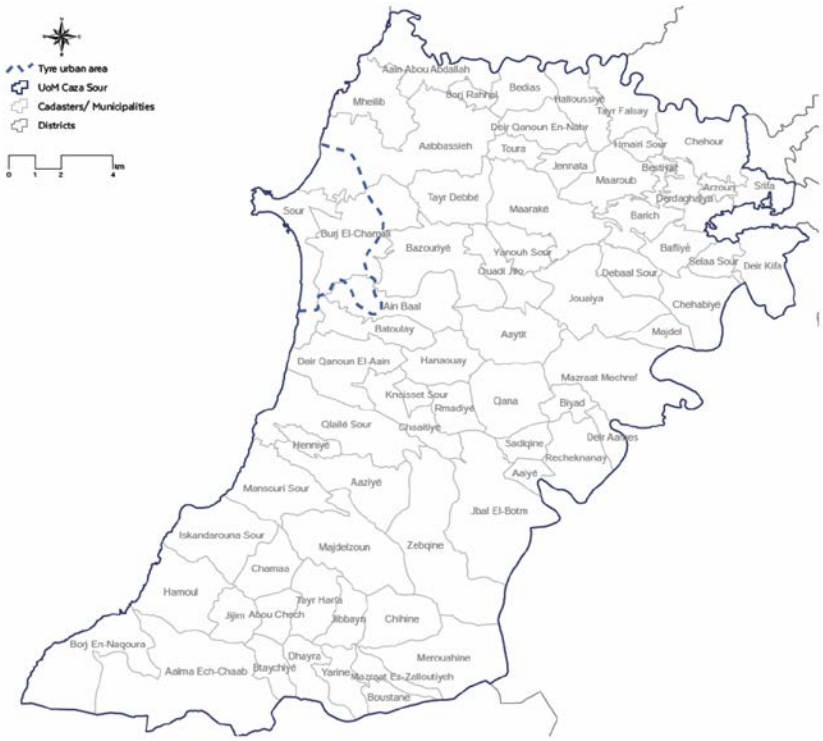
Solid Waste Management City Profile

Union of Municipalities of Tyre, Lebanon

District Information

Number of Municipalities: 55

Names of the Municipalities in the District:



Tyre, Arzoun, Bazouriyeh, Al Bayad, Al Borghliye, Al Ramadiyeh, Al Kneyseh, Al Bustan, Al Jebin, Al Hinniyeh, Al Haloussiyeh, Al Hmeyreh, Al Zaloutiyeh, Al Shatiyeh, Al Dhira, Al Kleyle, Al Majadel, Al Mansouri, Al Nafakhiyeh, Al Nakoura, Al Abassiyeh, Burj Rahal, Burj Al Shemali, Barish, Bedyas, Batouley, Jenata, Jbal Al Batm, Hanaweih, Deir Amess, Dardaghyah, Deir Keyfa, Deir Kanoun Rass, Deir Kanoun Al Naher, Zebkin, Reshkaneyna, Shameh Shehour, Shayhin, Seddikin, Srifa, Tayr Harfa, Tayr Daba, Tayr Felseyh, Toura, Aytit Alma Al Shaeb, Ain Baal, Qana Mrouhin, Maaroub, Mahrouneh, Maarakeh, Majdal Zoun, Mazraet Meshref, Yanouh, Yarin.

Population: 400,000 (average between summer and winter)

Area (km2): 418 km^2

Climate: Tyre's climate is classified as warm and temperate. The winter months are much rainier than the summer months in Tyre. The average annual temperature is 20.2 °C. The rainfall averages 697 mm.

Main Economic Activities:

Agriculture:

South Lebanon is an important agricultural region, spreading from Sidon to Tyre where intensive agriculture is present in greenhouses. Greenhouse agriculture in South Lebanon covers an area of 6,277 ha, 78% of which is used for the plantation of fruits. Permanent agriculture land covers an area of 201,539 ha, 38.9% of which is used for planting olives, and 31.6% used for citrus fruits. The District of Tyre is considered one of the largest and most fertile coastal plains in the country and accounts for about 20% of the employment in the District in comparison to 8% in the whole country.

Tourism:

The District of Tyre is rich in natural and historical heritage, which makes it a very popular touristic attraction, drawing more than 50,000 visitors a year to visit the sandy beaches and archaeological sites. The Tyre coastal nature reserve is a registered Ramsar site that is an important nesting ground for loggerhead and green sea turtles, while the archaeological sites in the city of Tyre are registered as a UNESCO world heritage sites since 1984

Most of the touristic activities are centred in the city of Tyre where 36% of the establishments are related to tourism.

Commercial Port of Tyre:

The commercial port of Tyre is worth noting though it is characterized by a very low activity limited to an average of one ship per month mainly importing used cars from Germany or Cyprus. There are no prospective plans of developing the port for the following reasons:

- The port is too small to accommodate increased pressure;
- The existing underwater archaeology limits to possibility of expanding it;
- Accessibility from the land is limited because of its presence in the heart of the old town of Tyre.

District website: http://uotm.org/

Country Information

Population: Approximately 6 million

Area (km^2): 10,452 km^2

Economy and GNI/Capita: Upper-middle-income economy ($3,896 to $12,055 GNI/Capita)

Main Economic Activities*:*

Lebanon's economy is service-oriented with banking and tourism as main growth sectors. It has a free-market economy and a strong commercial tradition. The biggest fractions in GDP are attributed to the services sector, which is known as the tertiary sector of the economy. The real estate (14%) and the trade (13%) sectors are equally significant. The real estate market has proved to be one of the pillar sectors of the Lebanese economy as it affects positively on the government public finances by contributing 19.6% of total government revenues. The trade sector, on the other hand, shaped Lebanon's role in the region and constituted a significant source of both income and employment. The impact of the Syrian crisis did not affect the trade sector as the Lebanese Government introduced the "Maritime Lebanese Bridge Program" to support exporters in re-routing their exports through sea routes.

Sector	*GDP composition for 2015 (%)*
Agriculture	3.5%
Mining, Manufacturing, and Utilities	11%
Financial Services	8%
Professional and Administrative Services	7%
Education and Health Services	11.5%
Real Estate	14%
Public Administration	9.3%
Trade	13%

Government Agencies responsible for guidance on waste legislation

Ministry of Environment (MoE)

The responsibilities and involvement of the MoE in the waste management sector could be summarized as follows:

- Planning in terms of carrying out studies, conducting field surveys, putting forward plans for managing the different types of wastes, etc.;
- Proposing Decrees related to the criteria for allocating waste management facilities like sanitary landfills, environmental standards for the construction and operation of waste management facilities, guidance for open dumps rehabilitation, etc.
- Setting standards and environmental requirements;
- Organizing permits;
- Supervising the activities of solid waste generators and waste handlers/operators;
- Taking action (through the Department of Control) in case of violations of the set requirements. In this context, it is worth mentioning that the MoE has the authority of retrieving the permits of classified establishments whenever they violate the environmental requirements for solid waste management imposed by decisions of the Minister.

