been assessed.

Future projects

In an effort to formalize environmentally sound HCWM practices, MoE with the assistance of the EU and UNDP published in 2002 an "Environmental Auditing Manual for Hospitals" that aims to (i) assess compliance with government legislation, regulations and guidelines; (ii) assess adherence to internal policies and procedures; and (iii) identify areas for improvement to minimize the adverse impacts related to HCWM.

Development partners have already committed funds for waste treatment technology. AEC has received a grant from the EU Life Third Countries program to install an autoclave in the Mohafaza of Mount Lebanon (€450,000); the EU has also approved funding for two HCWM projects in the Mohafaza of Southern Lebanon (Abbasiyeh, €342,000) and Mount Lebanon (Chouf Suwaijani, about €220,000) through a program with the Office of the Minister of State for Administrative Reforms (OMSAR); the Spanish Agency for International Development (AECI) has funded a HCWM project in the Mohafaza of Southern Lebanon (Saida) that will be operated by AEC. These initiatives, plus the treatment facility at Hotel Dieu in Beirut, provide a cluster approach to HCW treatment by servicing a group of hospitals.

6. OPTIONS FOR IMPROVEMENT AND DEVELOPMENT

While the priority actions are addressed in more details in Section 11 hereafter, recommended specific actions and options for improvement and development are summarized here below.

Policy/ legal / institutional Framework

- Issue the policy / legal / institutional framework.
- Evaluate the previous strategies and plans of the government, in order to better set future strategies and plans.
- Assess the objectives of proposed projects and concentrate on those projects that assure the sustainability of results, and that are in line with the national strategies and priorities as well as with the local conditions.
- Ensure the institutional viability of any project in terms of commitment and support at both the national (CoM and Parliament) and local (municipalities) levels.
- Ensure political commitment (CoM and Parliament) in support to locally developed strategies.
- Ensure the building up of a global consensus at all levels: communities, municipalities and government, through public awareness campaigns.
- Avoid confinement in standard political visions aiming at balanced regional development; insofar as SWM is concerned, focus should rather be targeted at those areas with local consensus on an agreed upon plan.

Enhancement of the waste management services

- Follow a "progressive coverage" for SWM schemes by proceeding first with tendering of waste disposal operations where there is agreement over specific final disposal locations. In addition, even if a national strategy as well as a complete treatment scheme are not defined yet, the start with the implementation of a landfill (a prerequisite for any type of treatment) as a temporary phase could also be possible.
- Ensure that old dumpsites closure is an integral part of local development vision or strategy; International donors (World Bank, EIB, Islamic Bank, EU, USAID, should be encouraged to fund closure of dumps as part of integrated plan that includes the pre-condition of having an alternative treatment facility. Funding would cover site assessment, detailed design of remediation activities, implementation of remedial project.
- Create a priority list for closure of all dumps, establishing the 10 most important ones to close.

Finance and cost recovery

- Seek information and discuss the steps needed to benefit from the Carbon Credit Program fund aimed at the containment and treatment of gases generated by organic waste under the Clean Development Mechanisms (CDM).

Private sector participation

- Setting the open, transparent and competitive procedures in contracting the private sector in the SWM sector.

Public awareness and capacity building

- Capacity development (detailed in section 3.7 and Annex 9).
- Public awareness / community participation (detailed in section 3.6 and Annex 8).

Management and monitoring

- Setting the mechanism for data management and sharing between the various stakeholders.
- Establishing and support of SWM networks, such as SWEEP-Net network.
- Monitor, in the medium and long term, the future implementation of the strategies, in order to identify the eventual gaps and needed adjustments and improvements.

7. TECHNICAL ASSISTANCE PARTNERS AND DONORS

Annex 12 summarizes current and recent international and donor activity related to the SWM sector in Lebanon. A wide range of international organizations and donors are participating in the sector in the country. A number of projects address different approaches for recovering value from waste, and some address aspects of hazardous waste management relevant to the SWM sector.

The activities and projects are mainly focused on the following sectors:

- Feasibility studies for SWM projects, dumpsites rehabilitation, marketing of compost, etc.
- Development of national strategies and legal/institutional framework for SWM
- Provision of infrastructure for solid waste collection
- Closure of existing dumps
- Execution of SW treatment facilities (sanitary landfills, sorting and composting plants, biogas collection and treatment systems, etc.)
- Strengthening and developing the capacity of stakeholders at the national levels, such as the MoE as well as at the local level such as municipalities
- Awareness programs to population (such as to encourage local inhabitants to implement sorting at the source)

8. OPPORTUNITIES OF NETWORKING AND PARTNERSHIP

Information and knowledge amongst residents and stakeholders are important for efficient and sustainable development in the SWM sector. The poor dissemination of information and knowledge sharing between the various stakeholders, the lack of clear definition of responsibilities in the public sector due to the absence of legal/institutional framework, the poor coordination between the stakeholders, the lack of sufficient capabilities at both the national and municipal levels, the lack of sufficient political support to the SWM sector, as well as the lack of sufficient awareness and community participation in the SWM sector have been key factors hindering the setting up of an efficient SWM in Lebanon, and have given rise to the need for the establishing of networking such as the SWEEP-Net network. The benefits of networking can be well recognized amongst members and stakeholders, and can be witnessed in the contribution to a more sustainable development of the SWM sector.

The opportunities for activities and projects that the SWEEP-Net network is targeting shall be mainly based on the following criteria:

- Are in compatibility with the strategy/priorities/actions of Lebanon
- Reflect a critical demand of the country, not a need of a person or a particular decision maker
- Have a regional dimension: opportunity can be transferred and adapted to other countries in the MENA region
- Can serve as a case study for the MENA group of countries
- Are limited in time and resources

The recommendations concerning the main opportunities and priorities for actions of the SWEEP-Net network in Lebanon, based on the results of the national workshop which has been held on June 1rst 2010, are summarized in Table 10.

Table 10 : Recommendations Concerning Main Opportunities and Priorities for Actions of the SWEEP-Net Network in Lebanon

Solid waste management component	Recommendations concerning main opportunities and priorities for actions of the SWEEP-Net network in Lebanon
Policy, Legislative, Institutional	• Set a campaign for positive lobbying and pressure on decision makers for the approval of an integrated SWM framework (policy, legal, institutional), of a national specific strategy and plan which obtain the consent of the various parties, and for taking the necessary decisions and actions • Set a campaign for participation in the decision making process • Preparation of an evaluation report concerning the proposed draft law on integrated SWM, and applicable decrees • Participation in finalizing the applicable decrees necessary for the implementation of the Integrated Solid Waste Management law following its approval, in the aim to ensure a sustainability of the system (cost recovery, institutional, etc) • Intervention in the decision making process, in setting the plans and strategies in the SWM sector (from their early stages) through eventual representation of the network in the SWM Board, which will be responsible for the waste management in Lebanon in conformity with the proposed draft law on ISWM • Campaigns and workshops for capacity development at both the national and the municipal level in the various technical and administrative sectors (mainly contracting the private sector and managing private sector contracts) • Organization of workshops aiming to strengthen the experience of consultants and operators in specific fields
Planning	• Preparation of an evaluation report concerning the previous strategies and plans of the government, in order to better set future strategies and plans • Preparation of an evaluation report concerning the strategies and plans foreseen by the government (strategy of MoE of 2010) in the aim of : - Identifying the eventually needed adjustments and modifications (mainly in terms of appropriate selection of waste disposal sites and technologies), taking into consideration the specific characteristics and differences between the regions of Lebanon (economic aspects, social aspects, financial level, quantity and type of wastes, environmental aspects, type of waste collection and the possibility of application of sorting at the source in the future, density of population, land availability, presence of agricultural areas, marketability of compost, political aspects, acceptance of the population, etc.) - Providing the decision makers with the power of persuasion • Set-up, following the preparation of the evaluation report, a meeting with the Minister of Environment and the governmental committee for SWM, as well as their support staff, to discuss the foreseen strategy and the corresponding evaluation report • Monitoring, in the medium and long term, the future implementation of the strategies, and preparation of an evaluation report in this respect, in order to identify the eventual gaps and needed adjustments and ameliorations • Study to set a priority list for closure of existing dumps, establishing the 10 most important ones to close • Study for rehabilitation of a selected priority dump which already disposes of a solid waste treatment facility (such as Sour) • Allowing Lebanon to benefit of the Carbon financing, through a study to identify the necessary steps, through workshops for decision-makers, through arranging visits for decision-makers to other MENA countries which already have major successful experience in this sector (such as Tunisia).

