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The World Bank

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IMPLEMENTATION COMPLETION AND RESULTS REPORT  
(IBRD-74320)

ON A

LOAN

IN THE AMOUNT OF EURO 16.8 MILLION  
(US\$22.0 MILLION EQUIVALENT)

TO THE

REPUBLIC OF TUNISIA

FOR A

SUSTAINABLE MUNICIPAL SOLID WASTE MANAGEMENT PROJECT

December 30, 2014

Social, Urban, Rural and Resilience Global Practice  
Middle East and North Africa Region

## CURRENCY EQUIVALENTS

(Exchange Rate Effective November, 24, 2014)

Currency Unit = Tunisian Dinar (TD)

TD 1.00 = US\$0.546

US\$ 1.00 = TD1.832

EURO 1.00 = US\$ 1.26

US\$ 1.00 = EURO 0.79

## FISCAL YEAR

January 1 – December 31

## ABBREVIATIONS AND ACRONYMS

ANPE	National Environmental Protection Agency ( <i>Agence Nationale de Protection de l'Environnement</i> )
ANGed	National Agency for Waste Management ( <i>Agence Nationale de la Gestion des Déchets</i> )
CAS	Country Assistance Strategy
CDM	Clean Development Mechanism
CEPA	Country Environmental Performance Analysis
CER	Certified Emission Reductions
DBO	Design-Build-Operate
EIA	Environmental Impact Assessment
GDP	Gross Domestic Product
GIS	Geographical Information System
GIZ	German Society for International Cooperation
ISN	Interim Strategy Note
LFG	Landfill Gas
MDG	Millennium Development Goals
MDP	Municipal Development Project
MEDD	Ministry of Environment and Sustainable Development ( <i>Ministère de l'Environnement et du Développement Durable</i> )
M&E	Monitoring and Evaluation
MENA	Middle East and North Africa
METAP	Mediterranean Environmental Technical Assistance Program
NEAP	National Environmental Action Plan
NGO	Non Governmental Organization
PAD	Project Appraisal Document
PDO	Project Development Objective

PRONGID National Program for Integrated and Sustainable Waste Management  
(*Programme National de Gestion Intégrée et Durable des Déchets*)  
QAG Quality Assurance Group  
QALP Quality Assessment of the Lending Portfolio  
SEDD Secretariat of Environment and Sustainable Development (*Secrétaire d'Etat du Développement Durable*)

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**Tunisia**  
**Sustainable Municipal Solid Waste Management Project**

**CONTENTS**

**Data Sheet**

- A. Basic Information
- B. Key Dates
- C. Ratings Summary
- D. Sector and Theme Codes
- E. Bank Staff
- F. Results Framework Analysis
- G. Ratings of Project Performance in ISRs
- H. Restructuring
- I. Disbursement Graph

1. Project Context, Development Objectives and Design.....	1
2. Key Factors Affecting Implementation and Outcomes .....	5
3. Assessment of Outcomes .....	11
4. Assessment of Risk to Development Outcome.....	14
5. Assessment of Bank and Borrower Performance .....	14
6. Lessons Learned .....	16
7. Comments on Issues Raised by Borrower/Implementing Agencies/Partners .....	17
Annex 1. Project Costs and Financing.....	18
Annex 2. Outputs by Component .....	19
Annex 3. Economic and Financial Analysis.....	21
Annex 4. Bank Lending and Implementation Support/Supervision Processes .....	23
Annex 5. Beneficiary Survey Results .....	25
Annex 6. Stakeholder Workshop Report and Results.....	26
Annex 7. Summary of Borrower's ICR and/or Comments on Draft ICR .....	27
Annex 8. Comments of Co financiers and Other Partners/Stakeholders .....	28
Annex 9. List of Supporting Documents .....	29



<b>A. Basic Information</b>			
Country:	Tunisia	Project Name:	Tunisia: Sustainable Municipal Solid Waste Management Project
Project ID:	P095012	L/C/TF Number(s):	IBRD-74320
ICR Date:	12/30/2014	ICR Type:	Core ICR
Lending Instrument:	SIL	Borrower:	GOVERNMENT OF TUNISIA
Original Total Commitment:	USD 22.00M	Disbursed Amount:	USD 20.71M
Revised Amount:	USD 22.00M		
<b>Environmental Category: B</b>			
<b>Implementing Agencies:</b> Agence Nationale de Gestion des Dechets (ANGed)			
<b>Cofinanciers and Other External Partners:</b>			

<b>B. Key Dates</b>				
Process	Date	Process	Original Date	Revised / Actual Date(s)
Concept Review:	07/13/2005	Effectiveness:	07/20/2007	07/20/2007
Appraisal:	11/15/2006	Restructuring(s):		06/21/2012
Approval:	03/13/2007	Mid-term Review:		02/12/2009
		Closing:	06/30/2012	06/30/2014

<b>C. Ratings Summary</b>	
<b>C.1 Performance Rating by ICR</b>	
Outcomes:	Unsatisfactory
Risk to Development Outcome:	Substantial
Bank Performance:	Moderately Unsatisfactory
Borrower Performance:	Moderately Unsatisfactory

<b>C.2 Detailed Ratings of Bank and Borrower Performance (by ICR)</b>			
Bank	Ratings	Borrower	Ratings
Quality at Entry:	Moderately Unsatisfactory	Government:	Moderately Unsatisfactory
Quality of Supervision:	Moderately Satisfactory	Implementing Agency/Agencies:	Moderately Satisfactory
<b>Overall Bank Performance:</b>	Moderately Unsatisfactory	<b>Overall Borrower Performance:</b>	Moderately Unsatisfactory

**C.3 Quality at Entry and Implementation Performance Indicators**

Implementation Performance	Indicators	QAG Assessments (if any)	Rating
Potential Problem Project at any time (Yes/No):	No	Quality at Entry (QEA):	None
Problem Project at any time (Yes/No):	Yes	Quality of Supervision (QSA):	None
DO rating before Closing/Inactive status:	Moderately Unsatisfactory		

**D. Sector and Theme Codes**

	Original	Actual
<b>Sector Code (as % of total Bank financing)</b>		
Central government administration	17	10
Other social services	1	1
Solid waste management	78	87
Sub-national government administration	4	2
<b>Theme Code (as % of total Bank financing)</b>		
City-wide Infrastructure and Service Delivery	29	33
Climate change	14	18
Environmental policies and institutions	14	8
Other human development	14	8
Pollution management and environmental health	29	33

**E. Bank Staff**

Positions	At ICR	At Approval
Vice President:	Gerard A. Byam	Daniela Gressani
Country Director:	Neil Simon M. Gray	Theodore O. Ahlers
Practice Manager/Manager:	Chaogang Wang	Narasimham Vijay Jagannathan
Project Team Leader:	Philip Winchell Bottern	Dahlia Lotayef
ICR Team Leader:	Philip Winchell Bottern	
ICR Primary Author:	Jerome F. Chevallier	



## F. Results Framework Analysis

### Project Development Objectives (from Project Appraisal Document)

The development objective of the Project is to assist the Tunisian Government in strengthening the key elements of sustainability of municipal solid waste management. This objective will be achieved through the operationalization of a planning and implementation system of solid waste management at the national and local levels and through the rehabilitation of a number of environmentally harmful dumpsites. These actions will enable the Tunisian Government to enter the emerging global market of carbon credits through the Clean Development Mechanism (CDM) introduced under the Kyoto Protocol.

### Revised Project Development Objectives (as approved by original approving authority)

#### (a) PDO Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
<b>Indicator 1 :</b>	The Government of Tunisia enters the emerging market for carbon credits by selling Certified Emissions Reductions with total revenues of US\$20 million or more.			
Value quantitative or Qualitative)	0	US\$20 million	US\$4.2 million	US\$3.55 million
Date achieved	07/02/2007	07/02/2007	06/21/2012	06/30/2014
Comments (incl. % achievement)	Not met: 7.1% of initial target; 85% of revised target.			
<b>Indicator 2 :</b>	Environmental Performance : The percentage of the Tunisian urban population living in areas serviced with sanitary landfills and large dumpsites have been closed			
Value quantitative or Qualitative)	0		63.5%	63%
Date achieved	07/02/2007		06/21/2012	06/30/2014
Comments (incl. % achievement)	This new indicator following restructuring was almost met.			
<b>Indicator 3 :</b>	Improved modalities of public-private partnerships for waste management will reduce the shortfall in financing landfill operations by at least 10 percent.			
Value quantitative or Qualitative)	Shortfall in 2006: US\$1.212 million.		Dropped.	
Date achieved	07/02/2007		06/21/2012	

Comments (incl. % achievement)	
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**(b) Intermediate Outcome Indicator(s)**

