TUNISIA
PPP 2018

11

Tunis-Djerba Waste Management

Location:
Tunis and Djerba

Company:
ANGeD

Mission:
Waste management

Cost:
TND 530 million

General presentation

Tunis waste management project

The project focuses on the treatment of household and similar waste in Greater Tunis. Indeed, it is envisaged to make two waste treatment and disposal sites available. Each of these two sites includes a Mechano-Biological Treatment (MBT) facility and a landfill. The total cost of the project is ***TND 530 million****.*

MBT reduces the amount of waste going to landfill and limits the environmental impact of landfilling of non-recovered fractions.

The MBT also makes it possible to recover several recoverable fractions in the incoming waste, and several solutions are conceivable:

- *Solution 1*: Recover recyclables (plastics, paper, glass, metals, etc.)
- *Solution 2*: Recover recyclables (plastics, paper, glass, metals, etc.) Recover a stabilized organic fraction allowing a valuation as an amendment,
- *Solution 3*: Recover recyclables (plastics, paper, glass, metals, etc.) Recover a stabilized organic fraction allowing a valorization like amendment. Recover a fraction with high calorific value allowing the production of a secondary fuel.

The operation, of a MBT installation is schematized as follows:

- The incoming waste deposited by the collection bins is the subject of a first mechanical treatment which consists of opening the bags.
- After opening the bags, the waste is directed to a biological treatment which results in waste water loss and degradation of part of the organic fraction.
- At the end of the biological treatment is a mechanical treatment that sorts and separates the waste to capture the various fractions according to the recovery objectives - as indicated above.

In the case of Greater Tunis, the strategic study identified solutions 2 or 3 as adapted. A criterion of the choice will be the feasibility of the energy valorization necessary for the solution 3.

The study identifies the cement plants among the conceivable outlets, specifies that:

"To date, the company Carthage Cement is the only cement factory of Tunisia ready to accept and have the opportunity to use the secondary fuel. But it is likely that subsequently other Tunisian cement plants opt for the secondary fuel option."

The deadlines for developing acceptance protocols for RDF in cement plants can be quite long, for example because of test campaigns.

Consequently, it is recommended not to leave the choice of such a valuation to the sole discretion of the candidates or tenderers during a tender, but to anticipate as precisely as possible from the feasibility study of the project. The residual non-recovered fraction is discharged to landfill.

For the Greater Tunis project, it is envisaged to install the MBT on the sites of the 2 existing landfills (see below). In which case the project will involve the creation or upgrading of the cells needed for storing non-upgraded fractions.

Djerba waste management project

The project includes:

- the collection of solid waste and sweeping in the Perimeter of the Concession;
- the design, construction, equipment and commissioning of a mechanical-biological treatment center (MBT) for households, including landfills for non-recoverable residues after bio-stabilization;
- the operation, maintenance and monitoring of the new MBT center and existing transfer centers and possibly carried out by the concessionaire,
- slaughterhouse waste management

For the MBT, the specifications of the project of the concession provides a MBT based on recycling and recovery and bio-stabilization of the ultimate fraction cannot be valued. The concessionaire will therefore aim to maximize the quantities recycled or recovered in the form of solid recovered fuel (SRF) or compost for source-sorted organic waste or other solutions.

With reference to the 3 solutions explained above, this is therefore Solution 3, which provides for energy recovery by solid fuel production.

The concessionaire will propose viable, cost-effective and modular waste recovery solution that minimize landfilling as much as possible. The waste must necessarily be bio-stabilized before burial in the bins. The objective stated by the grantor is that the burial does not exceed 45% of the volume of the incoming waste (expressed in mass). The bidder proposing the lowest landfill rate will be the best scored technically. However, the proposed landfill rate in the technical offer will be contractually binding.

Any solution proposed by the Concessionaire must be the subject of an economic study to justify its interest for the Djerba Municipality in terms of the environment in general and its financial impact on the project.

