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IMPLEMENTATION COMPLETION AND RESULTS REPORT (TF098543)

ON A CARBON FUND EMISSION REDUCTION PURCHASE AGREEMENT IN THE
AMOUNT OF A MAXIMUM OF 4.5 MILLION TONS OF CO₂-EQUIVALENT

TO

THE KINGDOM OF MOROCCO

FOR A

MUNICIPAL SOLID WASTE CARBON FINANCE PROGRAM (P121917)

March 5, 2019

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

CURRENCY EQUIVALENTS

(Exchange Rate Effective June 30, 2018)

Currency Unit = Moroccan Dirham (MAD)
US\$1 = MAD 9.47
MAD 1 = US\$ 0.11

FISCAL YEAR

January 1 – December 31

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Acronyms

CD	Country Director
CDM	Clean Development Mechanism
CERs	Certified Emission Reductions
CNSS	Caisse Nationale de Sécurité Sociale
CPA	CDM Project Activity
CPF	Carbon Partnership Facility
DGCL	Direction Générale des Collectivités Locales
DOE	Designated Operational Entity
EB	Executive Board of the CDM
EMP	Environmental Management Plan
ER	Emission Reduction
ERPA	Emission Reduction Purchase Agreement
GHG	Green House Gas
GCGFMU	Climate Change Group – Fund Management Unit
ICR	Implementation Completion Report
ISR	Implementation Status and Results Report
LFG	Landfill Gas
MW	Megawatt
PCF	Prototype Carbon Fund
PDD	Project Design Document
PDO	Project Development Objective
PoA	Program of Activities
SM	Sector Manager
SWM	Solid Waste Management
tCO _{2e}	Tons of carbon dioxide equivalent
UNFCCC	United Nations Framework Convention on Climate Change
VERs	Verified Emission Reductions

IMPLEMENTATION COMPLETION AND RESULTS REPORT

CONTENTS

DATA SHEET	5
A. Basic Information	5
B. Key Dates	5
C. Ratings Summary	5
D. Sector and Theme Codes	6
E. Bank Staff.....	6
F. Emission reductions delivery to date.....	6
G. Supervision of Carbon Finance Operations Guidelines.....	6
1. ACHIEVEMENT OF IMPLEMENTATION OBJECTIVES AND OUTCOMES	7
2. BANK AND PROJECT ENTITY PERFORMANCE	14
3. COMMENTS FROM PROJECT ENTITY AND OTHER PARTNERS	15
4. SAFEGUARDS COMPLIANCE	15
5. POST COMPLETION OPERATION AND JUSTIFICATION FOR MOVING TO THE SECOND PHASE.....	16
6. LESSONS LEARNED	17

**IMPLEMENTATION COMPLETION AND RESULTS REPORT (ICR)
Municipal Solid Waste Carbon Finance Project**

DATA SHEET

A. Basic Information

Country: Morocco
 Project Name: Municipal Solid Waste Carbon Finance Program
 Project ID: P121917
 ICR Date: February 22, 2018

Emission Reduction Purchase Agreement (ERPA) volume:

	IBRD Carbon Partnership Facility
Municipal Solid Waste Carbon Finance Program (initial 2013-2020)	4,500,000 CERs
Municipal Solid Waste Carbon Finance Program (amended 2016-2020)	272,000 CERs

Bank/IFC lending or grant: US\$520,000 (TF098543)
 Environmental Category: A
 Project Entity (PE): Fonds d'Équipement Communal (FEC)
 Co-financiers and Other External Partners: n.a.
 ICR prepared by: Anastasia Touati and Fernando Lecaros
 Approved by CD:
 Approved by SM:

B. Key Dates

Carbon Partnership Facility (Second Tranche) ERPA

ERPA signing date	August 1, 2013
ERPA effectiveness date	September 23, 2014 (Sub-ERPA signature)
Project commissioning date	July 31, 2015
ERPA amendment date	March 23, 2017
ERPA termination date	December 31, 2020

C. Ratings Summary

Outcomes	Moderately Satisfactory
Bank performance	Moderately Satisfactory
Project Entity performance	Moderately Satisfactory

D. Sector and Theme Codes Sector

Codes (in %)

Renewable Energy	85%
Solid Waste Management	15%

Theme Codes (Primary/Secondary)

Climate Change	Primary
Infrastructure services for private sector development	Secondary

E. Bank Staff

Position	At ICR	At ERPA Signing
Task Team Leader	Anastasia Touati	Jaafar Sadok Friaa
Deal Manager	Javier Freire Coloma	Adrien de Bassompierre
Legal Counsel	Julius Martin Thaler	Flavia Rosembuj
Regional Safeguards Coordinator	Chaogang Wang/ Taoufiq Bennouna	Hocine Chalal
Sector Manager/Director	Ellen Hamilton	Franck Bousquet

F. Emission reductions delivery to date

During the first reporting period (28 February 2014 to 31 July 2016), the project generated 4.1 % (11,169) of the Certified Emission Reductions (CERs) that are contracted (272,000) in the amended ERPA, based on the only Monitoring Report for Clean Development Mechanism (CDM) Program of Activities (PoA) to date^{1,2}. The second verification cycle, for the monitoring period of August 1, 2016 to December 31, 2017, will start in 2019.