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
<b>Indicator 1 :</b>	The performance of the National Solid Waste Management Program (PRONGID) is reviewed and a new sector policy is endorsed by the Board of ANGED			
Value (quantitative or Qualitative)				Not done
Date achieved				06/30/2014
Comments (incl. % achievement)	This new indicator following restructuring was not met. A review of PRONGID's performance was underway at closing date.			
<b>Indicator 2 :</b>	ANGED is equipped with new tools for planning information management, and monitoring and evaluation.			
Value (quantitative or Qualitative)			GIS system is in place and operational	Done
Date achieved			11/09/2014	06/30/2014
Comments (incl. % achievement)	A new indicator following restructuring. Fully achieved.			
<b>Indicator 3 :</b>	ANGED develops a system, open to the private sector, for procurement regulation and for public bidding on combined collection, transfer and transport contracts.			
Value (quantitative or Qualitative)			Dropped	
Date achieved			02/12/2009	
Comments (incl. % achievement)				
<b>Indicator 4 :</b>	Involvement of concerned stakeholders in the preparation of Regional Municipal Solid Waste Master Plans, consistent with and affecting national programming.			
Value (quantitative or Qualitative)			Dropped	
Date achieved			02/12/2009	
Comments (incl. % achievement)				

<b>Indicator 5 :</b>	10-15 municipalities voluntarily participate in a pilot effort to determine baseline indicators and achieve their established objectives.			
Value (quantitative or Qualitative)			Dropped	
Date achieved			02/12/2009	
Comments (incl. % achievement)				
<b>Indicator 6 :</b>	ANGed has a system and standard procedures established for closing, rehabilitating, and environmentally monitoring open dumps.			
Value (quantitative or Qualitative)			Dropped	
Date achieved			02/12/2009	
Comments (incl. % achievement)				
<b>Indicator 7 :</b>	Continuous monitoring system for CDM operations within ANGed in order to maximize carbon emissions reductions.			
Value (quantitative or Qualitative)				Done
Date achieved				12/30/2010
Comments (incl. % achievement)	System was already in place during restructuring.			
<b>Indicator 8 :</b>	Number of open dumps which are closed.			
Value (quantitative or Qualitative)	7		7	7 dumps closed
Date achieved	07/02/2007		02/12/2009	12/30/2010
Comments (incl. % achievement)	Fully achieved; but new open dumps are proliferating.			
<b>Indicator 9 :</b>	Number of landfills equipped with land fill gas treatment systems as per the CDM requirements.			
Value (quantitative or Qualitative)	10		8	8
Date achieved	07/02/2007		02/12/2009	06/30/2014
Comments (incl. % achievement)	Cells 4 and 5 of Djebel Chekir, which were part of the project, are not yet fully equipped.			

## G. Ratings of Project Performance in ISRs

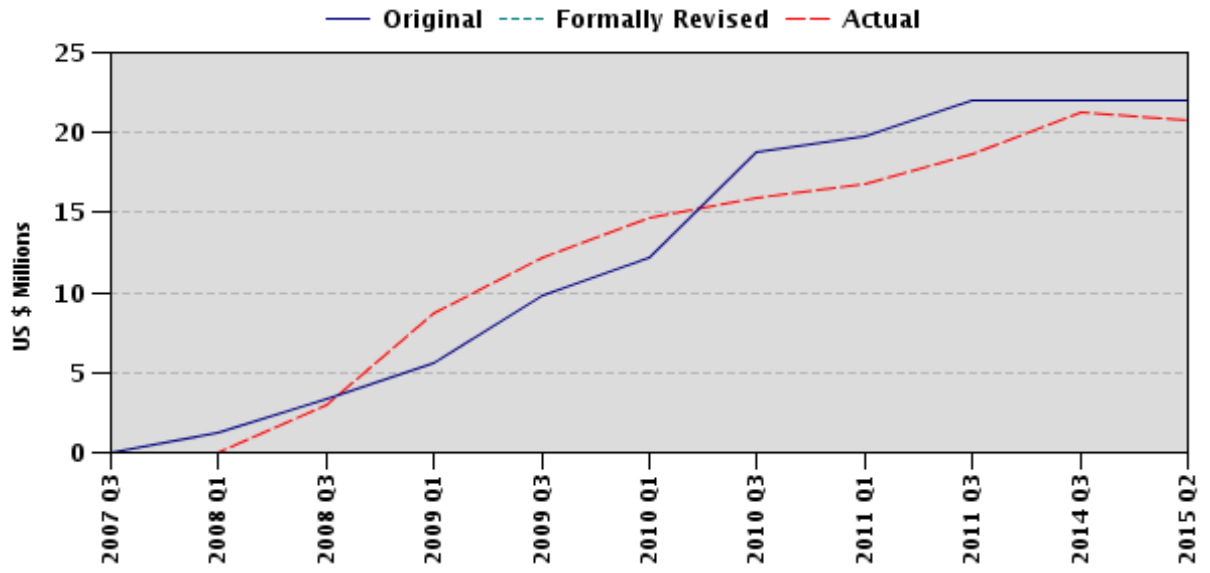
No.	Date ISR Archived	DO	IP	Actual Disbursements (USD millions)
1	06/27/2007	Satisfactory	Satisfactory	0.00
2	12/17/2007	Satisfactory	Satisfactory	1.42
3	06/27/2008	Satisfactory	Satisfactory	5.75
4	01/06/2009	Moderately Satisfactory	Moderately Satisfactory	10.93
5	12/22/2009	Satisfactory	Moderately Satisfactory	14.69
6	05/14/2010	Moderately Satisfactory	Moderately Satisfactory	16.72
7	11/18/2010	Moderately Satisfactory	Moderately Satisfactory	17.59
8	06/30/2011	Moderately Unsatisfactory	Moderately Unsatisfactory	19.05
9	01/03/2012	Moderately Unsatisfactory	Moderately Unsatisfactory	19.05
10	09/07/2012	Moderately Unsatisfactory	Moderately Unsatisfactory	19.05
11	04/15/2013	Moderately Satisfactory	Moderately Satisfactory	20.33
12	12/28/2013	Moderately Satisfactory	Moderately Satisfactory	20.42
13	06/25/2014	Moderately Unsatisfactory	Moderately Unsatisfactory	21.29

## H. Restructuring (if any)

Restructuring Date(s)	Board Approved PDO Change	ISR Ratings at Restructuring		Amount Disbursed at Restructuring in USD millions	Reason for Restructuring & Key Changes Made
		DO	IP		
06/21/2012	N	MU	MU	19.05	Reason: (a) to complete the remaining infrastructure and institutional activities; (b) to adjust the institutional component to take into consideration the post-revolution context at both a national and local level; and (c) to more accurately measure project progress and outcomes. The proposed restructuring would not modify the Project Development Objective (PDO).  Key changes (i) Extension of Loan closing date for two years, from June

Restructuring Date(s)	Board Approved PDO Change	ISR Ratings at Restructuring		Amount Disbursed at Restructuring in USD millions	Reason for Restructuring & Key Changes Made
		DO	IP		
					<p>30, 2012 until June 30, 2014. This would be the first extension of project closing date.</p> <p>(ii) Revision of project components to include: (a) replacing the activity on regional municipal solid waste management plans by an independent strategic review of the national solid waste management program (PRONGID); and (b) investing in 7 instead of 9 landfill gazes (LFG) collection systems outside of Tunis.</p> <p>(iii) Update of the results monitoring framework to account for the change in project components, candidly reflect project outcomes, and adapt specific targets especially those related to reduction of CO2 emissions.</p> <p>(iv) Reallocations between disbursement categories to reflect the addition of a new category of eligible expenditures for training acti</p>

## I. Disbursement Profile



## **1. Project Context, Development Objectives and Design**

### **1.1 Context at Appraisal**

**1. The political situation in Tunisia was stable**, with President Ben Ali vested with considerable power over the decision making process. He had been re-elected to a fourth five-year term in October 2004 with 94.5 percent of the vote. Economic performance was strong and improving. In 2004-06, GDP growth averaged 5.1 percent per annum, compared to 4.1 percent in 2001-03. The budget deficit declined to an annual average of 3.1 percent compared to 3.5 percent during the preceding three-year period. Tunisia was making good progress towards meeting the Millennium Development Goals (MDGs).

**2. In 1990, Tunisia developed a national environmental action plan (NEAP)**, which provided a framework for the launching of significant environmental and resource conservation programs. During the 1990s, the Bank estimated that Tunisia allocated about 1 percent of its GDP to public expenditures on environmental and natural resource management, a level comparable to that of some European countries. Municipal waste was increasingly perceived as a threat to Tunisia's coasts, and to its striving tourism industry. In 1995, a framework law on waste management was promulgated. In 2000, the Government developed a national program for the management of solid waste (which became eventually PRONGID - National Program for Integrated and Sustainable Waste Management). The National Environmental Protection Agency (ANPE) was responsible for its implementation. The program was supported by several donors, including the European Investment Bank (EIB) and the German and Italian aid agencies.