Ministry of Interior and Municipalities (MOIM)

The responsibilities and involvement of the MoIM in the waste management sector could be summarized as follows:

- The Municipalities are responsible for street sweeping and cleaning of the public spaces under their administrative territory;
- Waste collection practices are the responsibility of Municipalities;
- Municipalities could establish waste treatment and disposal facilities within their territories;
- Municipalities are responsible for controlling violations related to improper solid waste practices;
- The General Directorate of Customs (under the authority of the MoIM), under the request of the owners, can dispose the products damaged during storage in the public warehouse, and then can impose taxes and fees on the owner according to the produced waste. In case the owners cannot be reached, the General Directorate of Customs can sell the stored products.
- The interior security force (under the authority of the MoIM) is responsible for controlling environmental violations taking place along the coastal zone.

- The interior security force elements (under the authority of the MoIM), the municipalities' police and the inspectors of the MoE are responsible for controlling violations of environmental permits, including solid waste management, in the mining and quarrying sector.

Office of the Minister of State for Administrative Reform (OMSAR)

The OMSAR is in charge of the upgrading the institutional and technical capacity of public institutions including ministries, governmental agencies as well as the municipalities. OMSAR has been managing the implementation of a series of EU funded waste management projects under different programs of which we mention the following:

1) Assistance to the Rehabilitation of the Lebanese Administration (ARLA) (€14.2M (EU Fund); $36M (National Treasury) based on Decision No 34 dated 31/5/2010 & Decree No 3860 dated 19/4/2010): This is a program for the provision of waste management services in rural areas outside Beirut and Mount Lebanon. It involved the construction of waste management facilities and their subsequent operation and maintenance. Beneficiaries from the program summed up to 177 municipalities with an overall population of 1.15 Million Capita.
2) Solid Waste Management Programme (SWAM I) (€14M (EU Fund)): This fund was dedicated for the Bekaa and Akkar governorates which were severely affected by the Syrian refugees

Council for Development and Reconstruction (CDR)

The responsibilities and involvement of the CDR in the waste management sector could be summarized as follows:

- Taking over the planning responsibilities for development purposes;
- Preparing studies and research;
- Launching and managing the bidding process for solid waste management contracts (consultancy and contracting services);
- Implementation of projects approved by the council of Ministers.

Ministry of Health

The control of environmental and public health related problems was the responsibility of the Ministry of Health (MoH) and more specifically the Hygiene Department, which was later on replaced by the Directorate of Prevention. Some legislation refers to the role of the MoH in supervising solid waste disposal without explicitly elaborating this role and the associated level of authority. After the establishment of the MoE, the above role was transferred to the MoE.

Ministry of Industry

The role of the Ministry of Industry (MoI) in waste management is limited to the issuance of the industrial permits for waste treatment facilities that include equipment or a certain process.

MSW Sector Overview: District Level

Classification of MSW

Municipal solid waste is classified as waste that is generated in the residential, commercial, touristic, and institutional sectors, municipal services (e.g. street sweeping and landscaping, etc.), and military bases.

The special wastes stream includes agro processing vegetable waste, slaughterhouse waste, WEEE, bulky items, tyres, exhaust oils, construction and demolition waste, and healthcare waste.

MSW Generation

MSW generation rate in the District of Tyre can be considered to be about 100,000 tons / year. Given the variation in demographics, land use classification, and seasonal variation, waste generation rates can be broken down as per the table below:

Category	*Population*	*Waste generation rate (kg/cap/day)*	*Daily SW gen. WINTER*	*Daily SW gen. SUMMER*
Lebanese - Winter	**245,000**			
Urban 30%	73,500	0.85	62	
Rural 70%	171,500	0.7	120	
Lebanese – Summer	**314,000**			
Urban 40%	125,600	0.85	-	107
Rural 60%	188,400	0.7	-	132
Syrian Refugees	27,500	0.5	14	14
Additional Refugees	27,600	0.5	14	14
Palestinian camps	66,000	0.7	46	46
Palestinians out of camps	1,000	0.7	1	1
TOTAL	**-**		**257**	**313**

Considering 75 days of the year as high "summer" season and 290 days for the "winter" season, the estimated waste quantities are as follows.

Winter season: 257 tons/day and 74,523 tons in total
Summer season: 313 tons/day and 23,482 tons in total

Annual waste generated: **98,005 tons/year**

***Collection Coverage* and Type**

Most of the municipal solid waste generated from the various villages of the Tyre District is deposited by the residents in kerbside containers provided by the municipalities for that purpose. The containers vary between 4 wheeled metal containers (mostly 1,100L), 2 wheeled plastic containers (12 or 240 L) and barrels that are distributed along the streets. Details about the numbers, volumes and types of available containers could not be retrieved from the municipalities.

Collection services are handled by the individual municipalities that ensure almost complete collection coverage reaching 98%. Collected waste is comingled and no source segregation takes place, despite from some small short-lived initiatives by NGOs. The collection is undertaken by a fleet of small to medium size compactors and pickups. In terms of collection frequency, this varies from one municipality to the other

depending on the specific needs of the municipalities. In some municipalities, collection is carried out during night shifts to avoid traffic.

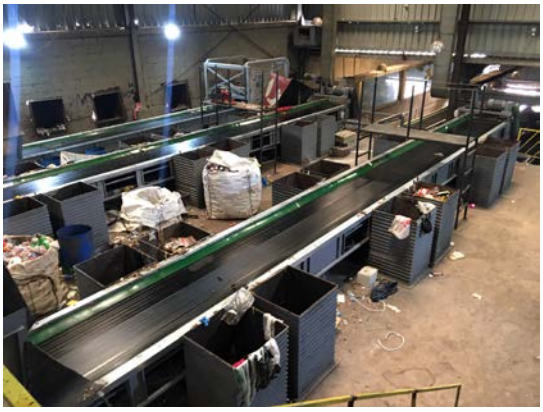
Waste Composition

Waste composition data is not available specifically for this region, however, correlation can be made with previous waste characterization studies carried out in municipalities within the Greater Beirut Area and Mount Lebanon and comparison can be made with those municipalities that share similar average household monthly income. The waste composition can therefore be classified as follows:

Component	*Composition (%)*
Organic Material	55.13
Paper & Cardboard	11.97
Plastics	12.84
Metals	1.90
Textiles	3.52
Glass	2.77
Wood	1.03
Diapers	4.55
Others	2.16

Waste Management Practice

MSW collected by individual municipalities is mainly taken to a mechanical biological treatment (MBT) facility located in Ain Baal. The treatment facility originally built in 2009 has recently undergone an upgrade with an increase in capacity (from 120 up to about 250 tons per day) and the addition of new equipment and facilities (e.g. bag opener, new sorting lines, ballistic separator, eddy current, and optical separator, and new hangar for compost maturation, refining screen, compost turning machine, and biofilter for the composting area). Prior to the upgrade the facility was only able to receive waste from about 34 of the 55 municipalities located in the District of Tyre, but now should be able to accommodate all of the waste from all 55 municipalities.



The works on the facility took about 12 months to complete, during which time waste was not treated at all but was directly disposed of in open dumps. The facility has now currently only been in operation since March 2019.