G. Supervision of Carbon Finance Operations Guidelines

According to the Bank Guidelines (Office Memorandum, December 1, 2011) oversight (supervision and monitoring) of Carbon Finance operations is conducted in two phases: (a) the implementation phase, from effectiveness of the ERPA to project completion; and (b) the monitoring phase, from project completion to termination of the ERPA. Between these phases, oversight responsibility of the project may be transferred from the Region to the Climate Change Group – Fund Management Unit (GCCFM). Since the Project is fully operational and capable of generating emission reductions, the present ICR summarizes the achievements of this project, and issues and lessons learned, in order to transfer it to GCCFM for the monitoring phase.

¹ The monitoring report start date is February 2014, based on the registration date. However, the installation of the gas collection network was done in February-March 2015 and commissioning of the flaring system occurred on July 31, 2015. Actual Emissions Reductions therefore took place August 1, 2015, onwards.

² UNFCCC PoA 6568 CDM Report completed 23/02/2017

https://cdm.unfccc.int/PoAIssuance/iss_db/poaiss42452156/view

1. ACHIEVEMENT OF IMPLEMENTATION OBJECTIVES AND OUTCOMES

1.1 Basic project description and summary of any significant changes since Emission Reduction Purchase Agreement (ERPA) signature³

1. Most Moroccan cities feature high population densities, rapid growth, and several forms of environmental degradation. At appraisal, Municipal Solid Waste Management (MSWM) had become one of the most serious environmental challenges in urban areas, with adverse effects on the quality of life, human health, environmental and natural resources, and economic and social development. At appraisal Morocco produced about 5 million tons of Municipal Solid Waste (MSW) per year and this was expected to reach 6.2 million tons in 2020.

2. Recognizing the urgent need for leadership and partnership in addressing the very serious issues in MSW, the Government of Morocco began to take vigorous actions toward the development and reform of the sector in 2006 with the enactment of the first Solid Waste Law.

3. Since 2009, the overall reform has focused on three main areas: (i) improve governance of the sector through additional legal, regulatory, and institutional measures designed to establish a clear framework for the sector, and eliminate overlap and/or gaps in the policy-making, regulatory, and operational structure; (ii) improve the sustainability of the sector through the introduction of financial mechanisms and incentives for municipalities to improve MSWM systems; and (iii) mainstream social and environmental considerations into the planning, implementation, and operations of MSW services and investments.

4. Regarding the improvement of the financial and environmental sustainability of the sector, the Government recognized that there were untapped opportunities in the MSW sector to mobilize additional financial resources for the sector from the carbon market while also supporting the global climate mitigation agenda. MSWM in Morocco is currently based on landfills, which produce vast quantities of methane. Capturing and flaring the methane produced by the decaying organic portion of the municipal solid waste can lead to significant greenhouse gas (GHG) emissions reductions (ERs) and generate additional sources of revenues through CDM under the Kyoto Protocol. In addition, by using captured landfill gas (LFG) to generate electricity, additional ERs can be achieved from the displacement of fossil-fuel based power generation. The Government identified CDM as a source of additional revenues to municipalities.

5. **As a result of the above needs and opportunities, per the request of the Government of Morocco, a programmatic series of two DPLs was delivered respectively in March 2009 and December 2014, and the Morocco Municipal Solid Waste Carbon Finance Program was developed in parallel to provide opportunities to municipalities in gaining access to the carbon market.** The overall objective of the DPL series was to support the government in implementing its program of reforms aimed at improving the financial, environmental and social performance of the MSW sector in Morocco. The SWM DPL program contributed to significant achievements in all three policy areas and outcomes were rated satisfactory in both associated ICRs. On the sector financing

³ Carbon Finance Assessment Memorandum, Report No. 87914-MA, World Bank Urban and Social Development Unit, May 1 2013, pp.5-7

⁴ Solid Waste Sector development Policy Loans Series (DPL1 -P104937-, 2 – P119781, 3- P127955 and 4-P148642) implemented between 2008 and 2015.

side, the DPL design incorporated mutually reinforcing elements, including carbon finance⁵. The Carbon Finance original program was demand-driven to provide a framework under which any interested municipality, or group of municipalities, would be able to develop a CDM project in the municipal solid waste management sector, as long as it met the eligibility criteria established by the CDM. Moreover, municipalities would be able to develop carbon assets and gain access to the carbon market at a relatively low cost, taking full advantage of economies of scale of the programmatic approach and keeping transaction costs down.