**3. The Mediterranean Environmental Technical Assistance Program (METAP)**, a long-term initiative implemented by the World Bank with European financing, was designed in the 1990s to help the eight Mashreq-Maghreb countries, including Tunisia, address environmental protection issues. In 2001, METAP was restructured and focused on three areas, including municipal and hazardous waste, and ANPE was selected to manage the municipal waste element for the eight countries. In 2002, in close cooperation with the Government of Tunisia, the Bank initiated the preparation of a Country Environmental Performance Analysis (CEPA) to help integrate environmental issues into economic development strategies. In the area of waste management, CEPA recommended an integrated approach with a focus on the technical and financial viability of investments. In 2005, a Ministry in charge of the Environment and Sustainable Development (MEDD) was created, and the National Waste Management Agency (ANGed) was established in MEDD to help municipalities plan and promote sustainable waste management.

**4. In the mid-2000s, the CEPA estimated that about one third of Tunisia's urban population had access to sanitary landfills** and the other two thirds had to do with about 400 uncontrolled dumps. About 40 percent of total municipal waste was disposed of in sanitary landfills. The design of these landfills was inadequate, however, with high risks of

accidents and operational problems. Economic efficiency of the system was low, due to its fragmentation and high cost. Municipalities were in charge of the household garbage collection, transport and treatment, but were unable to deliver on the latter two aspects because their revenue collection was weak and their financial situation precarious. ANPE, and ANGED after 2005, were responsible for the management of landfills and the transport from transfer centers to landfills. ANGED affiliates were responsible for collecting and recycling packaging materials, used oil and batteries. Cost recovery for the collection, transfer, treatment and disposal of municipal waste in the greater Tunis metropolitan area was only 15 percent of the total cost. The 10<sup>th</sup> Development Plan (2002-06) provided for the establishment of nine sanitary landfills for 101 municipalities with a total of 800,000 tons per year; the establishment of a treatment station for hazardous industrial waste with a capacity of 70,000 tons; and studies for the rehabilitation of a number of dumps.

**5. The project under review was developed in the context of CEPA, taking into account ongoing projects financed by other external partners.** The closure of unregulated dumps, supported by the project, was part of a presidential initiative, to which the MEDD was strongly committed, and the Government of Tunisia requested Bank assistance to participate in the greenhouse gas reduction credits. The project was the first one in the Middle East and North Africa (MENA) region to link investments in waste management with income derived from the reduction of carbon emissions.

**6. The project was not included in the lending program proposed in the 2004 Country Assistance Strategy (CAS).** The Project Appraisal Document (PAD) indicated that the project was in line with the first strategic objective of the CAS, which was to strengthen the business environment to support the development of a more competitive and internationally oriented private sector and improve the competitiveness of the Tunisian economy. Another justification for the project in the PAD was that it was consistent with the third strategic objective of the CAS, which was to improve the quality of social services through enhanced efficiency of public expenditures. The project was approved in the context of declining IBRD commitments to Tunisia and a shortfall of projects in the lending program proposed by the CAS. This and the opportunity to link a Bank-supported investment to income derived from the reduction of carbon emissions were the main drivers for the Bank's decision to move ahead with this innovative project.

## **1.2 Original Project Development Objectives (PDO) and Key Indicators**

**7. The development objective of the Project was to assist the Tunisian Government in strengthening the key elements of sustainability of municipal solid waste management.** This objective would be achieved through the operationalization of a planning and implementation system of solid waste management at the national and local levels and through the rehabilitation of a number of environmentally harmful dumpsites. These actions would enable the Tunisian Government to enter the emerging global market of carbon credits through the Clean Development Mechanism (CDM) introduced under the Kyoto Protocol.

**8. The key outcome indicators were:** (i) improved modalities of public-private partnership for waste management, which would reduce the shortfall in financing landfill operations, estimated at about US\$1.212 million in 2006, by at least 10 percent; and (ii)



the Government of Tunisia would enter the emerging market for carbon credits by selling Certified Emission Reductions (CERs) with total revenues of at least US\$20 million.

### **1.3 Revised PDO (as approved by original approving authority) and Key Indicators, and reasons/justification**

**9. The project was restructured in June 2012 (level 2).** Before the 2011 Tunisian Revolution, excellent progress had been made in implementing the infrastructure component of the project, but little was done under the institutional development component, due to delays in contracting consultant services. The decision making process was brought to a standstill in the aftermath of the revolution when regional and local councils were dissolved. The restructuring should have considered changing the project development objective, to focus on what the project should achieve before the closing date by defining *elements of sustainability* more clearly.

**10. The objective of the restructuring was to allow for completion of the infrastructure component, adjustment of the institutional component to the post revolution context and better measurement of project progress and achievements.**

The project objective was not changed, but outcome indicators were revised. The first one was dropped because the contribution of the project to achieving the target was difficult to measure. The target for the second indicator was reduced from US\$20 million to US\$4.2 million, as more accurate data to better estimate the CERs had become available. A third outcome indicator was added to provide more focus on project results and benefits. It was defined as the percentage of the Tunisian urban population living in areas serviced with Landfills and Landfill Gas (LFG) systems, in which environmental impacts and odor pollution have been controlled, and in which open dumps have been rehabilitated or closed.

### **1.4 Main Beneficiaries**

**11. The project was expected to improve the quality of life of the target population** by reducing the negative environmental impacts for the nearby residents of the seven inadequate open disposal sites to be closed or rehabilitated under the project. The environmental benefits of the closure or rehabilitation of the dumpsite were estimated on the basis of increased land value of nearby properties. On the other hand, the closure of these sites would negatively affect the livelihoods of the communities who worked as waste pickers. A project sub-component was designed to address this issue.

**12. Other beneficiaries were the municipalities involved in the project,** which would be enabled to improve the sustainability of their solid waste operations. Finally ANGED and ANPE would benefit from the institutional and capacity building component of the project.

### **1.5 Original Components**

**13. The project included three components:** institutional support and capacity building, infrastructure construction, and project management.

**14. The first component, institutional support and capacity-building (US\$1.8 million)** included four sub-components, namely: (i) institutional support and capacity building for

ANGed (finalization of organizational structure, preparation of operational manuals, development of procurement, cost optimization and financial monitoring systems, study on the use of the Greater Tunis landfill, and initiation of a computerized management system for the monitoring and control of emission reductions and CDM activities; (ii) regional planning, inter-communality and cost optimization (provide tools for participatory planning for sustainable and integrated waste management at local and regional levels, build capacities for appropriate allocation of costs at the municipal level, assess performance of municipal services, promote best practices, and define and implement cost reduction and waste collection service optimization strategies); (iii) institutional support and capacity-building for ANPE (development of sectoral guidelines for Environmental Impact Assessments – EIAs – and capacity-building in ANGed and ANPE; and (iv) mitigation of social impacts by initiating activities for improving the working conditions of waste pickers (detailed census, discussion of options for reinsertion with them, awareness campaigns and training on environmental health).

**15. The second component, infrastructure construction (US\$21.84 million)**, included three sub-components, (i) construction of cell No 5 of Djebel Chekir landfill in Greater Tunis (US\$5.3 million); (ii) collection and treatment of landfill gases in Djebel Chekir landfill as well as in the first cell of the nine new landfills; and (iii) rehabilitation of seven open dumps. The construction of the new landfills had been supported by the EIB and German and Italian bilateral aid.

**16. The third component, project management (US\$0.7 million)** included technical assistance, training programs, and equipment for the project management unit (PMU) in ANGed for project implementation.

### **1.6 Revised Components**

**17. Two sub-components were revised.** The development of waste management plans in eight governorates (sub-component 2) was abandoned because all pre-revolution municipal and regional councils, who had a key role in the sub-component, had been dissolved. It was replaced by a strategic review of the National Solid Waste Management Program (PRONGID), which was expected to set the stage for overdue sector reforms, including better governance of the sector and enhanced institutional and financial sustainability of solid waste management systems.

**18. Sub-component 2 of the infrastructure component was reduced** to involve the collection and treatment of landfills in seven landfills, instead of nine, because of the low potential for carbon reduction at two of the initial landfills.

### **1.7 Other significant changes**

**19. The changes in the institutional component led to changes to intermediate outcome indicators.** In the initial results framework, ANGed was expected to develop a system, open to the private sector, for procurement regulations and for public bidding on combined collection, transfer and transport contracts. This indicator was dropped. Two indicators related to municipal planning were also dropped (number of municipalities involved in a pilot effort to determine baseline indicators and achieve their established

objectives, and masterplans consistent with and affecting national programming). An indicator related to the performance of PRONGID was added as follows: the performance of PRONGID is reviewed and a new sector policy action plan is endorsed by the Board of ANGED. The indicator related to the involvement of stakeholders in the preparation of regional master plans was dropped and replaced by: ANGED is equipped with new tools for planning information management, and monitoring and evaluation. This change was made to better reflect the contribution of the project in improving the institutional management and organization.