The areas of valorization to be favored are agriculture (clean compost resulting from separated organic waste at the source) and energy.

The tenderer may also propose under his responsibility any other waste recovery solution if these are realistic and make it possible to achieve the objectives of this valuation.

The Specifications impose performance of processing capacity as follows:

Processing capacity

Description/ Parameters	Unit	Minimum capacity
Annual capacity	t/year	70,000
Weekly capacity	t/week	1,700
Hourly capacity	t/h	24

The Specifications impose performance standards on the quality of the treatment, as presented in the table below:

Performance standards

Description/Parameter	Guaranteed value	Conditions
Quantity of waste destined for landfill	≤ 45 %	**The total weight of the solid waste weighed at the entrance**
AT4 respiratory activity of any waste destined for Burial *	≤ 10 mgO2/g MS	**According to DIN ISO 16072**
Compost quality	Consistent with the Standards	**Standard NT 10.44 (2013)**

It is advisable to specify the contractual conditions for verifying these obligations, and in particular for the stabilization of waste destined for landfill (AT4 respiratory activity).

The specifications allow a greater flexibility in the recovery objectives but impose the objective of stabilizing waste to be buried.

The table in appendix 1 presents the main characteristics of the 2 projects.

Project rationale

In the current situation the municipalities that are responsible for their collection must deliver the collected waste either to an approved transfer station or to one of two approved landfills: the Jebel Chekir landfill and the Kabouti landfill. However, it is noted that on the one hand the waste is not collected in its entirety, and that on the other hand the waste collected is not all delivered in these approved facilities; there are several illegal dumps.

In fact, only the Jebel Chekir landfill, built in 1999, is now in operation although it is subject to opposition from the neighbouring population due to nuisance: odours and pollution of the water resulting from a poor leachate management. The use of the other dump, that of Kabouti, was prevented because of the protests of neighbouring residents.

The project contributes to the implementation of an integrated waste management system in Greater Tunis, and improves the sanitary conditions of the neighbouring populations of landfill sites.

The project contributes to the preservation of the environment. The project is necessary to eradicate the illegal deposits of waste that are a source of contamination. This concerns groundwater contaminated by untreated leachates. This also applies to the atmosphere contaminated by the fumes from landfill fires and the flight of dust or light waste.

More particularly, the project will modify the characteristics of the waste to be buried, and consequently reduce the environmental impact of the landfill and the resulting nuisances:

- Reduction of the amount of waste to be landfilled: a reduction of the amount of waste from 40 to 80% can be generated by the MBT.
- Reduction of environmental emissions (leachate, biogas, odours, etc.)
- Reduced leachate management issues. MBT reduces the amount of leachate, reduces leachate concentration, reduces the amount of concentrate to be removed, and uses fresh leachates to humidify MBT windrows.
- Reduction of the amount of biogas

The project contributes to the development of the circular economy:

- By sorting and recycling recyclables by sorting recoverable fractions that can either be recycled, converted into secondary fuel or a combination of both.
- Production of a secondary fuel (energy recovery): this initially includes plastics, paper / board, textiles and wood but also a large part of the organic matter when dried can be used as a secondary fuel.
- Production of a soil amendment (material recovery): In addition, the MBT allows the recovery of the fine organic fraction of the sieving as a soil amendment. It is conceivable to use this amendment for the temporary recovery of the landfill.

Legal and institutional framework

Institutional structures adapted for the sustainable management of MBTs in Tunisia will have to bring greater efficiency at acceptable costs and encourage the intervention of the private sector in the development, operation and management of these facilities, at least for purely operational aspects.

Current situation of the contracts

Until now, ANGeD has been responsible for the construction and operation of transfer centers and landfill sites, although it should be noted that some municipalities manage their own transfer centers.

From 2005, management contracts for the management of the transfer and disposal of solid waste have been awarded for a period of 5 years (in fact, comparable to simple service contracts); at present, these management contracts are the only real PPP experience in the field of solid waste management in Tunisia.