6. The Fonds d'Équipement Communal (FEC) is a Municipal Development Fund organized in 1959, which operates as a public development bank providing financial support through loans to municipalities' infrastructure projects. At preparation FEC played a role in supporting local authorities to gain access to the international carbon market and to develop CDM projects in the MSW area.

7. The PDO of the Municipal Solid Waste Carbon Finance Program is to support Moroccan municipalities to develop carbon assets in the MSW sector and access the carbon market⁶.

8. To achieve the PDO, the program was designed to i) support the development and registration of a CDM Program of Activities (PoA); and ii) allow the purchase of CERs (carbon assets), labeled in tons of CO₂-equivalent (tCO₂e), through an Emission Reductions Purchase Agreement (ERPA) under the Bank-managed Carbon Partnership Facility (CPF).

9. As a carbon finance project, the results indicator for the project laid out in the PAD was the target number of ERs generated, since that is the result against which project payments are made under an ERPA. However, the PDO was not to generate ERs per se, but more broadly to support the development of carbon assets and access the carbon market. As such, this ICR assesses success of the project based on achievement of these broader objectives, not on the number of ERs generated.

10. At preparation, the ERs would be generated through: (i) the avoidance of methane (CH₄) emissions from MSW landfills in Morocco, by promoting LFG capture and flaring, and/or electricity generation projects, and (ii) the reduction of carbon dioxide (CO₂) emissions through the displacement of fossil fuel-based electrical power generation.

11. The first ERPA was signed between FEC and the Bank on August 1, 2013 to purchase up to 4.5 million CERs to be generated between March 1, 2013 and December 31, 2020. The program was designed in the expectation that about 16 landfills would eventually join it, with a potential generation of 7.5 million CERs over the 2012-2020 period⁷.

12. Only one landfill, the Oum Azza landfill, located in the Rabat region, has joined the program. The landfill manages solid waste for three main urban municipalities (Rabat, Salé, and Témara), and ten smaller municipalities (rural "communes": Skhirate, Harhoura, Ain Attiq, Bouknadel, Sebbah,

⁵ World Bank, 2012, ICR on the Series of Programmatic Loans to the Kingdom of Morocco for the Municipal Solid Waste Sector Development Policy Loans (I and II).

⁶ Carbon Finance Assessment Memorandum, op. cit., pp.8-9

⁷ Carbon Finance Assessment Memorandum, op. cit., p.9

Sidi Yahya Zaer, Ain Aouda, El Menzeh, Oum Azza and Mers El Kheir)⁸. A lack of appetite from some of the communes to integrate their landfills in the CDM program, a low degree of maturity for the majority of the landfills pre-identified and expiration of CDM-imposed deadline, for the landfills almost ready to be registered, explain why no other landfill was registered (see detailed explanations in section 1.4). As a result of the low response, the ERPA was amended on March 23, 2017 to correspond to the expected CERs to be generated by the Oum Azza landfill over the ERPA period and limit the number of CERs to 272,000 tCO₂ equivalent. The timing of the project should also be noted here: at the time of the Carbon Finance Assessment memorandum (August 2012), there was a growing carbon market and related expectations related from projects that could qualify to participate in the CDM. Context at ICR is significantly different from context at preparation, given the growing regulating difficulties of CDM qualification combined with the collapse of prices in the carbon market during the 2013-2017 period.

1.2 Project Implementation and Commissioning

13. **Bank financial support (TF098543).** As part of the Morocco Municipal Solid Waste Carbon Finance Program, Morocco received a project preparation grant from the World Bank-managed Carbon Asset Development Facility, amounting to US\$520,000, dedicated exclusively to costs relating to the expertise required for preparing CDM projects to benefit local communities. In particular, it aimed at supporting the following activities:

- (a) Provision of technical assistance in preparing design documents for the activities of the PoA, including CDM Project Activity (CPA) design documents and generic monitoring plan;
- (b) Provision of technical assistance in managing and coordinating CDM PoA in compliance with CDM rules;
- (c) Provision of legal support in drafting generic Sub-Project Agreements and specific Sub-Project Agreements;
- (d) Provision of technical assistance in supporting CPA implementers for the implementation of monitoring tools and procedures in compliance with CDM requirements, including implementing carbon asset registry and information systems, CPA monitoring and ER payment procedures; and
- (e) Building CDM capacity by organizing workshops and training tools for CPA implementers.