There is no sorting at source system in Tyre and there is no infrastructure available to support such a scheme at this time. The MBT plant therefore treats mixed waste, which ultimately reduces the quality of the recovered material with a high contamination rate. Organic material is composted in trenches and matured in a covered hangar. The resulting bio-stabilised product can be classified as "compost-like-output", with a lower quality and high contamination and is only suitable as a soil improver for landscaping at best, and frequently ends up in open dumps if it not used for this purpose.

According to the data base at OMSAR, the amount of recovered recyclables, produced compost and disposed rejects is summarized in the below table for the period extending from July 2016 until June 2017.

Period	*Incoming Waste Quantities (Tons)*	*Produced compost quantity (Tons)*	*Recovered recyclables (Tons)*	*Rejects as reported by Operator (Tons)*
July - September 2016	6,663.52	3,849.29	409.96	2,732.62
October - December 2016	9,007.86	933.72	846.69	3,702.75
January - March 2017	10,142.37	1,403.65	408.15	4,754.21
April – June 2017	10,123.30	943.92	380.46	4,666.03

Disposal

Following treatment, residual waste is dumped in open dumps due to the lack of any sanitary landfill in the region, which is causing serious environmental and health risk to the surrounding area.

Recently a Master Plan for the closure and rehabilitation of open and uncontrolled dumps in Lebanon was prepared by the Ministry of Environment (MoE) and the United Nations Development Program (UNDP) with the technical assistance of Earth Link and Advanced Resources Development s.a.l. (ELARD). The study was originally prepared in 2011 and was then updated in 2016 due to the Syrian refugee influx and the solid waste crisis that started in July 2015 with the closure of the Naameh Landfill.

According to the above study, the district of Tyre witnessed an increase of the order of 55.2% (160,028 m3) and 60.8% (10,820 m3) in the volume of waste in both operational and non-operational MSW and CDW dumpsites between 2011 and 2016, respectively (see Table below).

Year	*Operational*		*Non-operational*		*Grand total*	
	Number	*Volume (m^3)*	*Number*	*Volume (m^3)*	*Number*	*Volume (m^3)*
MSW Dumpsites						
2011	35	268,887	16	20,528	51	289,415
2016	33	131,510	22	317,933	55	449,443
C&D Waste dumpsites						
2011	8	5,877	2	11,670		17,547
2016	10	21,920	15	6,447		28,367

Out of the 33 operational MSW dumpsites identified in the 2016 Master Plan:

- 21 dumpsites existed and were operational in the 2011 Master Plan and remained operational in 2016 with an increase in volume;
- 5 dumpsites were non-operational in 2011 and became operational in 2016 with an increase in volume. One of them (Maarake) has become a major dumpsite in 2016 survey with an estimated volume of 16,000 m^3;
- 7 new dumpsites appeared in 2016.

13 of the operational MSW dumpsites identified in 2011 with a total volume of 205,511 m³ became non-operational by 2016 by which time they had increased in volume by 48% to 300,000. This is due to the close of 6 of the largest dumpsites; one of which is Deir Qanoun El Ain which was closed in 2014.

Out of the 22 non-operational MSW dumpsites identified in the 2016 Master Plan:

- 7 dumpsites with a volume of 304,667 m^3 were not rehabilitated;
- 4 dumpsites with a volume of 13,266 m^3 were rehabilitated and covered;
- 11 dumpsites with a volume of 0 m^3 were rehabilitated and removed.

Out of the 10 operational CDW dumpsites identified in the 2016 Master Plan:

- 2 dumpsites existed in 2011 and remain operational;
- 7 dumpsites emerged as new in 2016;
- 1 dumpsite classified as MSW dumpsite in 2011, became a CDW one in 2016 (with a volume of 600 m³).

Out of the 15 non-operational CDW dumpsites (10 existing since 2011) identified in the 2016 Master Plan:

- 9 dumpsites with a volume of 5,320 m^3 were not rehabilitated;
- 2 dumpsites with a volume of 1,127 m^3 were rehabilitated and covered;
- 4 dumpsites with a volume of 0 m^3 were rehabilitated and removed.

Mixed CDW dumpsites containing MSW could be classified as MSW Dumpsite since MSW has direct short-term impacts on the environment. The district of Tyre has 3 operational mixed dumpsites with a volume of 4,620 m^3 in total.

Formal Waste Sector

Regarding the formal waste management sector in the District of Tyre, each municipality within the Union of Tyre Municipalities is responsible for the collection of waste from their jurisdiction.

The MBT treatment and disposal duties are the responsibility of the Union, however, these activities have been contracted out to a specialised waste management contractor. OMSAR provided technical assistance in the entire procurement process from drafting the tender documents to evaluation of the submitted bids. OMSAR also supports the financing of the treatment operation through a fund provided by the Council of Ministers. By contract, the operator of the facility must obtain minimum and maximum operational targets for the financial disbursements to be made. Specifically limits are set whereby the contractors must reach at least 10% recovery of recyclables and produce composted material 20% of total organic material, while maintaining residuals below 35% before any deductions are made from the payments.

Separated recyclables, such as cardboard and PET, are mostly sold on the local market for reprocessing, whereas metals are exported to regional outlets such as Turkey.

Informal Waste Sector

Informal recyclers are active in the Tyre District, although their role is underestimated, and sometimes ignored, by the public authorities. However, they are not ignored at all by the recycling companies, which work with them to acquire high quality recyclables at good prices. Some other times, scavengers sell these to dealers and thus indirectly provide local industries with recycled feedstock. The informal recyclers in Tyre manage about 10% of the waste stream and are responsible for 83% of the material recovery rate.

As things are now, it seems that scavengers, at present, are the major players in the recycling activities in Tyre. Scavenging takes place not only in municipal solid waste but also in other waste streams, for example, the industrial waste streams, where iron and metallic scraps, for instance, are collected by scavengers. Scavengers tend to extract waste components that have a profitable market value, such as cardboard, different metals, glass and PET.

Recent studies have estimated that the informal recyclers in the District of Tyre recover about 15,000 tons of recyclables per year; roughly 5 times more than the materials recovered at the Ain Baal MBT facility.

Financing of MSW

At the local level, MSW revenues are covered through a direct tax levied at the Municipality level called Arsifa wa Majerir (i.e. street clean-up, waste collection as well as cleaning drains and septic tanks), which is equivalent to 30% of the annual rent or rent assessment if the household head is the owner. Municipal budgets were aggregated at the central level thanks to the USAID University of Albany-supported municipal budget automation program, where it was possible to obtain the total municipal direct revenues by region from 2003 until 2007. Since the end of the program, municipal budget stopped being aggregated. Moreover, municipalities usually remain reluctant to release their budgets.

At the central level, the government and public entities collect numerous fees on behalf of municipalities. These fees are divided into two main categories: (i) Fees collected and directly redistributed to each municipality including arrears; and (ii) Fees collected and deposited into the Independent Municipal Fund (IMFU) including arrears. As for payments for solid waste management, the IMFU bears the brunt of the cost of their respective services in the perimeter of some municipalities.