Solid waste management component	Recommendations concerning main opportunities and priorities for actions of the SWEEP-Net network in Lebanon
Financing and Cost Recovery	• Study for setting a sustainable system for cost recovery (relying on "polluter pays" principle, setting of specific fee of SWM, etc)
Private Sector Participation	• Assisting in setting the specific measures for setting the open, transparent and competitive procedures in contracting the private sector in the SWM sector • Study to identify the various possible schemes and type of contracts for SWM, and recommend the most appropriate ones • Assisting in the preparation of typical contracts with the private sector operators incorporating the collection of waste sorted at the source (including the awareness campaigns and measures to be undertaken by the Contractor to encourage the adequate participation of the population in the implementation of the sorting at the source)
Public Awareness and Public Participation	• Participation in carrying out public awareness campaigns (waste minimization, sorting at the source). To ensure effectiveness, the campaigns should: - be accompanied with the approval of an integrated SWM framework - be accompanied with communication programs in the media and press - be accompanied with a correlation between the population participation and the benefits to the SWM implementation on the one hand and to the population on the other hand (technical, environmental, financial, etc) • Participation in carrying out public awareness campaigns for decision makers. • Support of specific campaigns for promoting sorting of wastes at the source in the household (priority in a pilot village which already disposes of a composting treatment plant, hence clearly illustrating the correlation between sorting at the source and the improvement of the SWM in general and compost quality in particular) • Strengthening of environmental and solid waste education into all levels of education (schools, university programs, etc), through reviewing and analyzing environmental education programmes and plans, and making recommendations
Technology Application	• Preparation of an evaluation report concerning the plans and treatment technologies foreseen by the government, in coordination with the MoE
Data Management	• Development of a rich and informative website of SWEEP-Net • Setting an adequate system for data management related to SW
Miscellaneous	• Management of industrial and hazardous waste (identification of main industrial and hazardous waste producers and quantities, proposals for management, etc) • Management of medical waste (assessment of the efficiency of existing waste treatment technologies)

On the other hand, examples of practices that Lebanon can transfer to other SWEEP-Net countries could be as follows:

- The legal / institutional framework that Lebanon has drafted (draft law on ISWM) can serve for the preparation of the framework in other SWEEP-Net courtiers.
- Successful implementation of a SWM in Zahleh through the commitment and support at both the national and local levels
- Lebanon, through his SWM experts, can assist in organizing capacity development workshops in other SWEEP-Net countries, in light of their qualifications and experience in this sector

- Lebanon, through his SWM experts, can assist in setting the governmental strategies and plans in other SWEEP-Net countries, or in the preparation of evaluation reports in this respect in order to identify the eventually needed adjustments and modifications

- Common private sector participation in SWM in Lebanon:
  - Efficiency in terms of quality of service
  - Direct relationship between the absence of a competitive procedure and the high costs of SWM
  - Importance of adequate contract terms

- The difficulties and failures that Lebanon has faced in the SMW sector can provide an illustration about the following:
  - The absence of a legal / institutional framework is a major obstacle for the implementation of an ISWM system.
  - The absence of a national strategy leads to high cost emergency plans
  - The absence of a national strategy may lead to the implementation of SWM technologies and projects which are not in line with the priorities of the country and its local conditions

- Experience of Lebanon in the implementation of small community based composting plants, which was not quite satisfactory (for details, refer to Section "Lessons Learned")
- Experience of Lebanon in the rehabilitation of old dumps, mainly Normandy and Zahleh
- Experience of Lebanon in the previous attempts to implement the sorting at the source in some zones in Beirut as well as in some rural villages (for details, refer to Section "Public Awareness and Community Participation")

9. NEEDS FOR TECHNICAL SUPPORT AND CAPACITY BUILDING

Needs for technical support and capacity building may be summarized as follows:

- The adequate country capacity, at the national levels and particularly at the local municipal levels, is one of the critical missing factors in current efforts to build an integrated SWM system. Development efforts will fail, even if they are supported with substantially increased funding, if the development of sustainable capacity is not given greater and more careful attention. This is now widely recognized by donor organizations and partner countries alike, as articulated in the 2005 "Paris Declaration on Aid Effectiveness".
- Poor dissemination of information and knowledge management
- Lack of sufficient public awareness and participation of the population in the SWM sector
- Decision-makers are generalists rather than technical specialists
- Insufficient South-South and North-South-cooperation and know-how transfer.

Developing comprehensive and effective systems of Knowledge Management at a national as well as at a regional scale remains central to the effective environmental management of the Mediterranean region. With internet increasingly available, networks such as the Sweep-Net network will help to ensure that valuable knowledge is being linked via websites and that potential users know where and how to look for information.

Training and capacity building activities may be conducted by the following means:

- Training workshops and e-learning activities
- Technical and advisory services
- Field missions and technical visits
- Development of guiding documents, studies, tools for decision makers
- Regular reports on waste management
- Support of awareness campaigns
- Promoting South-South and North-South cooperation and know-how transfer

Solid waste networks (such as SWEEP-Net network) could play an important role in training and capacity building.
One of the drivers for the success of the capacity development programs is the strong commitment to transition into a knowledge society in Lebanon.

Detailed capacity building and training requirements at the various levels and in the various themes are presented in Annex 9.

10. CASE STUDIES, BEST PRACTICES AND LESSONS LEARNED

Lessons Learned

Lebanese experience with SWM has provided for a range of lessons learned at the various SWM components, which would, when properly assessed and taken into due consideration, lead to an improvement in the SWM sector. These are categorized here below:

Table 11 : Lessons Learned

Solid waste management component	Lesson learned
Policy, Legislative, Institutional	• The political will to consider SWM as a priority on the national agenda is essential • Establishing a legal framework for SWM tackling technical, institutional and financial aspects is of utmost importance • Increasing the number of staff at the MoE is essential for ensuring adequate monitoring of the SWM system in the country • Well-established leadership and proper coordination between all the related institutions and administrations are vital for ensuring the successful implementation of a SWM strategy • The municipalities lack the human resources and technical skills for management of SW treatment facilities
Planning	• Setting up agreed upon plans and strategies between public administrations (CDR, MoE, municipalities, union of municipalities, ...) is a key element of any successful SWM system • Defining both a short term and a long term strategy with clear timeframe is needed to avoid resorting to emergency plans • Good plans requires transparency and cooperation with the local communities
Financing and Cost Recovery	• Creation of sustainable cost recovery systems relying on "polluter pays" principle is vital • Financial reinforcement of the municipalities is required to give them the possibility of playing their key role • Proven diverse competence among the private sector is essential to enhance competitiveness and achieving better services at better prices • Creation of incentives for municipalities is essential to encourage them to participate in SWM and host waste treatment facilities.
Private Sector Participation	• Good service can be achieved by the private, as is the case in Zahleh and at acceptable prices, with open, transparent and competitive procedures. • Inadequate contract terms lead to consequent problems • Privatization by the municipalities of the collection system is beneficial

Solid waste management component	Lesson learned
Public Awareness and Public Participation	• Sharing all the strategies and plans with the public and communities is a key factor in creating a circle of trust between them and the government • Sorting at the source can be very helpful for the improvement of the quality of compost and the increase of recyclables
Technology Application	• The adaptability of the treatment technology selected to the general characteristics in Lebanon and specific characteristics of each region is of major importance, particularly concerning the following factors: economic aspects, social aspects, financial level, type of waste, possibility of application of sorting at the source, density of population, land availability, presence of agricultural areas, marketability of compost, etc.). • Considerable operational problems may be suffered in small community based projects, due to technical failure in the systems, or to financial, institutional and/or legislative barriers.

Example 1: Integrated Solid Waste Management in Zahleh

Project:

The project consists of collecting about 180 tons of municipal waste from some municipalities in the caza of Zahleh, sorting the waste to remove the recyclable materials, landfilling the refuse in the adjacent sanitary landfill. The gas coming out from the landfill is being flared and the leachate is collected and treated. The collection and treatment of wastes is contracted to the private sector at competitive prices (for details of prices, refer to other sections of the report). The implementation of the landfill site in Zahleh has been successful through a process that included public awareness, consultation and participation, but also the strong support of the local politicians and authorities.

Lessons learned:

- Municipalities can have a success story in SWM independently from the government.
- Viability of any SWM project necessitates the commitment and support at both the national and local levels
- Collection could preferably be the responsibility of the municipalities (while encouraging contracting with the private sector)
- Low cost per ton of sorting and landfilling a compared to other areas in Lebanon, due to proper competitive contracts with the private sector
- Make use of all the funds and loans provided to the municipalities from various donors like the EU, USAID, YMCA, World Bank, etc., in an orderly manner compatible with the local needs and priorities

Recommendations:

- Allow the municipalities, such as Zahleh, to create a cost recovery system to be able to pay all the operation, maintenance and construction costs in the future.
- Ensure political and municipal commitment for SWM projects
- Possibility of adopting similar project schemes for other municipalities or unions of municipalities
- Give such municipalities financial and legal incentives to start awareness campaigns on sorting at the source first and then composting, since the project is in the admidst agricultural lands.