**20. The indicator related to the closing of open dumps was changed.** Initially, ANGED was expected to have a system and standard procedures for closing, rehabilitating, and environmentally monitoring open dumps. This was dropped and replaced by the number of open dumps closed.

**21. A new category of eligible expenditures for training purposes was introduced,** which entailed a reallocation of loan proceeds. The procurement prior review thresholds were changed to align them to the MENA standard practice. The loan closing date was extended by two years to end-June 2014 to take account of disruptions caused by the revolution to project implementation.

## **2. Key Factors Affecting Implementation and Outcomes**

### **2.1 Project Preparation, Design and Quality at Entry**

**22. The PAD does not include an analysis of the cost structure of the waste collection, transport and disposal system** or a review of public expenditures in the sector, including the amount of subsidization by the central government. During the quality assessment of the lending portfolio (QALP) in 2010, the task team mentioned that there were taxes on the import of plastic raw materials and the so called ECO LEF tax for waste packaging to defray the cost of waste disposal, but there was no information on the contribution of these taxes to the financing of the solid waste system. The Bank had through METAP and three municipal development projects experience from the sector and it was expected that pilot activities supported by the project in 10-15 municipalities would provide baseline indicators, which would in turn be used for the preparation of regional solid waste management plans.

**23. Lessons were drawn from experience in Lebanon, in the Philippines and in Tunisia.** A main recommendation from the experience in Lebanon was the importance of reaching an agreement with the Government on the sustainable management factors to be adopted, including financial and cost recovery aspects, early on. While the Government of Tunisia acknowledged the importance of cost recovery, they believed that immediate enforcement of this principle was not politically and socially feasible. Accordingly, agreement was reached on the development of a national cost recovery and optimization strategy based on a pilot action plan to be carried out during project implementation. The pilot action plan aimed at benchmarking solid waste management systems in a limited number of municipalities, which would allow a comparison and ranking of municipalities on the basis of the quality of services provided and their cost.

**24. A social analysis was needed to better understand the collection systems**, as well as the perceptions of communities concerning waste management systems and proposed improvements, leading to an assessment of the willingness to pay for improved services. The social analysis, as summarized in Annex 11 of the PAD, focused on the impact the closure of dumpsites would have on waste pickers and contributed to the design of the mitigation of social impacts sub-component of the project, but it did not provide any information on the communities' willingness to pay for improved services, which could have been a useful input to further sector development.

**25. Experience in the Philippines on the Design-Build-Operate (DBO) approach** showed that there was private sector interest in participating in the solid waste area. To make it successful, however, it is important to involve specialized expertise from the outset, reach agreement on the terms of reference of the DBO contract before Board presentation, and recruit a project manager with DBO experience during contract implementation. The DBO approach was used for the collection and treatment of biogas, and bidding invitations were prepared along the lines of those used in the Philippines.

**26. Lessons were drawn from experience in the implementation of METAP and the third Municipal Development Project (MDP 3) in Tunisia.** METAP provided technical assistance to Tunisia to promote private sector participation in the waste management sector and to develop an action plan for inter-municipal waste management in one governorate. MDP 3 financed rolling stocks for waste collection and transportation, and supported measures to improve municipal financial management, including revenue mobilization.

**27. The three lessons from these two projects** were the need to emphasize inter-communality cooperation, to focus on cost optimization, and to enhance the capacity of the public sector to work efficiently with the private sector. The project provided support to ANGED to initiate the inter-communality of sanitary landfills management. It is not clear from project documents, however, how the project would contribute to cost optimization. As for the third aspect, the project sought to better familiarize ANGED with the delegation of public services, for which there was little understanding in Tunisia. There was no specific action taken in that respect in the project, however.

**28. The project design was simple.** The infrastructure component focused on the most urgent actions to improve the system from an environmental standpoint. The gas recovery sub-component was designed to enable Tunisia to benefit from the World Bank's Carbon Finance Initiative through the reduction of greenhouse gas emissions. This would contribute to financing the investment and operating cost of solid waste management. Another innovative aspect of the project was the introduction of the DBO approach for the gas collection and treatment sub-component as a means to maximize emission reductions. The institutional development component was expected to put key institutional, operational and financial tools in place for a sustainable management of municipal solid waste.

**29. Other donors had been involved in the construction of landfills across Tunisia and in providing technical assistance to the sector.** In particular, GIZ, Germany's technical assistance agency, was active in the sector and working closely with the Bank on cost optimization and cost recovery issues.

**30. Safeguards.** Tunisia was selected among the MENA countries for piloting the use of country systems to address environmental and social safeguard issues in Bank-financed projects because of the advanced state of its regulatory framework following OP/BP 4.00 on Environmental and Social Safeguard in Bank supported Projects. There were gaps, however, between legal requirements and practice and the gaps were addressed before negotiations. It was not foreseen that land would be acquired for project purposes. On the other hand, some adjoining areas to dumpsites to be rehabilitated through the project were privately owned and would likely continue to receive waste. As the national framework did not cover involuntary resettlement, the project triggered the Bank's Policy OP/BP 4.12 on Involuntary Land Acquisition and Resettlement and a Resettlement Policy Framework was prepared in 2006. The social analysis on the losses that would be incurred by communities involved in waste picking in dumpsites to be closed was fully adequate.

**31. The risk analysis was incomplete.** Three risks were identified: (i) delays in implementing cost recovery measures; (ii) inability of ANGED to mobilize the funds required for the biogas component and the rehabilitation of dumpsites; and (iii) unwillingness of local communities to play an active role in solid waste management. The decision to gradually introduce cost recovery measures in the solid waste system, based on pilot activities and awareness campaigns, was expected to mitigate the first risk. The risk of insufficient project co-financing was mitigated by the upfront Bank payment of 25 percent of the total carbon credit revenue expected. The third risk was to be mitigated by direct support to communities and provision of some incentives for participating in pilot activities.

**32. Some other key risks, such as lower than expected revenues from emission reductions and delays in implementing the institutional development component of the project, were also relevant.** The expected revenues from emission reductions were calculated using a methodology (defined by CDM) over which the Bank had no control and they were highly overestimated. Secondly, the Government had a tendency to focus on infrastructure as a means of solving problems and was less interested in institutional development issues. The risk arising from conflicts between landfill operators and gas collection and treatment operators working on the site at the same time was averted through contractual clauses and the filling methods used, allowing the gas operator to intervene in certain areas of the site only after it had been freed by the landfill operator. As the ban on the presence of unauthorized personnel on landfill sites was more or less implemented effectively, the risk of interference of waste pickers in landfill operations was not foreseen, but it became a serious issue during project implementation.

**33. Government commitment to the project.** Through its regional leadership of the solid waste component of METAP, Tunisia had demonstrated its interest in promoting an integrated approach to the development of the sector. The CEPA recommended that a

specific agency be created for managing the solid waste sector to provide vision, leadership and coordination among various stakeholders. ANPE, which was responsible for the sector, was overburdened and unable to fulfill this role. In keeping with this recommendation, the Government established ANGED as the agency responsible for solid waste management with a clear mandate to work with local governments for the development and implementation of a national program to bring about increased efficiency and sustainability in solid waste management. In January 2006, the Ministry in charge of the Environment established a Steering Committee, including representatives of key ministries and stakeholders, to provide strategic guidance to and overall monitoring of the investment program and thus facilitate inter-agency coordination. The government commitment to the program was deemed strong.

**34. Consultations.** Two two-day seminars were organized in February 2006 to discuss environmental impact assessments (EIAs). Participants included representatives from ministries, the public and private sectors, NGOs, media and donors. Key messages were the need to focus on strategic environmental assessments and address the entire solid waste management chain. The roles of participants in the sector were clarified.

**35. In the Eighth Quality at Entry Assessment (QEA8) in October 2007,** QAG gave a satisfactory rating to the project, including highly satisfactory for implementation arrangements and environmental aspects and satisfactory for all other dimensions of the project. They praised the simple project design and the modest objective.

## **2.2 Implementation**

**36. Three factors heavily influenced project implementation:** In the early years of project implementation, ANGED decided to focus on the infrastructure component, which resulted in considerable delays in launching the institutional development component. The volume of gas collected and treated in the landfills was consistently well below expectations due to an overestimation of the potential gas production and technical problems at the landfills such as lack of sufficient drainage equipment, difficulties with adjustment of valves to secure the right mix from different gas pumps and condensation in pipes. Finally, the 2011 revolution led to a standstill in project activities, the replacement of all officials involved in decision making for the project and an authority crisis, which manifested itself through the inability of the police to enforce the ban on access to landfills by unauthorized personnel and the dumping of waste in unauthorized areas. To address the shortfall in gas volume, the Bank intensified its technical supervision and made specific recommendations which were systematically monitored.