These contracts cover the provision of infrastructure operation and management services but without private sector involvement in the financing of infrastructure, the design or implementation of the facilities because the investment requirements are minimal and focus on the provision of means of exploitation (vehicles, leachates treatment plants, catchment and flaring gas discharge stations and equipment).

Current situation of cost recovery and tariffs

Resources from the payment of the fee paid by the landfill customers currently allow ANGed to cover about 20% of the operating costs of the landfill and transfer service. These resources are supplemented by state subsidies (mainly the environmental protection tax).

The current system of financing the landfill of waste (20% borne by municipalities and 80% by the environmental protection tax) would not allow, in the case of a PPP, to ensure the recovery of waste. costs. Even the operating costs could only be partially covered.

In the case of MBT the valuation of by-products provides a recipe. Under no circumstances can this recipe cover the full cost, or even the simple cost of operating the facility. However, the legal aspect of the ownership of valuation revenues needs to be clarified.

Current legislative framework

Overall, the existing institutional and legal framework in Tunisia is well suited to the implementation of PPP projects and contracts.

In the solid waste management infrastructure public services, Tunisia also benefits from a mixed recovery system for the costs of post-collection of solid waste, fueled in part by royalties paid by landfill customers. partly through a grant from FODEP from the proceeds of the tax for the protection of the environment, which allows to ensure more generally a good level of recovery of operating costs of services (but cannot ensure self-financing).

However, as mentioned above, the performance of the royalty collection system remains insufficient since it currently **covers only around 20% of the operating costs** of the waste transfer and landfill service.
Recent legislative changes have broadened the PPP options that it is theoretically possible to implement in Tunisia to a wide range of contracts including the various types of contract: Service contract, Management contract, Affermage, Concession and Asset Transfer.

On the other hand, in the particular field of solid waste management, the creation decree of ANGed has not been modified, preventing the agency from granting private persons concessions for the financing, the realization and the management of solid waste. exploitation of the works.
In addition, given the weakness of its own resources, particularly financial, the agency would not be able to be the licensing authority able to reassure private operators.

The distribution of roles and actors
Project management, whether it is the current installations on which a MBT or a new complete MBT + discharge facility is added, is provided by the ANGed.
The alternative is private sector investment, but the current cost recovery conditions represent too high a risk for such an alternative. Moreover, as mentioned above, the current legal system would not allow ANGed to make a concession.

Project management assistance (AMO) is a recognized function. Typically this role is assigned to a private consultancy firm with the necessary technical, legal and financial skills, and which is responsible for assisting the Project Owner in the preparation of projects and calls for tenders (technical studies, environmental and social impact studies, consultation and communication support, legal and administrative assembly studies, DCE) in the analysis of tenders, the finalization of contracts, and the supervision of works and operations . This assistance is desirable for a program as important as that envisaged here.
This is a private sector intervention.
The design / planning of installations is generally divided between the Contracting Authority - or more specifically the AMO - and the builder.
In the case of a complete project management, the project owner will carry out detailed studies of the planned installation. The AMO then plays the role of Project Manager and will carry out project studies (APS and APD) and Project.
In a design-build (DB) tender, the contracting authority has a functional program prepared and a solution studied at the APS level, the rest of the design studies will be carried out by the designer of the consortium of the design contract.
In both cases it is a specialized design office.
This is a private sector intervention.
The realization of the installations is the responsibility of the construction companies (equipment and civil engineering).
This is a private sector intervention.

For the exploitation it seemed appropriate to indicate the distinction between Exploitation without Major maintenance renewal (GER) or Exploitation with GER. The client can always reserve the possibility of self-management of the GER. On mechanical or thermal installations such a solution is rarely recommended and remains rather marginal.
There is a range of possibilities for private operator intervention, from a simple service contract based primarily on the provision of means prescribed by a contract, to a global service (including GER) for a price. fixed per tonne processed with commitment to the farm's performance in terms of availability, processing capacity, emission compliance, management of recoverable by-products and residues to be eliminated and restoration of the installation in perfect working order at the end of the contract.