The IMFU payments, which constitute an important part of the municipal fiscal revenues, are usually backlogged putting some municipalities in precarious situations. The IMFU is distributed as follows:

- 75% to be distributed to municipalities of which 30 percent are earmarked for local development projects and 70 percent for budgetary support: 40 percent is proportional to the population, which is allocated on the basis of the registry office's civil status and not effective residence and remains a serious issue especially in larger municipalities; and 60 percent is based on the direct taxes/fees amount collected by the municipality over the preceding 2 previous years; and
- 25 % to be distributed to Federations of Municipalities, of which 75 percent are earmarked for local development projects with a priority to under developed areas and 25 percent for budgetary support.

This distribution is in theory but in practice, the resulted allocation is not followed. Moreover, the share of MSW in total transfers has been increasing over the year except in 2015 where the solid waste crisis broke out. In 2013 and 2014, they accounted for almost half the transfers hence increasingly forgoing municipal development investments.

The cost recovery with regards to MSW in Lebanon is quite an impossible task and the most recent percentage of cost recovered to total cost of MSW services figures was calculated in the World Bank, 2011. Except for Beirut – Mount Lebanon area that the fee is estimated to cover almost 30% of the sweeping and collection cost, the other regions barely cover 10% of the sweeping and collection cost.

It is important to note that the operational cost of the waste treatment facility in Ain Baal is fully subsidized by OMSAR through a fund from the Council of Ministers.

Cost of Operation of the existing system

Information about the operation of the existing waste management system was obtained from the engineering unit at the Union of municipalities. In this context, it is to be noted that:

- The cost of operation of the street sweeping activities and waste collection is managed and handled independently by each municipality;
- The cost of operation of the existing Ain Baal MBT Facility is at the moment funded by OMSAR;
- The cost of the ultimate disposal of all the rejects resulting from Ain Baal Facility is paid by the Union of municipalities of Tyre;
- For municipalities that are not served by the Ain Baal Facility, the cost of ultimate disposal is borne by the municipalities themselves.

Considering the whole picture of the District, the following issues should be noted:

- The recent increases of the public-sector workers salaries are expected to increase the current collection costs by 15-25%. Most of the municipalities have inefficient waste collection systems with a current (after the increase) weighted average collection cost for the District at US $ 20 /ton.
- Most of the waste is dumped to dumpsites with a minimum cost of around US $ 10/ton and only the rejects of the Ain Baal facility are charged with 29.2 US $/ton.
- Out of the almost 100,000 tons of waste generated annually, 10% is directly diverted by the informal recyclers, so the formal systems must manage just 90,000 tons/y.

The cost of operation of the current system can be described as follows:

Component	*Tons/year*	*USD/ton*	*Total (USD/yr)*
Collection	90,000	20	1,800,000
Treatment	36,000	25	900,000
Direct Disposal	71,347	10	713,470
Ain Baal Rejects	10,000	29	292,000
Total	-	-	3,705,470

Considering 90,000 tons involved in the formal system, the average waste management cost per ton is estimated at **41.2 US $/ton**.

Roughly, half of the total cost is for waste collection, 25% of it for waste treatment and 25% for waste disposal.

This distribution is typical for transit systems that move from a simple collection system to waste treatment and sanitary landfills, however, the overall cost is rather low because more than 70% of the waste is disposed of at dumpsites in a minimum direct cost.

Considering the permanent Lebanese population (244,505 people), the average cost per capita and year is estimated at ***15.15 US $/ton*** or about ***1.26 US $/month*** which is very low.

Using as benchmarking the annual expenditures of individuals in Southern Lebanon (5,052 US $/y) as they are analysed on the 2012 household survey, the cost of waste management is just 0.3% of the individuals annual expenditures. For a quick comparison, they annual expenses for waste are less than 1/3 of the expenses for coffee, tea and cocoa (49 US $/y).

Cost Recovery

The total cost (including street-sweeping) reached US$ 3.32 million in 2017 of which 0.69 million were covered through the waste fee collected or a 21% of the cost. This amount levied includes the

commercial waste fee paid by businesses, especially the tourism sector although there no breakdown by payee.

The waste fee collected reached 60% in 2017 and would not cover the cost of collection even if it was fully recovered (US$ 1.15 million). This could be explained by the number of rents in the old city that have not been adjusted for years, and therefore represent a small share of the theoretical full recovery waste fee. The MSW deficit was covered through other chapters including the IMFU (transfer of US$ 2.13 million in 2016). The cumulative areas of the waste fee to be collected stand at US$ 4.64 million by end 2017.

In percentages, the following numbers highlight the real problems regarding cost recovery:

- **Total cost** 100% (3.32 million US$)
- **Tariff applied** covers 34.6% of the total cost
- **Tariff collected** 60% of the tariff applied → 20.7% of the total cost

It should be considered that the total cost for the waste treatment facility is covered by OMSAR, thus the final cost recovery from the tariff is lower that 20%.

Waste Management Challenges

a. *Dumpsites and lack of safe disposal*
The waste final disposal is the main problem of the district. Indeed, several sites for the construction of a sanitary landfill have been suggested and assessed. However, the population has rejected all the solutions with protests and complaints (NIMBY[1] syndrome). The selection of solutions has been always taken from the top without or with little consultation with the residents. A deep, more structured and transparent consultation with the key stakeholders might be the only solution to find a suitable site for the final waste disposal.

b. *Informal Recycling Sector (IRS) is active but and not coordinating with the formal SWM system*
The low rate of recycling from Ain Baal facility is also the result of the IRS activity. The Union of Municipalities tends to ignore the existence of scavengers and do not recognize their work and that of the informal sector.

The network of IRS is well developed but continues stay informal thus creating the following problems:

- Interference with the formal system: scavengers while collecting recyclables material tend to remove waste from the bins and scatter them around the bins or move the bins to different locations that are easier for their collection.
- Lack of decent working conditions: being informal, scavengers do not have any healthcare protection or insurance for them and for their family. Furthermore, there is no control on the operational safety measures creating health problems not only to the scavengers but also to the rest of the population.
- Tend to be excluded by the society: creating friction and problem with the residents and are difficult to be identified and to collect data about their work (quantities of recyclables, number of persons involved, structure of the IRS system). On the other side, they play an important role in the recycling sector by removing valuable material. In addition, working at

[1] Not In My Back Yard

the household level or at the bins level they contribute to a reduction in the transportation cost of the formal SWM system.