**37. The Mid-Term Review took place in February 2010.** The Bank congratulated the Government for the rapid and effective implementation of the infrastructure component. On the other hand, it emphasized the need to take additional actions to increase the production of gas at the Djebel Chekir landfill, and to implement without delay a revised action plan for ensuring that the institutional development component would be completed within the two years left before the original closing date of the loan.

**38. As indicated above, the project was restructured in June 2012, just before the original closing date of the loan.** Following the restructuring, there were expectations that the institutional development component would be launched and completed by the loan closing date, but the implementation process was still slow and frequent changes in the management structure did not solve this issue

### **2.3 Monitoring and Evaluation (M&E) Design, Implementation and Utilization**

#### **M&E design**

**39. There were two outcome indicators.** It was expected that improved public-private partnership arrangements for waste management would reduce the shortfall in financing landfill operations by at least 10 percent. The deficit was estimated at US\$1.212 million in 2006. Contracts for the management of the landfills had been signed before project approval and there was therefore little scope for improved public-private partnership arrangements. This indicator was dropped during project restructuring as the contribution of the project to achieving the target was difficult to measure.

**40. The project enabled Tunisia to enter the market for carbon credits.** It was expected that revenues from selling Certified Emission Reductions (CER) would yield total revenues of US\$20 million or more. This target was based on the mandatory application of the CDM model and the project had no control of this. The CER potential of the sites was grossly overestimated and the volumes produced were much less than expected. The target value was lowered to US\$4.2 million after project restructuring.

**41. There was no outcome indicator for assessing the sustainability of the municipal part of the solid waste management system.** As indicated above, there was no information on municipal finance or on the cost efficiency of municipal waste management in the sector analysis of the PAD.

**42. The three output indicators related to the institutional development component were dropped because of the delays in implementing that component.** They included: (i) development by ANGED of a system, open to the private sector, for procurement regulations and for public bidding on combined collection, transfer and transport; (ii) involvement of concerned stakeholders in the preparation of regional municipal solid waste master plans; and (iii) participation of 10-15 municipalities in pilot efforts to determine baseline indicators. They were replaced after project restructuring by: (i) the performance of PRONGID is reviewed and a new sector policy action plan is endorsed by the Board of ANGED; and (ii) ANGED is equipped with new tools for planning information management, and monitoring and evaluation. These new tools were not specified, however, making it difficult to assess whether the target would be met.

**43. The two output indicators related to the infrastructure component were appropriate.** The first one was defined as follows: ANGED has a system and standard procedures for closing, rehabilitating and environmentally monitoring open dumps. It was dropped at restructuring and replaced by the number of open dumps closed, which is simpler, but does not capture the initial requirement that a system and standard procedures

be in place. The second output indicator, continuous monitoring system for CDM operations to maximize CERs, was straightforward and maintained.

## **M&E implementation**

**44. There was a special focus on M&E during the project launch workshop in November 2007.** A series of instruments was developed with workshop participants to ensure that all critical aspects of the project would be adequately monitored and evaluated. With the exception of the emphasis consistently put on the need to monitor gas collection carefully, there was no mention of M&E in the aide-memoires of subsequent supervision missions, however, until the Mid-Term Review of the project in February 2010. The mission recommended that ANGED should include a discussion on project indicators in its progress reports. The mission agreed that indicators would need to be adjusted. Aide-memoires until the end of 2011 did not address M&E issues. An annex providing an outline of a revised results framework was attached to the aide-memoire of the 2011 November-December mission.

### **2.4 Safeguard and Fiduciary Compliance**

**45. All supervision missions focused on the resolution of safeguard issues as they arose.** Most missions were concerned with social safeguards. The June 2008 mission dealt with the need to document land issues for each dumpsite and made a detailed set of recommendations concerning several dumpsites in keeping with the policy framework for resettlement and land acquisition. Progress in implementing these recommendations was monitored by each subsequent mission and implementation was in compliance with all relevant policies. Eventually, all issues raised by Bank missions were addressed, with the exception of the expropriation of land adjoining the rehabilitated dump of Ezzouhour-Sousse, which is still underway. Project implementation was in compliance with all relevant policies.

**46. After the 2011 revolution, the police force was no longer able to control access to landfills and prevent the illegal dumping of waste.** The May 2011 supervision mission observed an increase in the number of waste pickers, including children, on the Djebel Chekir landfill, and that earlier security measures were no longer enforced. The mission recommended that ANGED take immediate measures to ensure the security of waste pickers, accelerate the recruitment of the social expertise under the mitigation of social impacts subcomponent of the project, and prepare an action plan. With the help of a local NGO, progress was made in implementing the action plan and improving the conditions of waste pickers. Problems persisted, however, including the presence of 44 children out of 316 waste pickers on the Djebel Chekir landfill in June 2014, compared to about a hundred waste pickers on the site before the revolution.

**47. The 2011 revolution brought about serious disruptions in the collection, transfer and disposal of solid waste.** Municipal equipment for collection of waste was vandalized and waste accumulated in streets and illegal dumpsites. Despite the government



commitment to improve the situation in the sector, there was a serious deterioration in the management of the Djebel Chekir landfill, because of the overfilling of cell 5, combined with delays in implementing cell 6, confusion in the management of the landfill, and weak control over access to the site.

**48. Good progress was made under environmental safeguards, especially by ANPE in the area of Environmental Impact Assessments (EIAs).**

**49. In the fiduciary area,** procurement was slow because of centralization of the process. Financial management has been consistently satisfactory, except at the very end of project implementation. By the closing date, the audit report for 2012 had not yet been received by the Bank. It was eventually received for 2012 and 2013 in October 2014.

### **2.5 Post-completion Operation/Next Phase**

**50. During the Implementation Completion Report (ICR) mission in November 2014,** ANGED indicated that it would use remaining funds of the local contribution to the project to finance the completion of the contract with consultants to prepare the strategic review of PRONGID and the recruitment of consultants to prepare a communication strategy. It intends to mobilize funds to finance the equipment of cells 4 and 5 of the Djebel Chekir landfill to produce biogas in 2015.

**51. In July 2014, the Bank approved a Euro 217 million program loan to help Tunisia implement its decentralization principles provided for in the January 2014 Constitution.** It would support the move away from a highly centralized system, in which local governments had little autonomy and accountability to their citizens. The program loan aims at: (i) strengthening local governments' performance to deliver municipal infrastructure; and (ii) improving access to services in disadvantaged neighborhoods. Collection of solid waste is a key municipal responsibility.

## **3. Assessment of Outcomes**

### **3.1 Relevance of Objectives, Design and Implementation**

**52. The objective of strengthening the key elements of sustainability of municipal solid waste management is highly relevant today.** On July 3, 2012, the Board reviewed the Interim Strategy Note (ISN) for FY13-14. The overarching objective of the interim strategy was to support employment creation within three areas of engagement, including: (i) laying the foundations for renewed and sustainable growth and employment creation; (ii) promoting social and economic inclusion; and (iii) strengthening governance, voice, transparency and accountability. In the area of promoting social and economic inclusion, the strategy included empowering municipalities for delivering improved services, *inter alia*. This required addressing weak management and limited financial resources. Before the revolution, the ratio of municipal to central government resources was estimated at 4 percent and declining. Inter-governmental fiscal transfers were biased towards richer municipalities. The new Government was keen on building up technical and financial resources of municipalities. The ISN would support this objective through a number of

initiatives, including a new urban project and the restructured Sustainable Municipal Solid Waste Management project.

**53. The project design was simple**, but the context in the early years of project implementation was not favorable for building up the sustainability of the solid waste management system and the capacity of municipalities to live up to their legal obligations. The project was designed to link investments in waste management with income derived from the reduction of carbon emissions, and as a pilot operation to introduce new tools that would eventually lead to improving sustainability throughout the sector.

### **3.2 Achievement of Project Development Objectives**

**54. The project has not achieved its development objective.** The new tools for improving sustainability in the sector have not been implemented. The technical capacity of municipalities in waste collection has been weakened by the destruction of equipment during the revolution and their financial capacity has not improved during project implementation. As indicated above, their resources are far from sufficient to deliver adequate services. The efficiency of their operations has remained low, as most of them continue to use force account without effective cost control in solid waste management. Unfortunately, waste collection services have worsened in recent years, with a visible increase in litter on municipal roads. Expectations that the institutional development component would lead to the elaboration of master plans for the sustainable management of waste in eight governorates were not met.