As mentioned above, ANGed is currently a facility operator.
But the exploitation can also be entrusted to a specialized private company.
In the latter case it is a private sector intervention.
The operational control of the installations is currently ensured by the ANGed, but may be entrusted to a specialized design office. It is a typical mission of Assistance to Contracting Authority
Facility finance is a primary function. In the current situation, given the uncertainty of cost recovery, this solution appears to represent a level of risk that is difficult for the private sector to accept.

Legal and institutional framework of the consultation for Greater Tunis

The statement of the current situation indicates that a part of the waste is not collected and that a part of the waste collected is not carried in the accredited centers apparently because of the cost. Under these conditions, how can the dealer be assured of receiving the waste?
It does not seem to be envisaged in the case of Greater Tunis that collection is part of the licensed service.

Legal and institutional framework of the consultation for the island of Djerba

The consultation is organized in a call for tenders. The RC does not provide for dialogue or negotiation. The grantor is a commune of Djerba which represents the two others. It is not specified in what title and what are the power and competence transferred by the 2 other communes to the one that represents them.
The legal framework is that of the Concession as specified by the Contract which indicates that the relations established between the parties will be governed by the laws and regulations in force in Tunisia, in particular those applicable to the Concession.
Dealer's Regulations: Monthly based on the tonnage actually weighed.

The Concessionaire is in charge of the collection and to this extent he controls the inputs. However, the concession does not cover the entirety of the collection circuits: on Djerba Midoun 47% (in area) is concerned; on Djerba Houmet-Souk 61% and on Djerba Ajim 70%.

PPP and concession legal framework

PPP

- Law n° 49-2015 dated 27 November 2015, on Public-Private Partnership Contracts
- Government Decree n°771 dated 20 June 2016, on composition and prerogatives of the strategic council for Public-Private Partnership Contracts
- Government Decree n°772 dated 20 June 2016, on fixing the conditions and procedures for entrusting Public-Private Partnership Contracts
- Government Decree n°782 dated 20 June 2016, on the modalities for keeping register of the actual dues encumbering the works, facilities and equipment set under Public-Private Partnership Contracts:
- Government Decree n°1104 dated 4 July 2016, on conditions and modalities for fixing the counterpart money to be paid by the public entity to the project company, and fixing the conditions and modalities for transfer and pledging of claims.
- Government Decree n°1185 dated 14 October 2016, on organization and responsibilities of the general Public-Private Partnership Authority.

Concessions

- Law n°2008-23 dated 1st April 2008, on the status of concessions
- Decree n° 2010-1753 dated 19 July 2010, on the conditions and procedures for entrusting concessions.
- Decree n° 2013-4631 dated 18 November 2013, modifying and complementing Decree n° 2010-1753 dated 19 July 2010,

on the conditions and procedures of entrusting concessions.

Project scope

Greater Tunis. The project concerns Greater Tunis which includes the four governorates of Tunis, Ariana, Ben Arous and Manouba.

Djerba island. The project the municipalities of Houmet Essouk, Ajim and Midoun.

Completed technical studies

Site identification for the facilities of the Greater Tunis project: The project plans to reuse the two existing sites. This will have to be confirmed in particular by the results of the environmental and social impact studies. Moreover, the experience shows the difficulty of "reopening" a landfill site, even to improve operating conditions.
It seems possible to identify and study the feasibility of new sites.

Site identification in the documentation for the facilities of the Djerba Island project:

For the realization of the MBT Center, the grantor provides the Concessionaire with a plot of land locate in Sedwikech. The MBT Center site covers approximately 15 hectares, located 16 km southwest of the town of Midoun and 10 km southwest of Aghir along the main road 941 linking Aghir and El Kantara. The site is part of an area of a sebkhat, floodplain almost flat topography ranging between 0.5 and 1.0m altitude.
The site is near a wastewater treatment plant and seems accessible to trucks. Its surface seems suitable. However, the project includes not only the construction, the equipment of a MBT), but also the landfill bins of non-recoverable residues after bio-stabilization

Technical studies completed or to be carried out
Existing study: National strategic study.