14. The grant was signed on 28 April 2011; the initial closing date was 31 December 2014, which was subsequently extended to 31 August 2016 to give more time for other candidate landfill projects to access the CDM program. As of the closing date, TF commitments amounted to 56% of the available funds, of which 96% corresponded to consulting services (audits included) with the balance corresponding to training.

15. The preparation grant was not fully utilized given other candidate landfill projects did not reach a stage where they could access CDM support, lowering the need for continued technical assistance (See Section 1.4 for details on achievements under the grant).

⁸ FEC information.

16. **Commissioning of the Oum Azza landfill.** The Oum Azza landfill started operations on 19 December 2007 and the closure of the site is scheduled in 2027. Since the start of operations, the site has received an average of 1,400 tons of waste daily, with an annual 3% rate of waste growth. The landfill is equipped with a leachate collection system that carries by gravity the leachate to a biological treatment basin. A collection system is also used to carry rainwater into a storage basin for multipurpose uses. The landfill has a total operational lifetime design of 20 years⁹. The Operator, which specializes in landfill management, operates the landfill under a 20-year contract (2007-2027).

17. The Oum Azza Landfill LFG project was registered under the United Nations Framework Convention on Climate Change (UNFCCC) Clean Development Mechanism (CDM) on 17 December 2013. A gas collection system, consisting of 45 wells, was installed in February/March 2015 and the flaring system was commissioned on 31 July 2015; the LFG capture and flaring system has therefore been operational and has generated emission reductions since August 2015. On 26 May 2017, the program had its first issuance of CERs for the period from August 2015 to July 2016, for a total of 11,169 CERs, corresponding to the first monitoring period of the project. In addition, about 11,000 ERs have been reported by the project for the period from August 1, 2016 to December 31, 2017 (see table 1), pending verification which is expected to start by the end of 2018.

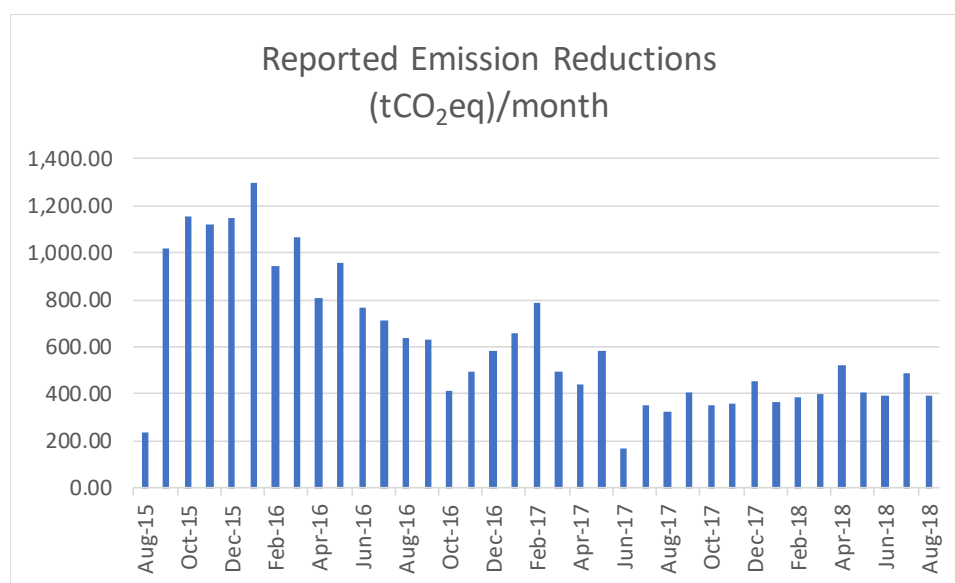
Table 1-Emission Reductions to End-2017

Monitoring Period	Reported Emissions Reductions	CERs
28/02/2013 - 31/07/2016	11,169	11,169
01/08/2016 – 31/12/2017	11,728	Pending verification
TOTAL	22,897	11,169

18. **Limitations on ERPA fulfillment.** The Bank-managed Carbon Partnership Facility originally planned to purchase a total amount of up to 4.5 million of tCO₂ equivalent over nine years (2012-2020), through the registration of up to 16 Landfill Gas (LFG) projects to the program. Given significant delays on the side of the Project Entity in securing the inclusion of additional landfills into the program before the CDM-imposed deadline, the Oum Azza Landfill was the only landfill to be successfully registered. The ERPA was therefore amended on March 23, 2017 into a sub-ERPA to reflect the reduction of the program to just the Oum Azza Landfill LFG project and, accordingly, to reduce the volume expected to be purchased by the Bank, as Trustee of the Carbon Fund of the Carbon Partnership Facility, to 272,000 tCO₂ equivalent over the duration of the program (2012-2020). **While at a smaller scale and lower volume than originally anticipated, the PDO was achieved nonetheless** (see section 1.4 for more details).