- Recognition, formalization and coordination with formal SWM system are the bases of a solution that gives benefits to both parties.

c. *Ain Baal MBT facility poor efficiency*

The formal SWM system of the district relies only on one SWM treatment plant which is not capable to process all the waste of the district. The "compost" produced is dumped as reject due the low quality.

d. *MSW includes waste streams that belong to special hazardous and non-hazardous streams*

In Lebanon, and in Tyre of course, there is no clear regulation about the fate of different waste streams. Due to the lack of national and regional regulations, different types of waste are entering in the municipal waste stream. The commercial, industrial, and agro industrial waste, the bulky items and the WEEE are mixed together with the domestic household waste. This is the major cause leading to the following problems:

- low quality of organic matter for composting (heavy metals, unpredictable pollutants)
- lower lifespan of the collection vehicles (bulky items, or WEEE create damages to the compactor systems)
- reduction of the resource potential for the value chain. The Industrial and commercial sectors produce waste that are already separated from the main stream and become easy to be sorted (carton, nylon from packaging industrial supplies, organic from agro-processing factory, slaughterhouses) at source.

e. *Lack of accountability and reliable data sets (population, waste quantities)*

A serious problem is that there is no accountability for the costs and revenues related to waste management on a municipal and regional level. This leads to high uncertainties, lack of transparency and increases the possibilities for corruption. The lack of data sets, for the population and waste poses a limit and uncertainties for planning and monitoring not only in SWM. The RTO should set up a consistent data collection methodology that will be used and updated within a monitoring system.

f. *Institutional and Legal capacity of the Regional Technical Officer (monitoring, procurement, contracting)*

The recent reduction in the number of members of municipalities from 62 to 55 in the UoM was the result of lack of services provided by the union to municipalities' members. The failure of Ain Baal in treating the waste generated in the whole district and the challenges in finding a location for a sanitary landfill, reduced the trust and the expectations in the UoM.

Thanks to the recent project in capacity building by UN Habitat, the UoM has increased the technical capacity of its employees. The newly established RTO started to be the technical reference for the municipalities in delivering services (road rehabilitation, sewage network maintenance and SWM). The RTO needs to increase the capacity and the skills of the staff but the unit has a potential to support the federated municipalities increasing the trust in the UoM and the willingness from the single municipalities to cooperate on a common and shared management of the services.

The RTO needs also to increase the institutional role, with more coordination and capacity to implement plans and solutions, to avoid single municipalities' initiatives. A framework for contracts in dealing with service providers from the private sector in general is also required.

g. *Access to capital mainly from the International Cooperation sector*
In the past decade, due the 2006 war and the Syrian crisis, the UoM received funds to develop the district. The UoM and Tyre municipality learned how to manage funds and how to apply to proposals. The funds are not reliable since as soon as the Syrian crisis will be over, the access to funds will be reduced. The access to capital for investment is limited by the lack of planning and the weakness of the legal and institutional framework.

h. *Low municipal, regional & national cooperation*
The low regional and national cooperation is on one hand due to the overall low-quality governing patterns in Lebanon and on the other hand due to the feeling of the UoM members that they are capable of making their own arrangements for all aspects of solid waste management without the need for co-operation with its neighbors.

i. *k. No cost recovery and not tariff applied*
Users are not paying for the service. Municipalities rely on the Investment Municipal Funds which should be used for investment to pay the regular services for SWM. The waste fee is not applied nor linked to any utility.

General description and overview of common practice

Lebanon suffers from specific and deep-rooted problems affecting waste collection, waste treatment and the disposal of municipal waste. Since 1997, the waste sector in Lebanon has operated under an emergency municipal solid waste management plan, which ended in July 2015. This culminated in the current national trash crisis, which was mainly triggered by the premature closure of Lebanon's largest sanitary landfill located in Naameh (Mount Lebanon) in July 2015. These problems have led to significant social, economic and environmental difficulties. In Lebanon, open dumping and open burning of municipal waste is a common and widely accepted practice. The main existing landfills, namely the Naameh landfill, the Zahle landfill, and the Tripoli controlled dumpsite, have only dealt with around 55 per cent of the total generated solid waste in Lebanon since 1998. The remainder is partially recycled/composted and partially disposed of in open dumpsites, by local authorities, such as municipalities and/or unions of municipalities. (MOE/GEF/UNDP, 2015)

The lack of an overarching and integrated waste strategy, including the provision of basic information (e.g. waste composition, waste amounts), the failure to implement relevant laws and regulations defining specific activities for improved waste management and waste utilization, and failure to coordinate activities and stakeholders (including the allocation of roles and responsibilities for waste management between local and central level) have been identified as further key shortcomings in the sector.

Despite various studies describing the problems in Lebanon's waste sector and addressing specific aspects like feasibility studies and assessments of alternative technologies (CDR, 2012), no overarching and comprehensive strategy for improving the situation step by step has been developed. There is an urgent need for substantial improvements and sustainable solutions, as the current situation is leading to significant negative environmental, economic and social impacts in large parts of Lebanon. Only with an enabling environment in place (i.e. a solid information base and afunctional institutional and regulatory framework), will urgently needed investments for technical solutions in the waste sector be based on solid ground.

Waste Generation (per capita/year)

MSW generation in Lebanon was estimated to be 2.04 million tons in 2013, but this figure is now thought to be much higher as a result of the influx of Syrian refugees. There is an estimated 1.7% annual increase in waste generation rate.

Based on data from the Ministry of Environment, waste generation rate varies from 0.8 kg/capita/day to around 0.95-1.2 kg/capita/day for rural and urban areas respectively. From these values, a weighted average can be computed and is estimated to be around 1.05 kg/capita/day. However, in major urban areas there is a high production of waste that reaches 1.2 kg/capita/day, which is mainly the case in Beirut and Mount Lebanon.

Collection Coverage

Collection coverage throughout the country is generally very high and is most cases very organised, however, there is very serious concern for public health due to the widespread open dumps. In total there about 962 open dumps.

Number of Landfills/MSW Disposal rate (tonnes/year)
Until mid-2015 the MSW management situation in Lebanon was as follows:

- 55 % of the total waste stream is deposited in sanitary landfills;
- 30 % dumped in open dumpsites; and
- 15 % is recycled and/or composted.

There are currently four operational landfills in Costa Brava and Burj Hammoud, which serve Beirut and Mount Lebanon, Zahle and Bar Elias.

An additional three landfills are currently under construction and commissioning by OMSAR in Srar, Baalbek, and Jib Jennine.

Waste management of Organic fraction (composting, anaerobic digestion)
The most commonly employed form of treatment of organic fraction is through windrow composting at facilities where waste is treated mechanically to segregate the different fractions

Energy Recovery Rate
Only one anaerobic digestion plant exists in Lebanon the produces about 50 MW of energy from the processing of a total about 300 tons of incoming waste per day.