References:

Mr. Assaad Zgheib – former president of the municipality (for coordinates, refer to Annex 3)

Example 2: Solid Waste Management in Saida

Project:

In the aim of replacing open dumping which has always been undertaken in the city of Saida (existing dump at the shore), a private company has built a treatment plant for a max capacity of 300 tons/day (possibly extendable to 450 tons/day) to treat the waste collected from the cazas of Saida and Jezzine (under a BOO contract) in return of a tipping fee per ton of waste. The plant is composed of a sorting phase, an anaerobic digester and an open area for compost maturation. This plant is however not operational yet mainly due to contractual and financing problems. It is to be noted that the construction of the project has faced many difficulties, suspensions and delays, and consequently induced delays in the start of operation. This was mainly due to the lack of prior agreement with the concerned municipalities (other than Saida), the lack of capacity of the municipalities to pay the set tipping fees, as well as the lack of a law prohibiting the disposal of waste in a haphazard manner in regions where a proper treatment system already exists hence obliging the municipalities to transport their waste to the treatment system. This problem is currently under negotiation between the concerned authorities and the operator for finding the appropriate solutions.

Lessons learned:

- Although it is a proven technology abroad (constructed by a German firm, with its operation foreseen to be supervised by the same firm), this technology is not yet tested in Lebanon, particularly in the absence of sorting at the source.
- The absence of prior agreement with the various municipalities to be eventually served by the facility, of a legal framework on SWM as well as of a cost recovery system has created contractual difficulties.
- The municipalities, mainly the small ones, cannot afford to pay for the treatment of their waste using this kind of treatment, particularly in the absence of a cost recovery system

Recommendations:

- A new contract should be signed with all the municipalities involved
- Locate a new site for the disposal of inert materials preferably before starting the operation.
- Assist in the preparation of typical contracts with the private sector

References:

- Environmental Impact assessment presented to the MoE.
- Environmental audit prepared and presented to the MoE.
- Reference: Name: Ghassan Firzli – Institution: IBC – Position: Project manager – Mob: 00961 3 682417 – Fax: 00961 7 736184 – email: g-ferezli@ibc-enviro.com

Example 3: Small Community Based Composting Plants

Project:

11 small community based composting plants were built in selected municipalities throughout Lebanon, particularly in the South. They were funded by the Non-Governmental Organisms (NGOs) "Young Men's Christian Association" (YMCA), "Pontifical Mission" (PM) and "Creative Associates International Inc." (CAII) with the aid of finance from United States Agency for International Development (USAID). The execution of the plants has been undertaken by the private sector. The operation of the majority of the plants is carried out by the municipalities themselves.

Lessons learned:

- Some of the plants suffer considerable operational problems which are due to technical failure in the systems, or to financial, institutional and/or legislative barriers.
- The absence of sorting at the source as well as proper sorting and refining units at the plant is a major obstacle for the production of good quality compost and hence its marketability
- Some of the municipalities do not have the technical capacity for the proper operation of the plant.
- The small scale of the plants would not a allow to develop economies of scale that would reduce overall costs and would also focus available technical expertise on fewer facilities for which higher levels of performance would be feasible.
- The rushed planning of the aids implementation for some of the plants is one of the problems.

Recommendations:

- Support of specific campaigns for promoting sorting of wastes at the source in the household, in a pilot village which already disposes of a composting treatment plant, hence clearly illustrating the correlation between sorting at the source and the improvement of the SWM in general and compost quality in particular
- Assist in marketing of compost
- Encourage contracting operation to private sector
- Better planning of bilateral arrangements and aids, in order to ensure that the SWM technologies and projects are in line with the priorities and strategies of the GoL as well as the local conditions, in the aim of ensuring a better effectiveness of these aids.

References:

Evaluation Report - Rural Material Recovery and Composting Facilities In Lebanon - Output of Short Term Input From 15 September To 14 October 2004 - Submitted to the Ministry of Environment of the Republic of Lebanon - Project MSC IPP Environment - MVV Consultants and Engineers - Berlin, October 2004

11. ANALYSIS AND PRIORITIES FOR ACTION

Analysis

The SWM sector in Lebanon is marked by extremes between the sector in Greater Beirut and the sector elsewhere in the country. In Greater Beirut, a SWM system has been developed that is relatively advanced; however, the system involves multiple handling of wastes and cost structures that make it expensive to the point that municipalities that participate in the system are being starved of funds for other municipal services. Outside Greater Beirut (with the exception of Zahleh, Tripoli and some small communities served by composting units), waste management systems are generally characterized by rudimentary «collect and dump» approaches. The Greater Beirut budget for SWM would have allowed the improvement of the waste management system in the country if it had been more optimized.

The basis of this inequity lies in initiatives taken to reconstruct SWM systems following the Lebanese war. An immediate response of the GoL following the war was to create the CDR, whose mandate included development and implementation of a SWM program for Greater Beirut; this has been achieved, but at high cost and, from a technical perspective, imperfectly. At the same time, the SWEMP initiative was intended to address waste management priorities elsewhere in the country; difficulties in institutional collaboration at the national and local levels made the project difficult to implement and its benefits have not been widely felt.

Enhanced SWM performance requires to adress institutional issues facing the sector. These focus on the roles and responsibilities of three institutions: The MoIM, the MoE and the CDR. The legal framework makes clear that solid waste collection and disposal (but not explicitly waste treatment or recovery of value from solid waste) is the responsibility of municipalities, represented by MoIM at the national level. The legal framework makes equally clear that the MoE has the responsibility for environmental regulation of the SWM sector. However, the absence of implementing instructions regarding the application of this mandate means that it is not clear what the specific roles and responsibilities the Ministry has in this regard and how these relate to the mandate of municipalities regarding solid waste collection and disposal. As a result, both MoIM and MoE believe that they have jurisdiction for SWM policy, legislation, strategy and planning and both have developed SWM strategies for the country. In addition, CDR has also put forward its perspective regarding SWM. Uncertainties regarding institutional authorities and duties can be resolved through the issuing of the Draft Law in ISWM and the related applicable decrees, as well as the development of implementing instructions under the relevant legislation/decrees governing each institution, to define precisely the role of MoE in the sector and the relationships between MoE, MoIM and CDR in this respect. The role of the SWM Board, as defined by the Draft Law, shall be to bring the various stakeholders together.

Resolution of these issues is central to establishing an effective and equitable SWM sector. In addition, however, a range of other issues need to be addressed regardless of how the institutional issues are resolved. These include:

- Development and issuing a guiding ISWM policy and strategy.
- Efficient implementation of private sector participation in the sector.

- Focus on enhanced cost recovery.
- Capacity development.
- Enhanced public awareness.

A **guiding ISWM policy and strategy** is required to establish a framework for development of new waste management systems. Outside Greater Beirut and Mount Lebanon, the priorities of an ISWM policy and strategy should be to: (i) put an end to the uncontrolled dumping and indiscriminate burning of solid waste and the negative environmental impacts these create, and the introduction of controlled dumps or, preferably, landfills; (ii) provide for environmentally and economically sustainable recovery of value from wastes through, primarily, recycling and composting or other treatment plants (type in function of the local conditions) and taking into account the activities of the informal sector; and (iii) identification of an enhanced institutional framework at the local level with capacity development, to be compatible with new waste management systems, including participation by the private sector. This last-identified priority should bear in mind the cost advantages of a regionalized SWM system, and the inability (to date) of GoL to entice municipal cooperation in this regard even with very attractive fiscal incentives.

Within Greater Beirut and Mount Lebanon, the immediate need is to establish a new landfill or treatment facility compatible with the local conditions to replace the Naameh landfill, which was extended reportedly beyond its initially foreseen lifespan, and from which leachate is hauled and dumped into the Mediterranean Sea. GoL incentives to elicit a «willing host» municipality for the required landfill have not produced results. Either a new landfill siting approach is required (such as identified above), or a new technical basis for managing waste. The effective need however is to identity alternative treatment techniques, such a waste-to-energy, which would ensure the treatment of GBA and Mount Lebanon wastes with possible electricity generation and minimization of refuse to be disposed of.