**55. Access to the emerging carbon credits** by selling Certified Emission Reductions (CERs) as a means for improving the overall sustainability of the solid waste management system is an important achievement of the project, although the initial target was not met and emission reductions at the end of 2013 were about 10 percent of the potential estimated initially. Tunisia has developed expertise to benefit from future greenhouse gas reduction schemes.

**56. A new outcome indicator was added during restructuring**, focusing on the percentage of the Tunisian urban population living in areas serviced with landfills and Landfill Gas Generation systems (LFG), in which environmental impacts and odor pollution have been controlled, and in which open dumps have been rehabilitated or closed. The target was 63.5 percent and it was reported to be 63 percent at closing date, taking account of the closure and rehabilitation of illegal dumps. This figure does not reflect the real situation, however, as the construction and implementation of new landfills were stopped after the 2011 revolution, because of strong opposition from nearby communities.

**57. There were two new output indicators related to the institutional development component following project restructuring.** The first one, a review of PRONGID's performance and endorsement of a new sector policy action plan by ANGED's Board, was not met, but this shortcoming is expected to be overcome shortly. Under the second indicator, ANGED is equipped with new tools for planning information management, monitoring and evaluation, and a Geographical Information System (GIS) was implemented and is operational.

**58. The targets for the two output indicators related to the infrastructure component as revised during project restructuring have almost been met** (number of landfills equipped with landfill gases treatment systems as per the CDM requirements, and number of open dumps closed). However, the work to equip cells 4 and 5 of Djebel Chekir, which has the largest production potential, was not completed by the closing date.

### **3.3 Efficiency**

**59. Efficiency is rated low.** The economic rate of return of the project was estimated at 24 percent in the PAD with a 12 percent discount rate. The capital cost of the project was US\$27.42 million. The recurrent costs were estimated at 2 percent of investment cost. The total benefits from the sale of carbon emission reductions were estimated at US\$39.79 million through the end of 2015. The environmental benefits of the closure of seven uncontrolled dumpsites were estimated at US\$2.75 million, by analyzing the increase in land prices in the vicinity of the dumpsites that would occur following their closure. The dumpsite sub-component was completed at a lower cost than anticipated, but still yielded larger than expected benefits. The ex post rate of return of the biogas investment is negative (see Annex 3 for details).

### **3.4 Justification of Overall Outcome Rating**

**Rating: U**

**60. The objective of the project was and remains relevant.** It was not achieved, however, and the efficiency of waste management has not improved. The revised targets for the two outcome indicators have not been met and the ex post rate of return of the biogas component is negative. The strengthening of the institutional and financial sustainability of municipal solid waste management (SMW) was expected to be achieved through the operationalization of a planning and implementation system of SWM at the regional and local levels, but this was not done. The strengthening of the environmental sustainability of SWM was expected to be achieved through the rehabilitation of a number of environmentally harmful dumpsites, but unfortunately benefits of the rehabilitation have been undermined by the proliferation of illegal dumps following the revolution in 2011.

### **3.5 Overarching Themes, Other Outcomes and Impacts**

#### **(a) Poverty Impacts, Gender Aspects, and Social Development**

**61. Great care was taken during project implementation to better assess and improve the livelihoods of waste pickers,** who are among the poorest of the poor. A census and a socio-economic survey of waste pickers were carried out, and a local NGO was recruited to raise awareness among them on security and health issues. A vaccination campaign was carried out. By the end of the project, the number of waste pickers in the landfills had increased and there was no change in their traditional lifestyle. There is however more awareness of their security, particularly in Bizerte, where an arrangement has been negotiated with the waste pickers, so that only a limited number of them are present on site at the same time.

#### **(b) Institutional Change/Strengthening**

**62. The institutional development component of the project was much delayed.** The recruitment of consultants took much more time than initially planned, in part because several calls for proposals were declared unsuccessful, and others because the central procurement commission rejected the recommendations of the project management unit. The Geographical Information System (GIS) has been developed, a unit to maintain it has been established in ANGED, and its staff has been trained. A diagnostic of the organization and performance of the department in charge of Environmental Impact Assessments (EIAs) in ANPE has been completed and a database has been established to monitor implementation of Environmental Management Plans (EMPs).

**63. During project implementation, ANGED gained considerable experience** and evolved into a strong support institution for the development of the solid waste management sector. It has become familiar with the DBO approach, which it is now using for all biogas investment and exploitation contracts. It has acquired solid experience in monitoring key parameters for methane avoidance and auditability of mitigation actions. It still needs to prepare procedure manuals for its main functions and other operational tools.

#### **(c) Other Unintended Outcomes and Impacts (positive or negative)**

**64.** There were no unintended outcomes or impacts.

#### **3.6 Summary of Findings of Beneficiary Survey and/or Stakeholder Workshops**

**65.** No workshop was held, only a meeting with the members of the project committee (see section 7).

### **4. Assessment of Risk to Development Outcome**

**Rating: Significant**

**66.** The development objective was not achieved. But some environmental progress was achieved with the rehabilitation of open dumps and financially with the access to carbon credit finance. The environmental dimension of sustainability is however jeopardized by the proliferation of new open dumps and development mechanisms for communication with the citizens about construction and operation of landfills would be needed. The valuable experiences with the emerging global markets for carbon credits and production of gas are important and continued technical assistance for production and negotiations on credits must be sustained.

### **5. Assessment of Bank and Borrower Performance**

#### **5.1 Bank Performance**

##### **(a) Bank Performance in Ensuring Quality at Entry**

**Rating: MU**

**67.** The sector analysis presented in the PAD was limited. The objective of the project was relevant, but a political economy analysis could have shown that the context was not favorable for building up the sustainability of the solid waste management system. Before

the revolution, the government had no interest in promoting decentralization and had a tendency to focus on infrastructure development to solve problems. The project design was simple, which was adequate for a first operation in the sector. The project was not part of the lending program proposed in the 2004 CAS, but in a period of declining Bank commitments, the project was a good opportunity to introduce Tunisia, the most advanced country in the region on environmental issues, to the emerging market of carbon credits. The risk analysis did not cover all relevant aspects and the results framework was not realistic. The ICR agrees with the 2007 QAG's assessment that the objective was modest and the design simple (see paragraph 35 above), but weaknesses mentioned here affect the rating for quality at entry.

#### **(b) Quality of Supervision**

**Rating: MS**

**68. Supervision was adequate overall.** Aide-memoires were informative and issue-oriented. Fiduciary and safeguards issues were consistently addressed. Bank missions provided valuable support to the implementing agency and Tunisian authorities in addressing project implementation issues. Action plans were prepared and monitored. When it became clear that the volume of gas collected was well below expectations, the Bank decided to intensify supervision of this component through quarterly visits of its expert in the area. In the early years, the Bank could have been more proactive in helping ANGED move the institutional development component. The Mid-Term Review and the restructuring intervened too late. After the restructuring, supervision missions did their best to support the institution development component. In particular, they worked hard with ANGED to ensure that the terms of reference of the strategic review of PRONGID would lead to a study with concrete proposals for reform.

#### **(c) Justification of Rating for Overall Bank Performance**

**Rating: MU**

**69.** Supervision efforts could not overcome the issues, which were not adequately addressed during project preparation or were beyond Bank control.

### **5.2 Borrower Performance**

#### **(a) Government Performance**

**Rating: MU**

**70. The Government supported the objective of the project and expressed interest in the findings of the supervision missions, but did not ensure that the objective of the project would be achieved.** The Government could have changed the management of the sector to make it more cost efficient. It continued with a top down approach in dealing with local governments and was heavily involvement in the procurement process, thus contributing to implementation delays of the institutional development component. Eventually, the post revolution Government managed to adopt a new Constitution emphasizing decentralization approved in January 2014, which opened up opportunities for improving solid waste management at the municipal level.

## **(b) Implementing Agency or Agencies Performance**

**Rating: MS**

**71. Early on, ANGED did a remarkable job in moving the infrastructure component forward,** but delayed the recruitment of consultants for the institutional development component. As a result, too little was done to establish the bases for a more sustainable municipal management of solid waste. Indeed, after the 2011 Revolution, the pace of project implementation slowed down.

## **(c) Justification of Rating for Overall Borrower Performance**

**Rating: MU**

### **6. Lessons Learned**

**72. The opportunity to give Tunisia access to carbon credit finance was a key driver for this innovative project and a very relevant objective.** Tunisia was the most advanced country in the MENA region in addressing environmental issues, and it made sense to help the country benefit from this new source of finance. However, the assessment of the potential for emission reductions was conducted through a process over which the Bank had no control. The model used by CDM (Intergovernmental Panel on Climate Change - IPCC 1996) was too rigid and highly optimistic, as was already clear following its 2006 revision. A more cautious approach in the economic analysis in view of the uncertainty surrounding the reduction of emissions would have been appropriate.