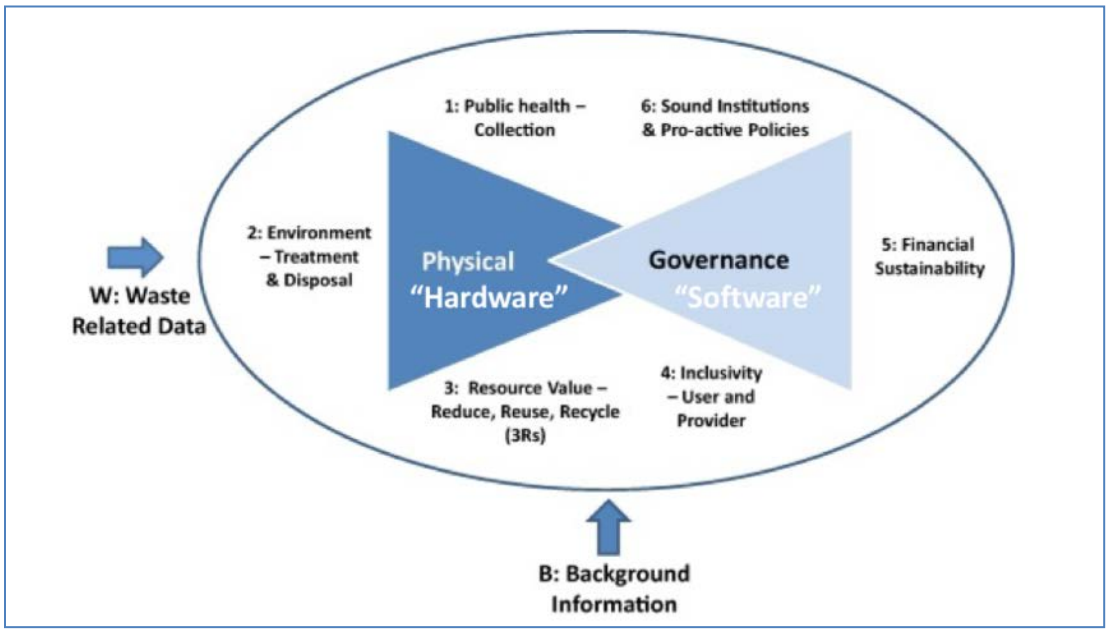
District Level

Aimed at improving waste management in general

As part of its technical assistance project, OMSAR has prepared an Integrated Regional Waste Management Plan for the waste generation in the entire District of Tyre. The aim of the master plan was to set the framework that will stimulate the formation of an integrated sustainable waste management system that will:

- Reduce the environmental and health impacts of waste management
- Enhance the resource recovery activities
- Increase the efficiency and the cost – effectiveness of the existing system
- Strengthen the institutional development and the cost recovery

The plan was designed in a way where social and institutional aspects take the same weight as the purely technical, environmental and economic considerations. The analysis of both the baseline assessment and the proposed plan has been made based on the "hardware" and "software" components of waste management, as described below.



Country Level

Aimed at improving waste management in general

The Ministry of Environment has recently produced a draft National Strategy on Integrated Solid Waste Management, which is a legislative requirement of the Law 80 of 2018 on Integrated Waste Management. The objectives of the Strategy are specified in various thematic areas as described in the table below:

Thematic area	*Objectives*
Policy, Legislation & Enforcement	• To support Waste Management (WM) activities with practical, effective and enforceable legislation in the light of the new Law on waste management; • To ensure environmentally sound long-term land use planning is the basis of all development decision-making • To better coordinate national waste management activities and ensure that the Strategy is periodically reviewed and updated to achieve the stated goal and purpose; • To setup and strengthen procedures for monitoring and enforcement; • To develop information system;
Sustainable financing	• To develop waste management systems and programmes financially self-sustaining; • To establish incentive schemes that implement the polluter pays principle by encouraging cleaner production and waste recovery; • To promote Extended Producer Responsibility and polluter pays principle (EPR); • To adopt and apply economic instruments;
Capacity development	• To define roles and responsibilities at national and regional/service area level; • To strengthen the capacities of those involved in waste management;
Waste reduction, recycle, reuse	• To reduce the amount of waste generated and landfilled; • To maximize waste utilization; • To progressively move toward a 'circular economy' and resource efficiency;
Sustainable Integrated waste management	• To enhance sustainability of SWM practices; • To promote effective waste collection and disposal throughout Lebanon and reduce the impact of waste management on humans and ecosystems; • To promote waste management hierarchy; • To promote decentralized waste management; • To improve waste management infrastructure and support sustainable operation and maintenance; • To promote the use of best available techniques for waste management; • To encourage participative approach during the waste management system development and implementation, including incorporation of informal sector and promotion of private participation
Public Awareness / Consultation	• To increase public awareness on their WM responsibilities; • To introduce and enhance community participation on waste management; • To promote waste reduction, recycle and reuse among the public;

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

1. National Appropriate Mitigation Action in Lebanon's Municipal Solid Waste Sector -

Lebanon is a signatory to the United Nations Framework Convention on Climate Change (UNFCCC), and as a Non-Annex I country has no official commitments under the Kyoto Protocol for reducing national GHG emissions. According to the requirements of all signatory countries for putting forward their INDCs as a key input to the 21st Conference of the Parties in Paris (COP21), Lebanon submitted its INDC to the UNFCCC in September 2015. The solid waste sector was explicitly mentioned as one of the sectors for which financial and capacity-building support as well as technology transfer and awareness raising are required to achieve the conditional GHG mitigation target under the INDC.

In the context of INDCs, a Nationally Appropriate Mitigation Action (NAMA) can be understood as a tool or implementation mechanism for countries to design and implement interventions and actions to achieve the goals and targets described under the INDC. The concept of NAMAs was first introduced in the Bali Action Plan as part of the Bali Road Map at the 13th UNFCCC Conference of the Parties (COP13) held in 2007 and was integrated into the Copenhagen Accord that came out of the UNFCCC COP15 in 2009. NAMAs are defined as a voluntary and non-binding set of policies or actions that should contribute to sustainable development and GHG emission reductions. As NAMAs can leverage national and international support for actions towards transformational change, sustainable development and GHG mitigation, many developing countries have engaged in the identification and development of NAMAs.

The MoE has joined the Low Emission Capacity Building (LECB) programme, a global initiative with 25 developing countries participating. Under the LECB programme, national counterparts are supported to strengthen technical and institutional capacities to identify and formulate NAMAs and Low Emission Development Strategies (LEDS) in the public and private sectors, and to strengthen the underlying GHG inventory management and Measurement, Reporting and Verification (MRV) systems. Under the MOE, the Lebanese Climate Change Coordination Unit (CCCU), in consultation with relevant stakeholders, decided to use LECB support for the development of two NAMAs, one in the waste sector and one in the transport sector. This selection was the conclusion of a prioritization process in which it was determined that improved management of MSW offers the greatest opportunity for GHG reductions compared with other waste streams and carries a high potential to bring transformational change to the sector.

The concept of a NAMA allows for the sector-wide and stepwise approach that is required to bring significant and far-reaching improvements for the solid waste sector in Lebanon. Based on a comprehensive sector assessment and an intensive consultation process with key local stakeholders of the MSW sector in Lebanon, the scope of the NAMA was defined.

Purpose and Objectives of NAMA

The overall purpose of this NAMA is to identify and describe concrete actions needed for the MSW sector in Lebanon to improve the processes leading to higher efficiency and to achieve a transformational shift towards higher sustainable development standards and for reducing GHG emission. Furthermore, the NAMA should help leverage national and international support for establishing an enabling environment in the MSW sector and implement a defined set of technical interventions that help improve the current situation.

The NAMA will address a variety of key issues and challenges in Lebanon's solid waste sector, ranging from legislative support to achieve formal ratification of waste-related jurisdictions, the implementation of waste collection and management centers at which waste sorting can take place, LFG collection and utilization and implementing Waste to Energy (WtE) facilities based on waste incineration.