⁹ CDM Program Activity Design Document Form, Landfill’s gas capture, flaring and use program in Morocco, UNFCCC, 5 December 2012, https://cdm.unfccc.int/filestorage/b/t/SKYRUC2MOF475JV8H01ADBTLE6NWP.pdf/CPA-DD%20Oum%20Azza_v.4_FINAL%20REVISION_CLEAN?t=RDh8cGFwNmZpfDB5CU0WaYf_2mDvPNNtxnTo

Chart 1: Estimated Oum Azza Emission Reductions reported. Source: Operator



19. While the PDO has been achieved, it should also be noted that as per the information reported on ERs generation (see Chart 1), there is a high risk that the project will not be able to deliver the full ERPA contracted volume of 272,000 tCO₂ equivalent. At a current generation rate of a few hundred tCO₂eq per month, improvements in project technology are needed in order to deliver on the revised contract volume. The poor performance of the Biogas Collection and Flaring System in terms of CER generation is mainly due to a problem of high leachate presence, which prevents the proper extraction of the methane to be burned¹⁰. This also explains the poor performance of the last recorded period. The Operator has identified an action plan to tackle the leachate problem, which includes: (a) installation of additional gas wells, (b) installation of additional pumps, (c) a reassessment of the disposal procedure to ensure that waste buried on the site does not generate additional layers of leachates, (d) installation of a leachate treatment station, and (e) extension of the leachate drainage network.

20. As of February 2019, implementation of these actions is dependent on a funding agreement between the Operator, the General Directorate of Local Communities (DGCL) and the Ministry of Sustainable Development. Agreement is conditioned by a wider negotiation issue concerning the overall economics of the landfill and the remuneration of the operator, which are being discussed on the occasion of the Operator’s contract’s tenth anniversary (2007-2017). The operator is seeking greater remuneration, which is currently below the Moroccan average; as of ICR preparation the negotiations were still underway. Because the operator is responsible for the investments to be undertaken under the action plan, solving the leachate problem is dependent on arriving at an agreement on the overall remuneration issue.

¹⁰ Aide Mémoire—Mission de Supervision, 30 octobre au 1er novembre 2017, World Bank, p.3

1.3 Monitoring, reporting, verification and issuance of ERs

21. As noted in the Table 1, there was a single monitoring report, submitted to UNFCCC¹¹ on 23 February 2017, covering the first monitoring period, from 28 February 2014 to 31 July 2016¹². The report shows a reduction of GHG emissions amounting to 11,169 tCO₂e during the monitoring period; however the actual, physical, reduction only started after the commissioning of the flaring system (31 July 2015). The reported CERs are those in Table 1; the information is collected by the Operator and posted in a weekly report.

1.4 Achievement of Objectives and Outcomes.

22. **Achievement of initial scope.** Under the initial concept, the project pipeline consisted of sixteen landfills classified into three categories according to their expected commissioning dates, but eventually only one operation materialized. The reasons behind this lack of achievement include:

- a) Several of the candidate projects did not achieve the degree of maturity required to apply for CDM benefits by the registration deadline. This included technical aspects in order to achieve a controlled discharge, as well as administrative arrangements for private operators to take charge of the landfills. There was a two-year limit following the date of registration of the program to include additional landfills, and only Oum Azza complied with it. The Bank was aware of this obstacle (as documented in the Carbon Finance Assessment Memorandum); it was also acknowledged in the November 2017 Aide Memoire;
- b) The lack of interest of landfill operators, due to a negative assessment of the financial viability of the proposed schemes, given (i) their responsibility in investing in the required equipment (gas collection and flaring devices), (ii) the existence of arrears on the part of some communes regarding payments for landfill services, which gave rise to doubts regarding the ultimate transfer of CDM benefits, and (iii) doubts regarding the financial viability of the proposed scheme under a cost-benefit analysis, particularly when taking into account the collapse of prices in the carbon market during the 2013-2017 period.