**73. Agreements can be negotiated with waste pickers.** Some landfill operators have learned how to accommodate a limited number of waste pickers at any time on their sites after negotiations with waste pickers. Each country should develop guidelines on how to deal with waste pickers looking for win-win solutions, taking into account recycling procedures, local circumstances and waste pickers' traditional lifestyle. In view of the small percentage of waste recycled at project inception (about 8 percent) it would have been useful to put more emphasis on this aspect in the project. In that respect, waste pickers play a useful recycling role in the solid waste management chain. Apart from the social problem, their presence on sanitary landfills is a serious constraint, especially when there are too many of them on site simultaneously.

**74. It is urgent to develop a mechanism for consultations with communities on where to erect new facilities, and implement a solid communication strategy.** Closing and rehabilitating illegal dumps have contributed to improving the living conditions of neighboring communities but the proliferation of illegal dumps since the 2011 revolution, a consequence of popular opposition to the opening of new landfills, has undermined the benefits of a key action under the project. This situation cannot be allowed to persist.

**75. Strengthening the sustainability of municipal waste management in a highly centralized system of government with little autonomy and accountability at the local level is a daunting task.** This would require building up a sound public financial system at the local level, including improved revenue mobilization and increased efficiency of public expenditures, which was not a government priority. The institutional development

component was neglected because of the government inclination to put the emphasis more on top down physical investments than on bottom up approaches. A political economy analysis during preparation, particularly in a sector such as SWM, may have helped to identify issues more clearly.

**76. The reform of the solid waste management system is a long-term process.** Because of the complexity of the issues, a series of operations are needed to build up the sustainability of the system. The project's limited achievements include the strengthening of ANGED as an apex institution for the sector. In view of the urgency posed by the rapid deterioration of the environment due to the proliferation of illegal dumps, the Bank should continue its long-term involvement in the sector. Building upon its recent support to urban development, it should envisage a programmatic approach emphasizing: (i) cost reductions through integration of operations at the municipal level, inter-communality and contracting out to the private sector; (ii) improved cost recovery from collection, to transport and to treatment; and (iii) improved sorting and recycling.

## **7. Comments on Issues Raised by Borrower/Implementing Agencies/Partners**

### **(a) Borrower/implementing agencies**

**77.** Members of the Steering Committee praised the elimination of illegal dumps. They regretted that the 2011 Revolution led to delays in project implementation, paralysis in developing new landfills and reversals in the illegal dumping issue. They insisted on the need to complete the strategic review of PRONGID and to implement a communications strategy rapidly. They welcomed Bank support for the new project in support of municipalities approved in 2014. They agreed that municipalities should be responsible for the entire chain of solid waste management with ANGED's technical support. They suggested that micro projects be developed with NGOs to test different approaches to address the issue of integrating the waste pickers into the system. Finally, they requested that the Bank provide further support to the sector.

### **(b) Co-financiers**

**78.** GIZ has been closely involved in the solid waste sector through a number of initiatives, including participation in METAP and now in Sweep.net, a regional network committed to sharing information and new approaches among solid waste agencies in the region. GIZ highlighted that technical solutions alone cannot solve problems. The active involvement of communities affected by solid waste activities through public hearings and other methods is essential. The cost of solid waste management can be significantly reduced through the sorting and recycling of trash. In the case of Tunisia, the tourism industry is part of the problem. It should also be part of the solution.

**79.** GIZ also insisted on the need for improved cooperation among agencies involved in the sector and inter-municipal cooperation to create larger units.

### **(c) Other partners and stakeholders**

*(e.g. NGOs/private sector/civil society)*

NA

## Annex 1. Project Costs and Financing

### (a) Project Cost by Component (in Euro Millions equivalent\*)

Components	Appraisal Estimate (Euro millions)	Actual/Latest Estimate Euro millions)	Percentage of Appraisal
Component 1: Institutional Support and Capacity Building	1,374.05	106.14	7.7%
Component 2: Infrastructure Construction	16,671.76	15,260.34	91.5%
Cell 5 Djebel Chekir	4,045.80	3,650.42	90.2%
Biogas	7,053.44	7,358.45	104.3%
Rehabilitation open dumps	5,572.52	4,251.47	76.3%
Component 3: Project management and monitoring	534.35	19.35	3.6%
<b>Total Baseline Cost</b>	18,549.62	15,385.84	82.9%
Contingencies	2,335.88	0.00	0.00
<b>Total Project Costs</b>	20,916.03	15,385.84	73.6%
<b>Total Financing Required</b>	16,800.00	15,385.84	91.6%

\*At appraisal: US\$1.31 = EUR 1.00

### (b) Financing

Source of Funds	Type of Co financing	Appraisal Estimate (Euro millions)	Actual/Latest Estimate (Euro millions)	Percentage of Appraisal
Borrower		4.12	0.75	18.2%
International Bank for Reconstruction and Development		16.80	14.63	87.1%



## **Annex 2. Outputs by Component**

### **Component 1: Institutional Support and Capacity-Building**

#### **Sub-component 1:** Institutional support and capacity building for ANGED.

- ANGED's organization and training program. Not achieved. The bidding process started in May 2013. Only one proposal was received. In February 2014, the central procurement commission rejected the proposal.
- Preparation of procedures manual for main ANGED functions and operations. Not achieved.
- Support for the creation of a Planning and International Cooperation Unit. Unit exists.
- Support for the creation of a Support Unit for Municipalities and Communes. Unit exists, but not operational.
- Support for ANGED in financing landfill management and ensuring the financial and operational viability of landfills, opening up activities to the private sector and developing a procurement regulation system. Achieved.
- Development of appropriate systems for procurement of integrated municipal solid waste management services. Not achieved.
- Cost optimization and financial monitoring systems. Not achieved.
- Techno-economic study on the optimization of Djebel Chekir. Achieved.
- Computerized management system for the monitoring and control of emission reductions and CDM activities. A Geographical Information System (GIS) has been developed and is operational; training has been provided to staff.
- Communication strategy. Not achieved. Bidding process started in November 2012. Contract signed in March 2014.

#### **Sub-component 2:** Regional planning, inter-community and cost optimization.

The preparation of municipal solid waste management plans in eight governorates has been abandoned and replaced by a strategic review of PRONGID. Not done. The contract was signed in January 2014, but it was suspended because of replacement of key experts.

#### **Sub-component 3:** Institutional support and capacity building for ANPE.

- Revision of the ToRs for the impact study for projects involving waste collection, transport, disposal, recycling, rehabilitation and treatment. Achieved.
- Development of sectoral guidelines for Environment Impact Assessments and building competencies in ANPE and ANGED. Achieved.
- Training of the supervisory personnel responsible for evaluating Environmental Management Plans. Not achieved.

#### **Sub-component 4:** Mitigation of social impacts.

A local NGO has been recruited to prepare and implement an action plan. A census of waste pickers has been completed. Waste pickers have been vaccinated. A dialogue with waste pickers on security issues and opportunities for reinsertion has been conducted. The last Bank supervision mission in June 2014 was concerned by the deterioration at the

Djebel Chekir landfill. Out of about 316 waste pickers, the mission observed the presence of 44 children, due to lax access control.

## **Component 2: Infrastructure Construction**

**Sub-component 1:** Construction of cell 5 of Djebel Chekir landfill.

Construction of cell 5 was completed in July 2010. It was expected to meet the Greater Tunis requirements up to end-2013. A second landfill was planned for the Greater Tunis area on the site of Kabouti. Implementation of the project was initiated, but stopped after the 2011 Revolution in the face of strong opposition from neighboring communities. ANGED then decided to develop cell 6 on the Djebel Chekir site. For technical reasons, construction could not start immediately. Accordingly, ANGED has developed an intermediary cell with a smaller capacity, which is now operational.

**Sub-component 2:** Collection and treatment of landfill gases.

Implementation of this sub-component was delayed. Collection and treatment of gasses was completed for cells 1, 2 and 3 of Djebel Chekir. The system for gas extraction is still not installed on cells 4 and 5, which have a much higher potential than the three cells under development. ANGED intends to mobilize funds for equipping these two cells in 2015.

The sub-component included the collection and treatment of gas in the first cell of nine landfills. The scope of this sub-component was reduced during project restructuring to seven landfills. The exploitation of Bizerte, Gabès and Djerba started in August 2010. Exploitation of Sfax and Medenine started in June 2011. Development of Sousse started in February 2014 and of Monastir in September 2014.

Delays in gas collection and treatment has led to much lower emission reductions than expected and Tunisia is in default regarding its contract with the Bank on behalf of the Italian Carbon Fund.

**Sub-component 3:** Rehabilitation of priority open dumps. Seven open dumps have been rehabilitated, all before 2010, which has improved the living conditions for the nearby residents. However, this result is seriously challenged by with the emergence of a large number of illegal dumps since the 2011 Revolution.