It is to be noted that the various proposed plans (mainly the CDR plan of 2005 (sorting and composting in each caza even in Greater Beirut and Mount Lebanon) as well the MoE plan of 2010 (Waste-to-energy systems even in rural agricultural areas with low income)) have set a unified technology all over the country without taking into consideration the specific characteristics and differences between the regions. Hence, it is considered that there is a need for a technology adapted to the specific characteristics and differences between the regions (economic aspects, social aspects, financial level, quantity and type of wastes, density of population, land availability, presence of agricultural areas, environmental aspects, etc). New waste-to-energy technologies may be a relevant option for Greater Beirut and Mount Lebanon. However, the need to assess the possibility of adopting less expensive technologies of treatment such as composting and landfilling in the other regions and particularly rural areas should be considered. Concerning composting, the main factors to be considered could be as follows: i) presence of agricultural areas; ii) quality and marketability of compost; iii) possibility of application of sorting at the source allowing the improvement o the quality of compost and its marketability.

Private sector participation in the SWM sector is very common in Lebanon at the level of provision of waste collection services. The private sector also operates the SWM system in Greater Beirut and the other main cities. However, private sector financing of waste management facilities under a DBO, BOT or similar arrangement has not been widely undertaken, particularly outside Greater Beirut and Mount Lebanon.
Current approaches to managing PSP should be enhanced. Contracts are frequently awarded simply on the basis of lowest cost and without adequate consideration of the capability of the bidder to in fact deliver the services at the standards required. On the other hand, SWM contracts in Greater Beirut have been awarded on a non-competitive basis for a contract duration of a decade and with a high cost contract.

Neither scenario is conducive to maximizing public benefit from private sector participation in the SWM sector. Standardized private sector contracting and contract management procedures are required.
More effective and new measures for SWM cost recovery are required. Local capacities to finance SWM recurrent costs are severely limited by low levels of tax collection. This has specific relevance to the SWM sector, but is clearly a broader issue of municipal finance. Application of the «polluter pays» principle, however, in conformity with the aim of the Draft Law on ISWM, would result in the introduction of a new stakeholder (producers/importers/distributors of products that become waste) and the injection of new funds on a fair and equitable basis that could be applied to waste management financing and cost recovery. Importantly, this would also play a role in encouraging waste minimization in the country. The «user pay' principle should also be applied with respect to all medium and large sized industrial, commercial and institutional operations for the same reasons.

Capacity development requirements occur at three levels: institutional, management, technical knowledge. At an institutional level, the implementation of enhanced waste management systems will require creation of local organizational units through which to deliver enhanced waste management services and the commitment of resources to staff and train those units. At a management level, enhanced capacity in waste management decision making is required in support of building cohesive waste management systems to replace the prevalent «collect and dump» approaches commonly used outside Greater Beirut. At all levels, enhanced capacity to supervise private sector tendering, contracting and contract management either is, or will be, required as the private sector becomes involved in more complex aspects of waste management systems. At the level of technical knowledge, capacity development is required at national and local levels on the integration of SWM techniques and technologies into SWM systems.
A need for enhanced public awareness underlies several of the above requirements. Greater awareness on the part of the public regarding the social, economic and environmental impacts of inadequate waste management, options available to improve waste management systems and the costs of existing and potential future waste management systems will drive change and lead to identification at national and local levels of new initiatives.

Short term 1-3 years

Table12: Priority for Action (Short Term 1-3 Years)

ISWM Component	Priority For Action 1-3 years
Policy/Legal/ Institutional/ Planning	• An appropriate legal framework can be developed for the SWM through the issuing of the Draft Law. Once this is done, applicable decrees should be developed on a priority basis for adoption in order to give practical effect to the framework in this sector. • Establish leadership at the national level for the sector. A national entity with political authority to define - in consultation with others - a national SWM agenda is required. This issue has been addressed in the Draft Law in ISWM through the creation of the SWM Board. • Establish strategic priorities, the implementation roles of SWM Board, MoE, MoIM and CDR, and the measures and mechanisms that will be used to achieve priorities; legal instruments, public awareness and related activities can then be developed to give effect, as necessary, to the strategy. .. • Evaluate previous strategies and plans of the government, in order to better set future strategies and plans • Approving specific implementable national policy and strategy for an integrated SWM scheme (with particular consideration to the adaptability of the technology selected to the local characteristics of each region in Lebanon, as well as to the site selection) • Enforce the Law for prohibiting non-environmental disposal practices, such as forcing the municipalities to transfer their waste to the assigned treatment facility once it is operational. • Increasing the number of staff at the MoE is essential for ensuring adequate monitoring of the SWM system in the country • Capacity development is a priority at national and municipal levels, and is required according to the framework presented in Annex 9. To have maximum value, capacity development should be undertaken in the context of current issues faced by relevant individuals and entities. • Campaigns and workshops for capacity development at both the national and the municipal level in the various technical and administrative sectors (mainly contracting the private sector and managing private sector contracts)
Financing/ Cost Recovery	• Implement facilitated improved cost effectiveness through new waste management facilities serving wider regions. This would not only develop economies of scale that would reduce overall financing and recurrent cost, but would also focus available technical expertise on fewer facilities for which higher levels of performance would be feasible. • New municipal arrangements and inter-municipal agreements should be encouraged at the waste collection level, for eventual similar benefits. Inter-municipal agreements can come about through agreement of municipalities to work together, or through institutional reform brought about through a legal instrument. • Support can be given to establishing new inter-municipal structures through which to optimize waste management infrastructure. • Identify possible sources, schemes and types of contracts for financing SWM projects • Creation of sustainable cost recovery systems relying on "polluter pays" principle, and specific fees for SWM (phased implementation - partial cost recovery in the short term). • Financial reinforcement of the municipalities to give them the possibility of playing their key role. • Study best ways to benefit from Carbon financing.

ISWM Component	Priority For Action 1-3 years
Private Sector Participation	• Acting on principles of open, competitive bidding using transparent and equitable procedures, practices that are well understood in other contexts and which should be equally applied in the SWM context. • Support can be given to rationalizing private sector service costs. • Standard procedures can be developed through which to achieve transparent, equitable and accountable contracting of private sector services. These should be formally adopted so that risk of political manipulation of the tendering process is minimized. • Preparation of typical contracts with the private sector operators • Encourage municipalities to privatize the collection system.
Public Awareness/ Community Participation	• Sharing all the strategies and plans with the public and communities to create a circle of trust between them and the government • Support of specific campaigns for promoting sorting of wastes at the source in the household • Undertaking public awareness campaigns
Infrastructure	• Introduce "polluter pay" frameworks that require financial and other participation in the waste management system by manufacturers, importers and distributors of products that become priority wastes when they are discarded. The application of these frameworks should be integrated with existing informal recycling activity. • Need for technology adapted to the specific characteristics and differences between the regions (economic aspects, social aspects, financial level, quantity and type of wastes, density of population, land availability, environmental aspects, presence of agricultural areas, quality and marketability of compost, possibility of application of sorting at the source allowing the improvement of the quality of compost and its marketability, etc.) • Adopting new waste-to-energy technologies in Greater Beirut and Mount Lebanon, especially where it is impossible to have sanitary landfills. • Considering the possibility of adoption of other less expensive modes of treatment such as composting and landfilling in other regions and particularly in rural areas, especially where there is no objection on sanitary landfills. • Set up a priority list for closure of existing dumps, establishing the 10 most important ones to close and establish a rehabilitation study, towards ensuring their closure, namely: Saida, Sour, Baalbeck. • Management of medical waste (assessment of the efficiency of existing waste treatment technologies)
Data Management	• Enhance the need for improved waste generation data on which to base waste management decision-making. • Setting an adequate system for data management related to SWM • Establishing and support of SWM networks such as SWEEP-Net network

In light of the critical SWM situation currently prevailing in Lebanon, it is deemed vital that priority actions take place during the 1-3 years time frame. However, with the common delays usually occurring due to various socio-political factors, it is expected that some of these activities may be shifted within the 3-5 years timeframe.