23. **Achievements under the Grant funding.** A key achievement of the grant was to facilitate the preparation of the project design documents, ensure compliance with CDM rules, and provide legal support in reviewing the CER purchase contract, enabling the commoditization of emission reductions as carbon assets and access to the carbon market to sell these assets. The documents and procedures required are highly specialized and specific to the carbon market and therefore often create barriers to accessing the carbon market, and such support was integral to developing the program. In addition, the grant strengthened the capacity of the Oum Azza actors (FEC, delegating authority and operator) to monitor CERs, which was key to (i) developing the Oum Azza Carbon assets and (ii) facilitating access of the Oum Azza municipalities to the carbon market. In particular, as part of the

¹¹ UNFCCC PoA 6568 CDM Report completed 23/02/2017

https://cdm.unfccc.int/filestorage/E/L/A/ELAJWMHCSNT052YRF94PQ3ZI8K6UGB/PoA6568%20Monitoring%20Report%20v4%2023%2002%202017.pdf?t=TE18cGFqY2czfDAZsnpCIBp8KP3vGiO_xqlq

¹² The monitoring reports cover the period from the crediting start date. The ERs started to be generated from the start date, see footnote p.5.

activities financed by the grant, a generic monitoring plan for the Oum Azza Landfill was elaborated and, as part of its development, an international consulting Firm (Aby carbon) supported the FEC, the delegating authority and the Oum Azza operator in its monitoring of CERs. The support provided by the firm strengthened the capacity of the delegating authority and FEC for CER monitoring and due diligence regarding CDM rules and procedures¹³. Other outputs included consulting services for (a) feasibility studies for several candidate landfills (Al Hoceima, Agadir, Moulay Abdellah, Berkane, Safi, Akreuch, Khouribga) to apply for CDM support through carbon credits, (b) environmental and social evaluations of candidate projects (Al Hoceima, Agadir, Moulay Abdellah), and (c) a training workshop organized in October 2015 regarding the presentation of projects within the PoA.

24. **Achievement of objectives.** The main objective of the carbon finance program was to support Moroccan municipalities develop carbon assets in the MSW sector, and access the carbon market. Related key results indicators are as follows:

- Support the development and registration of a CDM Program of Activities (PoA);
- Allow the purchase of CERs (carbon assets), labeled in tons of CO₂-equivalent (tCO₂e), through an Emission Reductions Purchase Agreement (ERPA) under the Bank-managed Carbon Partnership Facility (CPF).

25. Through the Oum Azza Landfill, which manages solid waste for 13 municipalities, several Moroccan municipalities are successfully accessing the carbon market and with carbon assets represented by the effective generation of Certified Emission Reductions.

26. **Rating.** As per the program indicators revised to limit the CDM program to the Oum Azza landfill, the project has been commissioned on schedule and the flaring and monitoring is ongoing. All material environmental and social safeguard and related issues have been addressed in the project. But while the project is implemented and commissioned, there are some pending investments that would improve ER generation. For that reason, **overall implementation progress is Moderately Satisfactory (MS).**

27. Regarding the achievement of objectives to date, the Morocco MSW-CF program: (i) has been successfully registered under the UNFCCC, (ii) has an operational landfill (the Oum Azza landfill), and (iii) is undertaking monitoring of the emissions reductions, all in line with the ERPA that was signed in 2013 and the subsequent project ERPA amendment signed in 2017. Through the Oum Azza Landfill, carbon assets were developed with the effective generation of CERs and the associated municipalities are accessing the carbon market. While the original intention was to register more landfills under the Program, this was not possible due to the lack of appetite of municipalities to integrate their landfills in the program and the low level of landfill projects maturity at the time of the registration deadline. The scope of the project was reduced accordingly and therefore **progress towards achievement of the PDO is Moderately Satisfactory (MS).**

28. However, while the target of emission reductions is a contractual issue and is not part of the PDO, the low current ERs relative to the ERPA goals should be noted here. After the ERPA amendment, the CDM program objectives became circumscribed to the Oum Azza landfill. As noted

¹³ Programme d'activités MDP dans le secteur des déchets solides. Captage, torçage et valorisation du biogaz des décharges au Maroc (P121917). Rapport d'avancement des activités du don CADF n°TF098543 au 30/06/2014.

in Table 1 above, there have been 11,169 CER reductions until 31 July 2016 and 11,728 estimated reductions from 1 August 2016 to 31 December 2017, for a total estimated 22,897 ER to 31 December 2017. Starting 2018 the generation of CERs was expected to increase significantly; however, the level of emission reductions estimated in 2018 has remained low and there is a very high risk of under-delivering on the ERPA. Landfill gas generation and collection remain at very low levels, due to the lack of control of leachates from the landfill, as well as lack of sufficient investments in terms of landfill gas collection and treatment facilities; for example, the project could have sustained a 5000 m³/hour burner, but the actual burner installed only has a capacity of 1,500 m³/hour. As noted in 2.2, improvements to the rate of ER generation are dependent on the outcome of current negotiations regarding the operator's remuneration. While the ER generation potential is much larger than the numbers reported to date and an action plan has been put in place to identify investments needed, implementation of these actions is dependent on a funding agreement between the Operator, the General Directorate of Local Communities (DGCL) and the Ministry of Sustainable Development which is still pending as of November 2018. This lack of investment in maintaining and expanding the current system is hindering the project capacity to address the under-delivery of contracted ERs accumulated over the last 5 years.