Studies to be completed

- Validation of the perimeter of the project (Waste Management Master Plan for Greater Tunis)
- Feasibility study
- Social and environmental impact study
- Identification and validation of sites
- APS (Preliminary design) level study
- Geotechnical studies of existing landfills
- Characterization of household waste from Grand Tunis
- Environmental and social impact studies of the project
- Preparation of the tender documents for the project
- Communication and consultation program

Prospective implementation schedule

- Procurement phase: 2018-2019
- Construction Phase: 2019-2020
- Operation Phase: 2020-2040

Estimated CAPEX, OPEX and Revenues

The following table presents the results of the financial analysis that compares the costs of MBT solutions with simple landfill costs.

It is possible to implement a system providing a considerable improvement in the management of household and similar waste.

Total dynamic Cost (TND/Ton)

Tonnage (T/year)	Base Case	MBT
36 000	77,365	103,199
		33%
90 000	57,84	74,693
		29%
135 000	50,313	68,625
		36%
380 000	27,001	69,755

		158%

The strategic study estimates the production of waste in Greater Tunis in 2014 at 380k/year. Reported to the population of Greater Tunis 2, 6 million inhabitants in 2014, this production seems largely underestimated. The Mission Report indicates a range of 587,500 to 657,000t, the average of which is 612,500. It is considered below 2 MBT of 306,250 t / year of capacity 2015, which is a capacity of 2 X 666 kt / year.

For Djerba, the strategic study indicates a capacity of 68 kT/year in 2015 and 104 kT/year in 2034.

The table in Annex 2 presents the estimated costs. The revenues indicated are those provided from recycling and the sale of RDF (for Tunis only).

	CAPEX	OPEX
	M TND	M TND/year
Tunis	485.9	558.4
Djerba	43.5	30.1

***Annex 1:** Main characteristics of the 2 projects*

	Site	Waste Production	Maximum MBT capacity	Recovery Solution According to strategy	MBT surface	Surface of the Discharge
Unit	N/A	kt/year 2015-2034	kt/year	1, 2 ou 3	Hectare	Hectare
Grand Tunis Option 3	2 existing Sites	612 - 1 072	2 x 666	3	14.9	2 X 16
Djerba	Identified but floodable		70	2	3.4	6.12

Annex 2: CAPEX, OPEX and Revenue estimates

	MBT	MBT	MBT	MBT	MBT	Landfill	Landfill	Landfill
	CAPEX (20 years)	OPEX (20 years)	Total cost (20 years)	Revenue	**Total Net Cost**	CAPEX (20 years)	OPEX (20 years)	**Total cost (20 years)**
Unit	k €	k €/year	€/T	€/T	**€/T**	k €	k €/year	**€/T**
Grand Tunis	151 830	174 514	26.9	4.22	**31.0**	32 300	17 112	**16.3**
Djerba	13 607	9 420	22.5	1,3	**33.6**	5 728	5 643	**27.8**

	MBT	MBT	MBT	MBT	MBT	Landfill	Landfill	Landfill
	CAPEX (20 years)	OPEX (20 years)	Total cost (20 years)	Revenue	**Total Net Cost**	CAPEX (20 years)	OPEX (20 years)	**Total cost (20 years)**
Unit	k TND	k TND/year	TND/T	TND/T	**TND/T**	k TND	k TND/year	**TND/T**
Grand Tunis	485 856	558 445	86.1	13.5	**99.1**	103 360	54 758	**52.1**
Djerba	43 542	30 144	72	4.2	**107.6**	18 330	18 058	**89.0**

Exchange rate EUR/TND: 3.2