The overall objectives of the NAMA can be summarized as:

- Leading to scaled-up emission reductions;
- Resulting in co-benefits and aligning with Post- 2015 Sustainable Development Goals (SDGs);
- Leading transformational change for the MSW sector;
- Enabling private sector participation;
- Being financeable and bankable.

To achieve these objectives the NAMA is designed and setup in a way that reflects the current situation and local circumstances and will use stepwise approach that should help build the necessary enabling environment first, before physical interventions are implemented. These are the main building blocks of the NAMA:

- Setting up and operating an institutional framework capable of managing and operating the NAMA with all necessary measures and interventions;
- Supporting awareness creation for waste management and source sorting among key institutions, stakeholders and the public;
- Establishing the necessary legal and regulatory framework for the MSW sector that enables technical interventions (LFG utilization and WtE) to be applied;
- Ensuring the collection and utilization (power generation) or flaring of LFG in up to eight (8) existing sanitary landfills and open dumps;
- Preparing and implementing solid waste management and collection centers (including waste stream diversion to disposal sites);
- Applying (preparing, implementing and operating) WtE technologies in Lebanon. This includes assessing and preparing the implementation of one WtE plant in the Greater Beirut Area and assessing the potential for additional WtE plants outside the GBA.

2. National Greenhouse Gas Inventory Report and Mitigation Analysis for the Waste Sector in Lebanon (2015)

In the framework of Lebanon's Third National Communication (TNC) to the UNFCCC, GHG emissions resulting from the waste sector in Lebanon were estimated for the years 2005 through 2011. However, considering newly available data and/or better access to available data, a recalculation of GHG emissions from 1994 through 2004 was undertaken. Calculations were performed using the Revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories (IPCC, 1997) and the 2000 Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (IPCC, 2000). The tier 1 approach of the IPCC guidelines was adopted in the calculation of GHGs and consequently for the development of the national greenhouse gas inventory. Data collection was the main limitation in the development of the GHG inventory given the decentralized and inaccurate data available at a national level.

Legislation

National Level

General Issues related to MSW Governance

Existing legislation related to solid waste management consists of fragmented regulations not specifically dealing with solid waste (Sweep-net, 2010). There are several elements within the legal framework that deal with the environment in general or solid waste management. In general and as far as the existing legal framework is concerned, almost all legislations could be considered to:

- Be outdated and lack short-term as well as long-term vision concerning solid waste management. In that perspective, they do not set any target limits for waste generation, treatment and disposal levels;
- Do not differentiate between the various waste categories and/or the level of hazard associated with each. With the exception of medical waste where the decree differentiates between the various types of waste generated within a health care facility.
- Do not cover all components of an integrated waste management system and are mainly limited to banning open dumping and specifying storage conditions.
- Miss environmental considerations in the planning process which resulted in unsustainable decisions related to waste management.
- Lack a framework law that specifies the standards, the responsibilities, the environmental requirements and conditions for an integrated waste management network, financing and cost recovery, financial incentives, minimum specifications for waste management technologies, permitting requirements, etc. Some guidance booklets have been issued by the Ministry of Environment but they are not legally enforced.
- Do not assign a specific authority to be responsible for supervising waste management facilities thus creating confusion among the concerned authorities.
- Do not specify the monitoring mechanisms to ensure minimum environmental compliance.

In this context, it is worth mentioning that a new Law No. 80 of 2018 on Integrated Solid Waste Management has recently been passed by parliament. The Law brings together all locally involved stakeholders into one independent National Waste Authority that is responsible for planning and decision-making at the national level, as well as waste treatment. According to the Law, the municipalities and the unions of municipalities will be responsible for the collection of the waste generated within their territories. The proposed Board will be responsible for the waste management (treatment, landfilling, etc.) will be headed by the MoE, and shall include members from relevant public authorities as well as well as the private sector (academics, consultants) and NGOs.

Legislation governing MSW management

The below table summarizes the main decisions issued by the Lebanese Council of Ministers (CoM) from 1997 in relation to solid waste management. Most of these Decisions shaped the waste management strategies adopted so far in the country.

Most of the decisions address specific components of waste management namely solid waste collection, treatment and disposal (especially landfilling and waste dumping) and energy recovery (recently) thus neglecting other essential components of an integrated solid waste management system (such as waste minimization, recycling at source, etc.). The CoM decisions do not adequately distribute responsibilities, hence create confusion and hindering implementation. In most of the Decisions, the planning responsibilities were shared between the MoE and the CDR without a clear matrix of responsibilities between the two institutions. In addition, it is worth mentioning that a major obstacle that hindered the

implementation of so many Decisions was the inefficiency at the decision making level to enforce a location for a waste management facility and more specifically for sanitary landfills.

Decision	Brief Description
Decision 18 (dated 22 Jan 1997)	The Decision consists of approving the plan proposed by the Ministry of Environment to manage Bourj Hammoud dumpsite as well as the solid waste management in Lebanon.
Decision 31 (dated 28 Aug 1997)	The decision integrates plans and actions intended to minimize the negative impacts of solid waste and to promote an environmental approach when dealing with waste management
Decree 9093 (dated 15 Nov 2002)	The decision is kind of an amendment of decree 1917 (specifying the basics and rules for the distribution of the independent municipal fund). It sets financial incentives offered to municipalities establishing solid waste treatment and disposal facilities within their administrative territories.
Decision 33 (dated 28 Nov 2002)	The Decision authorizes the municipality of Saida to reclaim land from the sea to establish a municipal waste treatment plant.
Decision 3 (dated 31 Jul 2003)	The Decision calls for the establishment of a ministerial committee to review the CDR proposal for treating municipal, industrial, hospital and slaughter houses waste and waste resulting from waste water treatment plants in Lebanon.
Decision 16 (dated 14 Aug 2003)	This Decision is an amendment of Decision 3 above and calls for distributing the responsibilities among the CDR, the municipalities and producers of solid waste, to collect, treat and dispose of the solid waste. The Decision calls for forming a technical committee to come up with a plan.
Decision 6 (dated 06 Nov 2003)	This Decision includes the report of the assigned technical committee according to the decision 16 above concerning treatment and landfilling municipal waste. The assigned technical committee had prepared a report related to determining locations for treating and landfilling municipal waste which included 20 locations distributed on every Governorate and proposed to assess the situation of the Naameh landfill.
Decision 1 (dated 13 Nov 2003)	The Decision calls for studying the report of the technical committee and restudy the proposed locations and number of waste management facilities.
Decision 70 (dated 12 Feb 2004)	The Decision secures funds for extending the Zahle landfill and supervising the operation of works for an additional 3 years until the date 31/12/2006 from the budget of the year 2004.
Decision 12 (dated 08 Apr 2004)	The Decision amends the deadlines presented in the council of ministers' decision number 22 dated 8/4/2004 concerning starting the bidding for solid waste management in Lebanon The committee asked to restudy the proposed locations for treating and landfilling of solid waste based on the following: - Distributing the waste produced in Beirut on the neighboring districts and determining landfilling location and the quantities of waste that will be brought to each district; - Distributing the waste produced in Tripoli on the neighboring districts and determining landfilling location and the quantities of waste that will be brought to each district; - Finding a landfill location for Kesrwan area; - Amending the strategy of solid waste management in Lebanon; - Amending the strategy of municipal waste management in Lebanon proposed by the Ministry of the Environment.
Decision 68 (dated 20 May 2004)	The Decision includes the 3rd version of the report prepared by the technical committee for determining locations for treating and landfilling municipal waste. it instructs the CDR to start the bidding process for the development of municipal solid waste management facilities