Medium term 3-5 years

Table13: Priority for Action (Medium Term 3-5 Years)

ISWM Component	Priority For Action 3-5 years
Policy/Legal/ Institutional/ Planning	• Monitoring of the implementation of the SWM strategies and plans in order to identify the eventual gaps and needed adjustments and ameliorations • Continuous process for capacity building.
Financing/ Cost Recovery	• Development and adjustment of sustainable cost recovery systems relying on "polluter pays" principle, and specific fees for SWM (phased cost recovery).
Private Sector Participation	• Monitoring of the private sector participation under more complex contract types
Public Awareness/ Community Participation	• Continuous process for public awareness.
Infrastructure	• Management of industrial and hazardous waste (identification of main industrial and hazardous waste producers and quantities, proposals for management, etc). • More enforcement of the requirements for management of medical waste
Data Management	• Regular updating of data related to waste generation • Continuous process for improving the data management system related to SWM • Participation of the governmental ministries and institutions in the financing of the activities and projects of SWM networks such as SWEEP-Net network

ANNEX 1: MSW GENERATION INCREASE RATE

The foreseen municipal solid waste generation growth rate of 1.65% per year corresponding to the total waste generation is also compatible with the figures foreseen within the study "Assistance in Site Selection and Preparation of Environmental Studies for Solid Waste Facilities in Lebanon - July 2007 – prepared by the Consultant Rafic El Khoury and Partners" and the report "Country Environmental Analysis Report on Municipal SWM (Draft version No. 5, February 28, 2010)" prepared by Anders Haldin, World Bank (rate of 1.65% per year foreseen in both reports). These reports have in fact considered the annual growth rate for both the population and the total waste generation as equal to 1.65%, which results in a waste generation per capita remaining unchanged. Doubts may be raised concerning this assumption in light of an improvement of the quality of life and economic conditions which would generally lead to an increase in the waste production per capita. However, in the present report, the total waste generation growth rate of 1.65% per year has been retained taking into consideration the following factors:

- The population annual growth rate has been less than the 1.65% during the recent years due to the political and economic difficulties encountered in the country as well as the high emigration rate (annual growth rate ranged from 1.48 % to 1.63% from 2004 to 2008 according to the report "Country Environmental Analysis Report on Municipal SWM (Draft version No. 5, February 28, 2010)", while the total growth rate between 2004 and 2007 according to Central Administration of Statistics (CAS) was 0.11%).
- The increase in the waste production per capita in light of an improvement of the quality of life and economic conditions may be counterbalanced if actions are taken in the future with increased public awareness and waste generation reduction efforts.

As an overall figure for the country, the waste generation growth rate of 1.65% per year could be considered reasonable in light of the current conditions prevailing in Lebanon.

COUNTRY REPORT ON THE SOLID WASTE MANAGEMENT IN LEBANON

ANNEX 2: SWM LEGAL FRAMEWORK

(Partially based on Doug Hickman & Farouk Merhebi, The International Consortium GTZ – ERM – GKW, World Bank, METAP, RSWMP , Ministry of Environment, Lebanon, "Country Report – Lebanon", January 2004)

Type of Instrument	Name of Instrument	SOLID WASTE MANAGEMENT ELEMENTS					
		Waste types addressed	Functional responsibilities	Waste management	Institutional roles addressed	Financing and cost recovery	Other
Environment and other Laws							
Municipal Law	Legislative Decree 118 (June 1977)	Waste in General	Role and functional responsibilities of Municipalities	Cleanliness, sweeping and waste disposal	Institutional functions of the municipal council	Direct and indirect tax	
Waste Management Laws	Law 64/88 (August 1988)	Toxic/ dangerous substances	Creation of a higher council for the protection of environment	Preservation of the environment against pollution from hazardous waste and toxic substances; producer is responsible for the proper management of waste	Enforcement and monitoring	Sanctions on failure to manage waste properly	
	Law 216 (April 1993)		Development of management strategy for solid waste	Protection of the environment from all types of pollution	Creation of MoE		
	Law 387 (4/11/1994)	Hazardous waste	Regulation of transport of hazardous waste	Ratification of Basel Convention for the transport of hazardous waste by Lebanon	Role of MoE in permitting, enforcement and monitoring		
	Law 667 (December 1997)		Preparation of legislation to protect environment Setting standards Permitting for industries		Update of the role of the MoE and change its internal structure		
	Law 444 (July 2002)	Waste in general	Framework Law for the protection of the environment in general	Development of future decrees for EIA, waste management facilities specifications, hazardous waste	Role of MoE in enforcement and monitoring	Fund for environment: from fines, donations, grants, national budget	Penalties (monetary and jail) for violations
Decree	Decree 8735 (August 1974)	Domestic waste	Municipalities responsible for collection/ disposal of waste	Wastes may not be dumped in public places or private lands adjacent to roads and residential districts; Containers/collection vehicles must be covered	Disposal site must be approved by the Mohafaza		
	Decree 8006 (June 2002)	Waste from health care institutions	MoE approves EIA MoE provides permit	Handling, storage, transport, treatment, disposal	MoE, Ministry of Public Health	Producer is responsible for treating waste	
	Decree 9093 (November 2002)		Incentive to locate waste treatment and disposal facilities within municipal boundaries	Locating treatment and disposal facilities within the municipal boundaries	Municipal allocation from the Municipal fund	Municipalities to receive five times allocated money in municipal fund if they accept waste facility; up to ten times if they accept waste from over 10 municipalities	Never implemented by the government

COUNTRY REPORT ON THE SOLID WASTE MANAGEMENT IN LEBANON

Type of Instrument	Name of Instrument	SOLID WASTE MANAGEMENT ELEMENTS					
		Waste types addressed	Functional responsibilities	Waste management	Institutional roles addressed	Financing and cost recovery	Other
Decision	Decision 71/1 (May 1997)	Industrial and hazardous wastes	Regulation of the import of specific wastes	Waste of certain types requires the approval of MoE to be imported	MoE enforces regulation		
				Other wastes banned from Lebanon			
	Decision 8/1 (January 2001)		Wastewater and atmospheric discharge standards		MoE responsible for enforcement and monitoring		
Other (Policy, Bill, draft regulation etc.)	Draft law on ISWM (2005)	Solid waste	Responsibilities of various stakeholders	Proper management of solid waste	Setting framework for institutional aspects and financing and cost recovery	To be defined in applicable decrees	
	Strategy and policy for SWM issued by MoE (March 2010)	Municipal solid waste	Development of a policy framework for SWM	Contracting SWM projects	Setting priority for issuing legal framework		
	Draft EIA decree (2003)	All types	Approval of MoE on EIA	All waste management facilities require EIA	Role of MoE in reviewing and assessing the EIA reports		Projects that require full EIA or partial EIA
	Draft decree for the Management of Industrial and Hazardous waste (2003)	Industrial and hazardous waste classification	MoE is responsible for enforcement and monitoring	Identification, handling, storage, transport, treatment, disposal, record keeping	MoE is responsible for plans and strategies , enforcement and monitoring	Producer is responsible for waste treatment/disposal	Sanctions in cases of violation
	Draft decree for permitting institutions managing industrial and hazardous waste (2003)	Industrial and hazardous waste	MoE grants permits	Procedures for requesting permits for transport, storage, treatment and disposal of industrial and hazardous waste	MoE is responsible for granting permits, enforcement and monitoring	Sanctions	Provides guideline for disposal operations
							Guidelines for industrial and Hazardous waste landfill sites

ANNEX 3: INSTITUTIONAL FRAMEWORK

Institution	Function	Mandates
	National	
Ministry of Environment	Regulatory and monitoring authority Capacity development and awareness Specifications and standards for waste management technologies	Bassam Sabbagh b.sabbagh@moe.gov.lb
Ministry of Interior and Municipalities	Waste management at local level Legal framework Financing and cost recovery mechanisms (IMF) Capacity development Waste management technologies	Ahmad Rajab eng.ahmadrajab@hotmail.com
Council for Development and Reconstruction	Implementing authority at a national scale Preparation of bidding documents, and contracting and management of SWM projects Capacity development and awareness	Bassam Farhat bassamf@cdr.gov.lb
Ministry of Public Health	Medical waste management Conservation of public health	Farid Karam
Ministry of Finance	Financing and cost recovery mechanisms (IMF) Role to play in the future according to the draft law on ISWM : Financing treatment of SW	Charbel Chedraoui
Ministry of Public Works – General Directorate of Urban Planning	Classification of the surrounding areas to the SWM sites	Elham Abou Cherfan
	Local	
Municipal (all municipalities in Lebanon are concerned); selected main municipalities are herebelow:		
Municipality of Zahleh	SWM, contracts management, supervision and monitoring, financing and cost recovery	Assaad Zgheib
Municipality of Tripoli	SWM, contracts management, supervision and monitoring, financing and cost recovery	
Union of municipalities of Jbeil	SWM, contracts management, supervision and monitoring, financing and cost recovery	
Union of municipalities of Tyre	SWM, contracts management, supervision and monitoring, financing and cost recovery	
Municipality of Baalbeck	SWM, contracts management, supervision and monitoring, financing and cost recovery	
Union of municipalities of Chouf Esswayjani	SWM, contracts management, supervision and monitoring, financing and cost recovery	