2. BANK AND PROJECT ENTITY PERFORMANCE

2.1 Assessment and rating of overall Bank performance

29. The Bank provided support for identifying the project during preparation and arranging for FEC to be able to access resources provided by the CDM as attested by (a) arranging for a grant (TF098543) for technical assistance to support FEC in preparing the project, (b) preparing the assessment memorandum in May 2013, and (c) preparing, negotiating, and completing the August 1, 2013 ERPA between the Bank and FEC. The project was designed as a mechanism to provide support to multiple landfill projects under a single entity, which would minimize transaction costs associated with accessing CDM funds, but the assessment memorandum failed to provide an accurate assessment of the maturity of identified potential landfill candidates as well as estimates of economic and financial soundness of the subprojects to be supported through the CDM mechanism.

30. Regarding supervision, the bank team was keeping regular communication with the FEC and overseeing the implementation of the project through multiple missions for the preparation and implementation of the SWM DPL series, which ICRs were completed in December 2016. After that, the last recorded mission, and the associated ISR, took place from October 30 to November 1, 2017, although the team maintained regular communications with FEC, including through the monitoring of ERs

31. The project would have benefited from closer supervision particularly regarding on the ground monitoring that could have detected the issues behind the difficulty in incorporating the other landfills. The Bank recognized the lack of additional landfills and its impact on the project, and proceeded to restructure it in 2017 by setting realistic goals through the ERPA amendment. So on balance this project attained the main objective of successfully developing a project on the Oum Azza landfill that is yielding and selling carbon credits but at the same time the project has been scaled back, and for this reason **the Bank performance is rated Moderately Satisfactory (MS).**

2.2 Assessment and rating of overall Project Entity performance

32. FEC was proactive during project preparation by solidifying the pipeline of SW-CDM projects in close coordination with the PNDM providing municipalities with technical and financial support to help them prepare CDM project documentation and generate carbon assets. FEC was also instrumental in achieving the signing of the initial ERPA. In addition, FEC's capacity to perform its role as the coordinating and managing unit for the PoA had been enhanced through technical assistance provided by the CPF team during the two-year preparation phase of the Program (2010-2011). Nevertheless, FEC could have undertaken more detailed engineering studies for the initial assessment identifying the 16 potential participating landfills which for the majority didn't have sufficient maturity to participate in the CDM mechanism.

33. Regarding project management, FEC provided progress reports (describing the progression of the different planned activities under the associated Grant, and the environmental monitoring of the flaring system) and any additional information required by the Bank (including on safeguards issues) on a regular basis. However, over recent years FEC appeared to have a diminished responsiveness regarding the CDM. This might be linked to the poor performance of the project, as well as a significant number of management changes on the side of FEC, that may have resulted in significant delays on processing times for a number of documents. This is evidenced, for example, by the delay in providing project information from the Operator, or in processing the documents for compensation for CERs (after CER issuance in May 2017, the request and payment finally took place only in April 2018). **Based on these considerations, FEC's performance is rated as Moderately Satisfactory (MS).**

3. COMMENTS FROM PROJECT ENTITY AND OTHER PARTNERS

34. No comments were provided by the project entity.

4. SAFEGUARDS COMPLIANCE

35. The only safeguard policy triggered was "Piloting the Use of Borrower Systems to Address Environmental Issues in Bank- Supported Projects" (OP/BP 4.00). A Safeguards Diagnostic Review (SDR), consistent with OP 4.00 relative to Piloting the Use of Country Systems approach for Safeguards, was prepared and disclosed in August 2011. The Oum Azza landfill operator was required to prepare a study detailing the impact of the proposed combined collection and flaring of landfill gas, to be evaluated by the EIA (Environmental Impact Assessment) national committee.

36. The Project has low environmental and social impacts. By flaring methane gas, the project contributes to a net reduction in greenhouse gases (methane contributes roughly 25 times more than the resulting carbon dioxide). Construction included a system for gas collection (wells, collectors, and reservoirs for eliminating condensates), installation of the biogas pumping system, and implementation of the flaring and measurement system. During construction, the landfill operator prepared follow-up reports regarding the possible negative environmental impacts of the project, including dust emission, waste production, bad odors, exhaust gas emissions from construction

equipment, production of polluted water, and sound pollution, which were mitigated according to plan. Mitigation measures were applied to reduce the impacts as documented by the Operator¹⁴.

37. The operator has prepared annual environmental compliance reports. The controlled variables include (a) the leachate treatment station, (b) water quality control (surface runoff and underground water derived from the landfill), (c) air quality control, (d) functional aspects of the collection and flaring system, particularly the fire and explosion risks, and (e) the effects on fauna and flora surrounding the site. The reports highlight those variables that exceed acceptable threshold limits and propose corrective actions to be implemented. Several measures, including leachate control are still pending as of October 2018, as they are part of the action plan to be implemented after an agreement is reached between the Operator and the Government.