### Annex 3. Economic and Financial Analysis

The economic analysis in the PAD shows that the income from the selling of Certified Emission Reductions (CERs) constituted the bulk of expected benefits, estimated at US\$39.79 million through the end of 2015. The volume of emission reductions was expected to reach a cumulative 3.4 million tons of CO<sub>2</sub> at Djebel Chekir and 3.2 million tons of CO<sub>2</sub> at the nine regional landfills. Using current international carbon prices of between US\$6 and US\$7 per ton of CO<sub>2</sub> equivalent, the total amount of sales would reach between US\$39.5 million and US\$46.1 million.

Actual emission reductions up to end 2013 were a small fraction of expectations, 0.4 million tons instead of 5 million tons, or 8.1 percent, of which 10.2 percent for Djebel Chekir and 5.4 percent for the regional landfills. The benefit stream started later than expected (3 years later for Djebel Chekir and 4 years later for the regional landfills), and volumes were much lower than expected, as shown in table 1 below.

**Table 1: Emission reductions (thousand tons of CO<sub>2</sub>)**

Year	Djebel Chekir Potential	Djebel Chekir Actual	Other landfills Potential	Other landfills Actual	Total Potential	Total Actual
2007	334.1		21.7		335.8	
2008	369.3		125.0		494.4	
2009	401.2	66.3	228.4		629.6	66.3
2010	430.0	55.3	343.6	1	773.7	56.3
2011	456.1	42.8	440.2	14.7	896.3	57.5
2012	412.7	50.6	501.1	45.1	963.8	95.7
2013	373.3	68.3	504.7	59.0	878.1	127.3
2014	337.8	19.8*	503.9		841.7	19.8*
2015	305.6		505.9		811.5	

\* up to end-March 2014

Gross payments made for emission reductions up to end-March 2014 amounted to US\$2.47 million at Djebel Chekir, and to US\$1.08 million at the regional landfills, for a total of US\$3.55 million. In the contract, the price of a ton of CO<sub>2</sub> was set at US\$7 for the period up to end 2012 and US\$11 after the 2012 contract amendment. The average market price of a ton of CO<sub>2</sub> on the CDM market was US\$13 during 2008-12. It crashed to an average of US\$0.51 in 2013, and has not recovered since.

After deductions for advance payments, project preparation costs, the Kyoto protocol and other costs of US\$15.1 million, the net payments should have been negative. Table 2 shows the stream of revenues from Djebel Chekir and Table 3, from the other landfills.

**Table 2: Revenues from Djebel Chekir (US\$)**

Period	Gross revenues	Deductions	Net amount
11/13/2008 to end 2010	851,557	3,652,200	(2,800,943)
1/1/2011 to 05/31/2012	442,261	2,825,943	(2,382,682)
6/1/2012 to 3/31/2014	1,179,009*	2,382,682	(1,203,673)
<b>Total</b>	<b>2,473,827</b>	<b>8,861,125</b>	<b>(6,387,298)</b>

\* verified up to end-2012, certified afterwards.

**Table 3: Revenues from other landfills (US\$)**

Period	Gross revenues	Deductions	Net amount
8/1/2010 to end 2010		1,960,000	(1,960,000)
1/1/2011 to 05/31/2012	195,237	2,155,237	(1,960,000)
6/1/2012 to 3/31/2014	888,215*	2,039,763	(1,151,548)
<b>Total</b>	<b>1,083,452</b>	<b>6,155,000</b>	<b>(5,071,548)</b>

\* verified up to end-2012, certified afterwards.

Total gross revenues from all landfills up to end March 2014 amounted to US\$3.55 million and net revenues to a negative US\$11.46 million.

The rates of return on the biogas investment are very negative, minus 27 percent assuming the biogas investment on cells 4 and 5 of Djebel Chekir are completed in 2015, and minus 32 percent if this investment is not achieved. In both cases, it is assumed that for a ton of CO<sub>2</sub>, US\$11 will be paid through the end of 2018.

The closing and rehabilitating open dumps was not expected to have a positive economic rate of return. Costs were estimated at US\$7.3 million and benefits of this activity at US\$2.75 million. The actual cost was 24 percent lower than anticipated.

## Annex 4. Bank Lending and Implementation Support/Supervision Processes

### (a) Task Team members

Names	Title	Unit	Responsibility/ Specialty
<b>Lending</b>			
Sherif Kamel F. Arif	Consultant	GEFVP	
Siaka Bakayoko	Lead Financial Management Spec	GGODR	
Mohammed A. Bekhechi	Consultant	GSURR	
Hocine Chalal	Lead Environmental Specialist	GENDR	
Concepcion Esperanza Del Castillo	Consultant	MNSWA - HIS	
Marie A. F. How Yew Kin	Language Program Assistant	GENDR	
Georges Raphael Khoury-Haddad	Consultant	EASIS - HIS	
Dahlia Lotayef	Lead Environmental Specialist	GENDR	
Ahmed Mohamed Khaled Mostafa Abdel Wahid	Technical Specialist	GCCCF	
M. Yaa Pokua Afriyie Oppong	Senior Social Development Specialist	GSURR	
Andrea Pinna	Senior Environmental Specialist	GCCCF	
Maria Sarraf	Lead Environment Specialist	GENDR	
<b>Supervision/ICR</b>			
Sherif Kamel F. Arif	Consultant	GEFVP	
Mohammed A. Bekhechi	Consultant	GSURR	
Slaheddine Ben-Halima	Senior Procurement Specialist	AFTPE - HIS	
Cynthia Bleu-Laine	Consultant	GFMDR	
François Boulanger	Sr. Urban Economist	MNSSU - HIS	
Hocine Chalal	Lead Environmental Specialist	GENDR	
Tiguist Fisseha	Disaster Risk Management Specialist	GSURR	
Jaafar Sadok Friaa	Program Leader	SACPK	
Gael Gregoire	Sr Policy Officer	CESPQ	
Harvey Himberg	Consultant	OPSOR	
Marie A. F. How Yew Kin	Language Program Assistant	GENDR	
Georges Raphael Khoury-Haddad	Consultant	EASIS - HIS	
Annick Lachance	HQ Consultant ST	GWADR	
Mohamed Mehdi	HQ Consultant ST	MNAFM - HIS	
M. Yaa Pokua Afriyie Oppong	Senior Social Development Spec	GSURR	
Rolf Parta	HQ Consultant ST	BPSVP	
Katelijan Van den Berg	Senior Environmental Economist	GENDR	
Hans Willumsen	HQ Consultant ST	GSURR	
Philip Winchell Bottern	Senior Social Development Specialist	GSURR	
Jérôme Chevallier	ICR Author	Consultant	

**(b) Staff Time and Cost**

Stage of Project Cycle	Staff Time and Cost (Bank Budget Only)	
	No. of staff weeks	USD Thousands (including travel and consultant costs)
<b>Lending</b>		
FY05	0	0.45
FY06	30.78	208.16
FY07	19.37	91.36
FY08		
FY09		
FY10		
FY11		
FY12		
FY13		
FY14		
FY15		
<b>Total:</b>	50.15	299.52
<b>Supervision/ICR</b>		
FY05		0.00
FY06		0.00
FY07	2.15	10.91
FY08	7.88	106.12
FY09	3.27	45.49
FY10	5.34	55.41
FY11	12.71	84.12
FY12	12.63	90.88
FY13	12.68	110.95
FY14	9.18	106.69
FY15	2.00	30.22
<b>Total:</b>	67.84	640.79

## **Annex 5. Beneficiary Survey Results**

No surveys were carried out.

## **Annex 6. Stakeholder Workshop Report and Results**

See para 7a in main text about a meeting with members of the Steering Committee.



**Annex 7. Summary of Borrower's ICR and/or Comments on Draft ICR**

Borrower had not provided an ICR or comments on the draft ICR as of December 20, 2014.

**Annex 8. Comments of Co financiers and Other Partners/Stakeholders**  
See para. 7b in main text.

## **Annex 9. List of Supporting Documents**

- Association Environnement et Citoyenneté. Djebel Chekir landfill: socio-economic challenges and restructuring
- GIZ: Cost of environmental degradation due to solid waste management in Greater Tunis. May 2014
- GIZ: Challenges and Opportunities for Solid Waste Management in the Mashreq and Maghreb Region. April 2014
- World Bank: State and Trends in Carbon Pricing. May 2014
- World Bank: Urban Development and Local Governance Program Project. PAD, May 2014
- World Bank: Country Opinion Survey. March 2014
- World Bank: Country Program Evaluation, Approach Paper. April 2013
- World Bank: Interim Strategy Note, FY13-14. May 2012
- World Bank: Country Partnership Strategy FY10-13. November 2009
- World Bank: Country Assistance Strategy FY05-08. June 2004
- World Bank: Country Environmental Analysis. April 2004