ANNEX 4: STRATEGIES, ACTION PLANS AND PRIORITIES

Waste management components	Nature of strategy/ priority	**Articulation of strategy/ priority**
Policy/Institutional	• Draft Law on Integrated SWM presented by MoE to CoM in 2005, but is still under review. • CDR Waste Management Plan in 2005	• Not approved yet • Approved by Council of Ministers in June 2006. Not yet implemented due to difficulties (financing availability, objections against some sites locations)
	• Strategy presented to the council of Ministers by the Ministry of Environment (March 2010) • Need for issuing the legal framework for integrated solid waste management in Lebanon • Need for Issuing the strategy of MoE • Need for preparing and issuing the applicable decrees for the draft law (draft was previously under preparation) • Campaigns and workshops for capacity development at both the national and the municipal level organized Need for more campaigns and workshops	• Not approved yet; expected to be issued in June 2010
Finance/Cost Recovery	• Draft Law on Integrated Solid Waste Management sets the general framework for finance/cost recovery systems; • Need for preparing and issuing the applicable decrees for the draft law and pertaining to financing and cost recovery systems • Need for strengthening the financial capabilities of the municipalities, in order to give them the possibility of carrying out their responsibilities in terms of waste collection and treatment, awareness, monitoring, etc	• Not approved yet
Private Sector Participation	• Draft Law on Integrated Solid Waste Management aims at encouraging Private Sector Participation (PSP) in WM activities. • Need for preparing and issuing the applicable decrees for the draft law and pertaining to Private Sector Participation (decree that specifies procedures and specimen contracts to be followed in the procurement of WM projects)	• Not approved yet
	• According to MoE strategy of 2010: Involving the private sector in the operation of SWM in Lebanon under B.O.T. contracts for 25 years	• Not approved yet; expected to be issued in June 2010

Waste management components	Nature of strategy/ priority	**Articulation of strategy/ priority**
Community	• Awareness campaigns and capacity building for communities in the neighborhood of SWM plants and landfills, carried out • Public consultation campaigns in the process of site selection of SWM facilities • Direct involvement of the communities in the neighborhood of SWM plants and landfills (municipality, NGOs, universities, etc.) in the system of monitoring and supervision of these facilities • Various strategies set faced a lot of objections from the part of the population of the concerned regions (example, CDR plan of 2005, mainly concerning Jbeil and even Chouf) • Some attempts for public awareness campaigns were not quite effective • Need for awareness campaigns and public participation to facilitate the acceptance and implementation of the strategy of the MoE (mainly concerning the waste-to-energy technologies like incineration).	
Waste Management System/ Technologies	• The various proposed plans (mainly the CDR plan of 2005 (sorting and composting in each caza even in Greater Beirut and Mount Lebanon) as well MoE plan of 2010 (Waste-to-energy systems even in rural agricultural areas with low income) have set a unified technology all over the country without taking into consideration the specific characteristics and differences between the regions • Need for technology adapted to the specific characteristics and differences between the regions (economic aspects, social aspects, financial level, quantity and type of wastes, density of population, land availability, presence of agricultural areas, environmental aspects, etc) • New waste-to-energy technologies may be a relevant option for Greater Beirut and Mount Lebanon • Need to assess the possibility of adopting less expensive technologies of treatment such as composting and landfilling in the other regions and particularly rural areas • Bilateral arrangements between Lebanon and some of the funding agencies for execution of SWM facilities: some would be based on technologies which agencies may sometimes want to promote and which may not be in line with the final priorities and strategies of the GoL as well as the local conditions.	

ANNEX 5: SOLID WASTE MANAGEMENT PLANNING AND INVESTMENT PROGRAMS

Planned investments		
Institutional level	**Action**	**Projected investment requirement**
National	• CDR Waste Management Plan in 2005: Approved by Council of Ministers in June 2006 (based on 4 service areas, and sorting, composting and landfilling). Not yet implemented due to difficulties (financing availability, objections against some sites location) • Strategy presented to the council of Ministers by the Ministry of Environment (March 2010)	• The total investment cost (including design, VAT, contingencies and land acquisition) for sorting and composting facilities (one in each of the 26 cazas) as well as for disposal sites (8 sanitary landfills) is estimated at USD 400 millions. • Not approved yet by CoM; expected to be issued in June 2010
Governorate	Rehabilitation of Saida dump : Rehabilitation not started yet. The dump is still receiving an amount of approximately 300 t/d, and it is currently being expanded	• Grant from Saudi Arabia with a budget of $US20 million provided to the municipality of Saida • Another grant of $US5 million is provided to the municipality from El walid Bin Talal foundation
Investment commitments		
Sector/ locality	**Project**	**Investment commitment**
	"Appui à la préparation de projet de gestion de déchets solides": its objective is to provide financial support to municipalities or group of municipalities for the preparation and execution of waste management projects (execution of some sorting and composting plants, provision of waste collection equipment, as well as awareness and capacity building campaigns) (2004-ongoing).	Budget 10.2 Million Euros (grant from EU) Support for decentralized waste management initiatives (individual projects' budgets ranging between 100 thousand and one million Euros)
	Extension of "à la préparation de projet de gestion de déchets solides": its objective is to provide financial support to municipalities or group of municipalities for the preparation and execution of waste management projects (execution of some sorting and composting plants, provision of waste collection equipment, as well as awareness and capacity building campaigns) (2006-ongoing).	Added budget : 4 million Euros (grant from EU) Support for decentralized waste management initiatives (individual projects' budgets ranging between 100 thousand and one million Euros)
	Sorting plant in Zahleh and composting plant in Jbeil, as well as small community based composting plants in selected villages in South Lebanon (2001 –till date)	USAID - Support for decentralized waste management initiatives through financing of individual projects on a municipal level

Investment commitments		
Sector/ locality	Project	Investment commitment
	Emergency Plan for SWM within Greater Beirut Area: Started in 1998; it currently includes the collection of 2,400 t/d, sorting of 2,400 t/d, composting of 300 t/d of organic material, recovering of 160 t/d of recyclable materials, baling and wrapping of the rest, and disposal in a sanitary landfill. Contracts for waste treatment were signed for 10 years, and were renewed for 3 years in 2008, and renewed for another 3 years until end of 2013.	Investments include the provision of project infrastructure (2 sorting plants, 1 composting plant, warehouse storage facility, a sanitary landfill) for the disposal of municipal wastes and a landfill for inert and bulky materials. The budget for operating this system (collection and treatment) is approximately $US 130 million/yr
	SWEMP (outside Greater Beirut area): Project was initiated in 1996. Objectives were to equip municipalities outside the GBA with collection vehicles, close open dumps, construct between 10 to 15 sanitary landfills, capacity strengthening of municipalities and promotion of public sector participation.	Project put on hold at several occasions. World Bank loan of $US55 million was reduced to $US25 million to provide equipment and infrastructure for waste management. The capacity development component was not executed. Project closed at end of 2003. Only around $US5 million was spent for the construction of Zahleh landfill and provision of collection equipment and landfill mobile equipment
	Construction of an anaerobic digestor in Saida	BOO contract with a contractor from the private sector
	IPP solid waste (in the pipeline): objective is to provide support to Lebanon in achieving a self sustaining system for SWM	Budget: 1.1million Euros (grant from EU) Institutional and technical strengthening of municipalities, fostering of private sector participation, technical support for adequate public sector management
	IPP environment (started in 2002, ends in 2005): Strengthen the capacity of MoE in all related environmental matters including waste management	Budget 2.0 Million Euros (grant from EU) Support for immediate solid waste action, explore investment options in recycling industries, explore potential for privatization
	• Normandy (Beirut) dump reclamation • Started in 1999- ongoing • The project consists of sorting and treating the existing waste and recovering materials suitable for reclaiming an area from the sea.	Initial budget $US71 million paid by SOLIDERE (company for the development of Beirut Central District). SOLIDERE will reclaim double the size of the landfill and transform it to a prime real estate area. Final budget $US100-150 million.
	Zahleh landfill: construction of a sanitary landfill for Zahleh and the surrounding municipalities (initially foreseen 30 municipalities; currently served 18). Landfill operation started in 2002.	• Financing was undertaken under SWEMP (70 % from WB and 30 % local contribution). The total budget is $US 2.4 million. WB covered the cost of operation during 2 years ($US1.5 million). • Project includes capacity development and training on landfill operation for municipalities of the area.

Investment commitments		
Sector/ locality	Project	Investment commitment
	Zahleh dump rehabilitation: wastes were excavated and moved into a cell within the new sanitary landfill	• Financing was undertaken under SWEMP.
	• Chouf Es-Swayjani waste management plan. Preparation of a SWM plan for nine municipalities of the federation. • Project will identify institutional structures, propose a waste management plan, identify potential recycling industries and market for compost, and sensibilization of the population on SWM	• Financing from France- Lille Metropole Urbaine (grant). Project executed in 2003 • The same funding agency financed a project for the closure of the Slayyeb dump
	Expansion and management of the Tripoli dumpsite. A sea wall has been constructed around the dump to lower the risk on the environment. Collection Vehicles were provided under SWEMP project.	Financing by the federation of municipalities of Al Fayhaa
	• Taybeh landfill. EIA and landfill design for the site was completed . • Site was foreseen to serve most of the municipalities in Baalbek and Hermel cazas (East Beka'a) • Landfill not executed • Study for rehabilitation of Kayal dump was carried out; closure not executed	Financing was through SWEMP.