Decision	Brief Description
Decision 1 (dated 28 Jun 2006)	This decision consists of the approval of the MoE and CDR on MSW 2006 plan for Lebanon which consists of dividing Lebanon into 4 Service Areas and establishing a SWM system comprised of sorting, composting and landfilling
Decision 55 (dated 1 Nov 2010)	This decision consists of the CoM Decision to amend and complement Decision 1 by integrating WtE technologies in large cities or wherever it's suitable while implementing the 2006 Plan in other areas. The Decision also requires the involvement of the private sector in these projects and it requires incentives to encourage municipalities to adopt solid waste management facilities within its zones (refer to Table 28 for more details about this decision)
Decision 74 (dated 27 Mar 2014)	This Decision calls for forming an inter-ministerial task force to prepare recommendations for a national strategy for SWM and propose alternative solutions for Naameh sanitary landfill and Tripoli semi-controlled dump on the basis of a draft plan prepared by MOE, MOIM, and CDR on February 2013 based on the earlier strategies of 2006 and 2010 and on the latest RAMBOLL feasibility study (RAMBOLL 2012) for the adoption of WTE in major coastal cities. The proposed plan included a combination of sorting, composting, WTE, and, landfilling facilities.
Decision dated 12/1/2015	This Decision consists of the Council of Ministers approval of a national solid waste management plan prepared by MoE and CDR. The plan splits the country into six service areas and calls for the implementation of a combination of MBTs and landfills and such that the percentage of waste that goes to the landfill is limited to 40% of the waste stream in the first 3 years and 25% in the years after. The contract duration is 7 years with the possibility of renewal up to 3 more years after which the incineration technology or Refuse-Derived Fuel (RDF) will be introduced. The selection of the technology is left for the contractors bidding for the projects.
Decision No. 90 (dated 12/3/2016)	In this Decision, the Council of Ministers approved a waste management plan focusing on Beirut and part of Mount Lebanon. It calls for the construction of 2 sanitary landfills on the sea front, one in Burj Hammoud (eastern suburb of Beirut) and another right by the airport in Ouzai (southern suburb of Beirut) to accommodate newly generated waste from Beirut and Mount Lebanon excluding Jbeil after sorting the waste in the 2 existing treatment facilities in Karantina and Amroussyeh. Also, the COM decided to open Naameh landfill for 2 months to receive all accumulated waste on the streets since 18/7/2015. It is worth mentioning that the COM did not address any plans to other Lebanese areas like the North, Beqaa, or the South. Therefore, the 2010 plan is still effective for these areas.

Current Projects or Activities Aimed at Reducing SLCP Emissions

The American University of Beirut is currently working on a research study entitled "Understanding the vulnerability of Lebanon's Coastal cities to climate change risks: the case of Batroun and Tyre."

This will be accomplished through the following outputs:

- Vulnerability assessment of the priority sectors in the city of Tyre
- Mapping the resources and services
- Supportive policies and institutional structures review including the role of the municipality in each prioritized sector
- Road map for the municipalities to undertake adaptation actions and build resilience

Key Stakeholders

The district of Tyre has a number of key stakeholders, which are briefly described below.

Group	*Stakeholder*	*Description*
Local Institutions	Union of Municipalities of Tyre	The main stakeholder is the Union of Tyre Municipalities with its technical office recently established called RTO (Regional Technical Office). The office is responsible for Waste management in particular and is monitoring the facility of Ain Baal which is operated by a private company contracted by the UoM. The RTO is also the most appropriate counterpart to prepare and implement the Master plan and to produce the Action plans.
	Municipality of Tyre	It plays a key role in the whole district. It is not only the main urban center but it also attracts thousands of tourists during the summer thus influencing the economy of the entire area. For that reason, Tyre has a strong influence and interest in improving the SWM system.
	Other municipalities	Waste collection, transportation and street sweeping activities are under the responsibility of each municipality. A representative of each municipality or of a cluster needs to be consulted throughout the planning phases. Due to Tyre's influence and since they are delegating the responsibility for treatment and disposal to the UoM, the influence is reduced compared to Tyre. Their involvement is considered a key factor for the RTO, the expenses of which are shared by the municipalities.
Community and CBOs	CBOs	There are several CBOs in the district that are well connected to the communities. Though not all of them have worked in WM, they do have influence and should be involved.
	Popular Committee	In the past few years, the municipality of Tyre established a committee which includes representatives of the community and the civil society. This committee includes an active "woman committee" which is a key stakeholder as it represents the main beneficiaries of the planning process. This committee should be kept aware and active

		with constant consultation to help in the planning process, future action plans and to prevent potential manifestation of the NIMBY syndrome.
National Institutions	Ministry of Environment	Through the MoE does not really influence the process, it should be involved to increase the influence as the MoE keeps the control of the nation territory
	OMSAR	OMSAR acts as both an implementing agency and a policy making ministry. It develops regional plans and implements – supervises waste management projects outside BML area. They have influence and interest both at national level and a local level as they are trying to shape the proper level of regionalization and the technological solutions required in cooperation with the UoM. In Tyre District OMSAR built the AIn Baal waste treatment facility.
Others	Informal Recycling Sector	These include workers and enterprises that are involved in the informal recovery of recyclables from waste, either to an intermediate processor, a broker, or a manufacturer. Their numbers increased with the Syrian crisis. Their activities are most of the time not formally organized and not recognized by the local authorities. They have very low influence but high interest.
	Political parties	Two main political parties are predominant in Tyre districts. These are Haraket Amal and Hezbollah. They have high influence but relatively low interest in WM.
	Commercial, Industrial and Touristic Activities	Afraid of increase of taxation, if not properly consulted they can have a negative influence. They do not have real interest but are a Potential key stakeholder for waste source sorting initiative.
	Private sector waste operators	This is a representative of the private sector that is active in waste management in Tyre. They manage and operate Ain Baal facility. They do not have real interest. Driven by the profit, can have negative influence when forced to keep environmental standards or operational safety measures which need financial investments.
	United Nations Relief and Works Agency (UNRWA)	Specifically the environmental unit responsible to manage waste in the official Palestinian refugee camps. Waste of the camps impact the WM system of Tyre. They are collected by UNRWA and dumped in the territory. UNRWA has relatively low interest and influence.
	United Nations Interim Force In Lebanon (UNIFIL)	The UN peacekeeping agency deploys at the moment around 10,000 persons between military and civil personnel. Some interest due to their negative environmental impact (Waste and Waste Water). Some influence due the relations they keep with municipalities and the local community (UNIFIL employ many Lebanese staff from the surrounding villages). They have funded SWM project in the past (supply of trucks and equipment in general).

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