ANNEX 6: FINANCE AND COST RECOVERY

Budgetary allocations by Central Government	• No specific budget for SWM for the whole country • Greater Beirut and Mount Lebanon: in 2010, CDR is currently paying around 130 million USD / year for SWM services in Greater Beirut and Mount Lebanon (excluding Jbeil) (waste collection and treatment in Greater Beirut and Mount Lebanon, as well as street sweeping in Greater Beirut) from the Independent municipal fund
Budgetary allocation by Municipalities/ governorates	• Regions other than Greater Beirut and Mount Lebanon: SWM financed by the municipalities proper financing: Independent Municipal Fund (IMF), and a percentage of monies raised at the local level from property taxes • Budget varies per region and municipality
Cost/per ton for collection	• Cost vary per region • In Greater Beirut: - Collection 25 USD/ton (investment and operation costs). - Sweeping:16,000,000 USD/year • In Zahleh: collection (without sweeping): 17 USD/ton • In Tripoli: collection and sweeping: 2,300,000 USD/year (i.e. around 18 USD/ton based on 350 tons /day) • In rural areas in general: collection cost varies generally from 10 to 18 USD/ton
Cost per ton for disposal	• Cost vary per region • In Greater Beirut: - Disposal (landfilling): around 45 USD/ton (investment and operation costs). - Sorting, baling, wrapping, composting (partial), haulage to composting plant and landfilling: around 105 USD/ton • In Zahleh: - Landfilling: 5 USD/ton (operation costs); for full cost recovery (investment and operation costs), cost would be 15-20 USD/ton - Sorting: 10 USD/ton - Tipping fees for the 18 municipalities surrounding to Zahleh: around 10 USD / ton • In Tripoli: management of rehabilitated dump: 29 USD/ton
Total Cost per ton from collection to disposal/ treatment	• Cost vary per region • In Greater Beirut: around 130 USD/ton • In Zahleh and Tripoli: around 45 – 50 USD/ton • In rural areas with disposal in open dumps: around 20-30 USD/ton
Cost recovery per ton	• No specific SWM recovery system • No special fees for SWM services • Case of Zahleh landfill: tipping fees for the 18 municipalities surrounding to Zahleh: around 10 USD / ton (partial cost recovery).
Total cost recovery per year	• No specific SWM recovery system
Percentage of cost recovered	• No specific SWM recovery system
Gaps if any between the government budget and the cost incurred for collection and disposal	• Major deficit between the costs and revenues due to absence of a specific fee of SWM and insufficient collection of the municipal taxes
Type of SWM recovery system	• No specific SWM recovery system • No special fees for SWM services
Amount of SWM recovery (billing, levy, etc.)	• No specific SWM recovery system • No special fees for SWM services

ANNEX 7: PRIVATE SECTOR PARTICIPATION

Types of possible capacity development requirement	Capacity development needs at different institutional levels			
	National	Governorate	Greater municipal	Municipal
Specific measures for setting the open, transparent and competitive procedures for attracting private participation in the SWM sector	MoE, CDR, MoIM, other decision makers			
Preparation of national guidelines for TOR, bidding documents and procurement procedures for contracting SWM contracts to the private sector	MoE, CDR, MoIM, other decision makers			
Procuring, managing and monitoring private sector contracts (administratively, financially)	MoE, CDR, MoIM, other decision makers	Involved in case of some small villages where there is no municipality	Union of municipalities	Municipalities
Technical monitoring of SWM services	MoE, CDR, MoIM, other decision makers	Involved in case of some small villages where there is no municipality	Union of municipalities	Municipalities
Sources and methods of financing SWM projects (BOT, BOO,...)	MoE, CDR, MoIM, other decision makers	Involved in case of some small villages where there is no municipality	Union of municipalities	Municipalities

ANNEX 8: PUBLIC AWARENESS AND COMMUNITY PARTICIPATION

PA & CP programs and activities with reference to SWM	Key partner (NGOs/programs/stakeholders)	
	Contact person	Mail
Regional Solid Waste Management Project in Mashreq and Maghreb Countries - Workshop "Training activity in Lebanon and Jordan targeting SWM professionals at local level (Final report - October 2006)	Bassam SABBAGH	b.sabbagh@moe.gov.lb
Training workshop on solid waste treatment technologies (GTZ-ERM-GKW)	Bassam SABBAGH	b.sabbagh@moe.gov.lb
Regional Solid Waste Management Project in Mashreq and Maghreb Countries – National Activity in Lebanon –Task 2: Capacity Building Workshops (September 2005)	Bassam SABBAGH	b.sabbagh@moe.gov.lb
Several seminars by various NGOs		
Initiatives from local NGOs to promote sorting at the source: - NGO "Nidaa El Ard / Arabsalim" - NGO "Organization of Deir El Ahmar Women"	- Zaynab Moukaled - Dunia Khoury (Deir el Ahmar)	

ANNEX 9: CAPACITY BUILDING AND TRAINING REQUIREMENTS

THEME	Partners and beneficiaries			
	National	Local	Private sector	NGOs and academic sector
Policy / legal / institutional framework				
Improving existing legislation and policy	MoE, MoIM, CDR, MoF			
Appropriately addressing institutional weaknesses in applying ISWM	MoE, MoIM, CDR, MoF	Municipalities, Union of Municipalities		
Effectively promoting ISWM inter-institutionally and cross-sectorally	MoE, MoIM, CDR, MoF	Municipalities, Union of Municipalities		
Developing methodologies for effective involvement of all necessary stakeholders (public participation)	MoE, MoIM, CDR, MoF	Municipalities, Union of Municipalities		Universities, schools, research centers, NGOs
Building/strengthening management skills	MoE, MoIM, CDR, MoF	Municipalities, Union of Municipalities		
Supporting the structure of the competent authorities to tackle and enforce relevant legislation	MoE, MoIM, CDR, MoF	Municipalities, Union of Municipalities		NGOs
Monitoring the implementation of policies	MoE, MoIM, CDR, MoF	Municipalities, Union of Municipalities	Operators and consultants of SWM (collection and treatment)	NGOs
Financingand cost recovery				
Setting a sustainable system for cost recovery (relying on "polluter pays" principle), setting of specific fee of SWM	MoE, MoIM, CDR, MoF	Municipalities, Union of Municipalities		
Establishing of mechanisms for financing SWM projects	MoE, MoIM, CDR, MoF	Municipalities, Union of Municipalities		
Private sector participation				
Setting standard procedures to achieve transparent, equitable and accountable contracting of private sector services	MoE, MoIM, CDR, MoF	Municipalities, Union of Municipalities		
Developing efficient Public-Private Partnerships	MoE, MoIM, CDR, MoF	Municipalities, Union of Municipalities	Operators and consultants of SWM (collection and treatment)	

THEME	Partners and beneficiaries			
	National	Local	Private sector	NGOs and academic sector
Awareness – communication - conflict resolution				
Changing attitudes of the wider public (e.g. effective awareness campaigns)	MoE, MoIM, CDR, MoF	Municipalities, Union of Municipalities	Operators and consultants of SWM (collection and treatment)	Universities, schools, research centers, NGOs
Influencing consumption and production patterns (e.g. through targeted education for sustainable development)	MoE, MoIM, CDR, MoF	Municipalities, Union of Municipalities		Universities, schools, research centers, NGOs
Enabling the private sector to take responsibility to manage their own compliance with environmental legislation and to reduce their environmental impact by use of tools (technical, incentives, etc.) and awareness	MoE, MoIM, CDR, MoF	Municipalities, Union of Municipalities	Operators and consultants of SWM (collection and treatment)	
Promoting Corporate Social Responsibility, voluntary agreements, etc.	MoE, MoIM, CDR, MoF	Municipalities, Union of Municipalities	Operators and consultants of SWM (collection and treatment)	
Data management and sharing				
Developing reliable and harmonised data for waste related issues	MoE, MoIM, CDR, MoF	Municipalities, Union of Municipalities	Operators and consultants of SWM (collection and treatment)	Universities, research centers, NGOs
Treatment of data and generation of relevant information/ knowledge	MoE, MoIM, CDR, MoF	Municipalities, Union of Municipalities		
Effective networking within and among actors (knowledge sharing, expertise, experiences, coordination mechanisms among relevant public authorities, implementing consortia, etc.)	MoE, MoIM, CDR, MoF	Municipalities, Union of Municipalities		

THEME	Partners and beneficiaries			
	National	Local	Private sector	NGOs and academic sector
Contracts procurement and management				
Developing skills for adopting guidelines and regulations to specific conditions and contexts	MoE, MoIM, CDR, MoF	Municipalities, Union of Municipalities		
Preparation of tender documents and effective tendering procedures for SWM projects	MoE, MoIM, CDR, MoF	Municipalities, Union of Municipalities	Operators and consultants of SWM (collection and treatment)	
Developing good quality project proposals for SWM projects	MoE, MoIM, CDR, MoF	Municipalities, Union of Municipalities	Operators and consultants of SWM (collection and treatment)	
Monitoring the implementation of projects	MoE, MoIM, CDR, MoF	Municipalities, Union of Municipalities	Operators and consultants of SWM (collection and treatment)	NGOs
Effective evaluation of e.g.: performance - cost recovery - viability/sustainability of projects	MoE, MoIM, CDR, MoF	Municipalities, Union of Municipalities	Operators and consultants of SWM (collection and treatment)	
Technology assessment and operations				
Developing advanced methods for selecting appropriate technologies, sites, methodologies etc. (technical issues)	MoE, MoIM, CDR, MoF	Municipalities, Union of Municipalities	Operators and consultants of SWM (collection and treatment)	NGOs

ANNEX 10: INDUSTRIAL AND HAZARDOUS WASTE MANAGEMENT

Type of Waste	Quantity Estimation	Technology of treatment	Name of landfill/Plant	Place	Responsible
Industrial wastes (non hazardous)	Around 185,000 tons/year	Most of wastes are mixed with municipal wastes			
Industrial wastes (hazardous)	Around 3,380 tons/year	Most of wastes are mixed with municipal wastes			
Other hazardous wastes	Not available	No hazardous wastes treatment or disposal facilities. Most of wastes are mixed with municipal wastes			

INDUSTRIAL WASTE GENERATION

Category	Source / Type	Quantity (ton/year)	Remarks
Hazardous waste	Pesticides manufacturing	326	Mainly packaging waste and sludge contaminated with pesticides
	Industrial waste containing heavy metals	1,166	From waste paper recycling, printing. ceramics industry (pigments), metal galvanizing, non-ferro metal recycling
	Industrial oily waste	1,018	Residues from waste oil recycling, oily sludge, residues from solvents recycling
	Industrial paints, resins, dyes, adhesive residues	536	Mainly from paint, and wooden and metal products manufacturing
	Polychlorinated biphenols (PCBs)	40	
	Tanneries	250	Hazardous due to chromium content
Sub-total		**3,338**	
Non-Hazardous waste or	Various process waste with heavy metals contents below hazardous waste limits	1,292	Scrap leather, wood and paper waste, waste from textile, printing and ferro-metal industry
recyclable waste	Sludge from asbestos/cement manufacture	2,400	Dumped at private landfills
	Used lubricating oils	10,000	
	End of life vehicles	6,300	Recyclable parts
	End of life vehicles	700	Non-recyclable parts, this can be hazardous waste depending on the type of car dismantled
	Industrial mixed waste (non-process related)	20,000	
	Car tires	14,000	
Sub-total		**54,692**	
Construction and Demolition waste	Ceramic industry (tiles, flags), cement industry	73,000	Around 71,000 tons/year of this waste is dumped at private landfills (cement industry)
Putrescent waste	Food and beverage manufacturing	17,820	
	Slaughterhouses	40,000	
Total		**188,850**	

ANNEX 11: MEDICAL WASTE MANAGEMENT

Type of Waste	Quantity Estimation	Technology of treatment	Name of infrastructure	Place	Responsible
Infectious waste	100 kg/d	Autoclaving + shredding	Clemenceau Medical Center	Beirut	Hospital administration
Infectious waste	150 kg/d	Autoclaving + shredding	Haykal Hospital	Zgharta	Hospital administration
Infectious waste	4-5 tons/d	Autoclaving + shredding	Independent center	Sin El Fil	Arc En Ciel
Infectious waste	500 kg/d	Autoclaving + shredding	Independent center	Abbasiyeh – Tyr	Arc En Ciel
Infectious waste	1 ton/d	Autoclaving + shredding	Independent center	Zgharta	Arc En Ciel
Infectious waste	500 kg/d	Autoclaving + shredding	Independent center	Zahleh	Arc En Ciel
Infectious waste	500 kg/d	Autoclaving + shredding	Hotel Dieu Hospital	Achrafiyeh hotel Dieu	Arc En Ciel
Infectious waste	1 ton/d	Autoclaving + shredding	Independent center	Saida	Arc En Ciel
Infectious waste	Remaining part without treatment: estimated around 5-6 tons/d in 2010	No treatment (mixed with municipal wastes)			
Medical non risk waste	55 tons/d in 2010	Mixed with municipal wastes			

COUNTRY REPORT ON THE SOLID WASTE MANAGEMENT IN LEBANON

ANNEX 12: SOLID WASTE MANAGEMENT DONOR/LENDER ACTIVITY

Donor/Lender	Name of Project	Project Start/ Finish Dates	Project Location	Total budget and financial scheme	Project Objectives	Contact Person, Phone and E-Mail
European Union	"Appui a la preparation de projet de Gestion de Dechets solides":.	2004 - ongoing	OMSAR (Office of the Minister of State for Administartive Reform)	10.2 Million Euros	Provide financial support to municipalities or group of municipalities for the preparation and execution of waste management projects	Rahif Hajj-Ali
European Union	Extension of "Appui a la preparation de projet de Gestion de Dechets solides"	2006 – ongoing	OMSAR (Office of the Minister of State for Administartive Reform)	4 Million Euros	Provide financial support to municipalities or group of municipalities for the preparation and execution of waste management projects	Rahif Hajj-Ali
European Union	Investment Planning and Programming (IPP) – Environment	2002 – 2005	MoE	2.0 Million Euros	Strengthening and developing the capacity of MoE	Dr. Woolfgang Hager w.hager@moe.gov.lb
METAP – regional solid waste management program	National activity : Preparation of a draft SWM legal framework	2005	MoE	Around 80,000 Euros	Issuing a legal framework by the Government to manage the solid waste sector in Lebanon	Bassam Sabbagh b.sabbagh@moe.gov.lb
World Bank	Solid Waste Environmental Management Project (SWEMP)	1996 – 2003	CDR	Budget was 55 million USD and was reduced to 25 million USD	Provide infrastructure for solid waste collection Closure of existing dumps and provision of sanitary landfills	Bassam Farhat bassamf@cdr.gov.lb
Lille Metropole Urbaine	Closure of Slayyeb dump	2002-2003	Chouf Es-Swayjani area	132,000 Euros international contribution 20 % local	Closure and capping of the dumpsite Collection of gases	Samir el Fatayri
SOLIDERE	Reclamation of the Normandy dumpsite	1999 – 2004	Beirut Central District	53 million USD	Sorting and treating the existing waste and recovering materials suitable for reclaiming an area from the sea (double the size of the dump)	Hisham Karameh
METAP/Italian Trust Fund	Implementation of the Hazardous waste management program	2001-2002	MoE	180,000 USD	Develop legislation for HWM Propose a national strategy for HWM	Farouk El Merhebi fmerhebi@omsar.gov.lb
Swedish Government	Feasibility study for gas extraction and rehabilitation of the Bourj Hammoud dump	1999-2000	Bourj Hammoud	106,000 USD	Feasibility study started for the extraction of gas for power generation and rehabilitation of Bourj Hammoud dump.	Sami Feghali samif@cdr.gov.lb
USAID	Sorting and composting plants	2001-	Sorting plant in Zahleh and composting plant in Jbeil, as well as small community based composting plants in selected villages in South Lebanon		Provide financial support to municipalities or group of municipalities for the preparation and execution of waste management projects	YMCA Pontifical Mission (PM) Creative Associates International Inc (CAII) Concerned municipalities
USAID	Composting plant in Akkar	2001	Akkar El Atika		Biogas production for the treatment of organic waste to farmers t	Mercy Corps
World Bank/SWEMP	Management of Hospital Wastes	1999	CDR		Propose a national strategy for the management of Hospital waste	Sami Feghali samif@cdr.gov.lb
World Bank/SWEMP	Market Study for Compost and recyclable material	1999-	CDR		Feasibility study for the marketing of compost and recyclable materials in Lebanon	Sami Feghali samif@cdr.gov.lb
UNDP/LIFE	Waste management project for Bsharre	1996	Bsharre	90,000 USD	Awareness programs to encourage local inhabitants to segregate household waste into wet and dry components	Council of environment protection in Bsharre

The regional solid waste exchange of information
and expertise network in Mashreq and Maghreb countries

July 2010

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