38. **The October/November 2017 supervision mission noted the on-site environmental and hygiene office, especially the award of the ISO 14001 certification.** The mission recommended: (a) improving on-site signaling to avoid accidents, (b) encouraging workers to use protective equipment, and (c) improving the level of analysis in the environmental assessment reports. Following these recommendations, discussions with FEC and the Operator as of October 2018 and the last annual environmental compliance report suggest that those recommendations were taken into account. More specifically: (i) on-site signaling was improved and a monitoring procedure was put in place; (ii) the use of protective equipment is mandatory and controlled by the Quality engineer on site; (iii) the environmental compliance report provides explanations when relevant and presents the mitigation measures put in place as per instructions of the terms of reference. Additional reports are also drafted every 3 months for the specific mitigation measures put in place.

39. The mission also confirmed that the actions that will be implemented as part of the action plan to address the leachate problem are not expected to have any impact on safeguards, and would be monitored through the regular monitoring reports.

40. There have been no negative social impacts raised. The landfill operator hired the site's scavengers as workers in the recyclable products selection process; they are organized as a cooperative since 2011, whose activities include formalizing the worker's labor, and adding value to the waste selection process. They are now covered by the national social security organization (Caisse Nationale de Sécurité Sociale—CNSS). Health and security of personnel are well controlled (appropriate clothing, medical controls, first aid, safety warnings).

41. **As a result, the mission concluded there were no residual environmental or social problems at the project level.**

5. POST COMPLETION OPERATION AND JUSTIFICATION FOR MOVING TO THE SECOND PHASE (CARBON FINANCE MONITORING PHASE)

42. **Improving methane extraction and flaring.** The operator's proposed actions regarding the increase of methane extraction from the landfill are important to increase ER generation (they include, as listed beforehand, additional gas wells, additional pumps, disposal procedure revision, leachate

¹⁴ Operator's 'Rapport de Suivi environnemental', 2015, , Système de captage et de torchage du biogaz au CET Oum Azza, Phase travaux (Février 2015- Mai 2015).

treatment, and extension of leachate drainage network). As noted above, initiating these activities is dependent on reaching a financing agreement among the operator and Government agencies and a satisfactory remuneration regarding the operator's overall remuneration. The WB carbon Fund should follow-up on the initiation of these activities.

43. **Improving the project's finances by generating electricity.** The initial project design included the possibility of generating electricity by using the methane produced in the landfill to provide power supply to the electricity utility, which has not been done to date. An increase in the extraction rate would justify the implementation of a power generation system, with additional capacity to dispose of methane compared to the capacity of the existing flaring mechanism. Facilitating sales to the power utility and adapting to the existing power sector institutional structure should support the feasibility of this alternative and would allow the climate change benefits to increase. The Operator has plans to produce electricity after extending the collection network, and as soon as the collected methane content increases to 40 percent by volume. Depending on the performance of the project—which is conditioned by the leachate control improvements—the operator would install a 1 MW gas engine to meet on-site needs, which are of the order of 0.3 MW, and gradually install other gas engines up to a total capacity of 5MW. This alternative is subject to executing the investments required to improve methane extraction, and therefore will depend on the outcome of the negotiations between the operator and the Government.

44. **Justification for moving to the second phase.** During implementation, suitable measures were taken where necessary to mitigate the safeguards issues as noted in section 4. Although emissions are being avoided it is necessary to improve the capture of climate change benefits through the post completion measures noted before. For the remaining monitoring, the operator has strong capacity to manage the project and to carry out key functions related to safeguards requirements. In addition, measures that will be implemented as part of the action plan to address the leachate problem are not expected to have any impact on safeguards and would be monitored through the regular monitoring reports. The monitoring system has proved to be suitable. Phase 2 monitoring requirements are summarized in the following table:

PHASE 2 MONITORING REQUIREMENTS

	Subject/ Parameter	Monitoring requirement and associated evidence	Frequency of reporting required
Environment	Periodic follow up on fire or safety issues, toxic or hazardous waste found on site	Incident Report	Annually
	Monitor water quality at the site to ensure that the run-off water complies with Moroccan standards	Environmental independent audit reports, to ensure relevant national or local environmental standards are properly followed	Annually
	Monitor groundwater quality		
	Follow up on the measures to contain leachate overflow during high precipitation events		

6. LESSONS LEARNED

45 **Stimulating demand.** The project’s concept of an “umbrella” project (PoA) to channel CDM resources through FEC was an efficient way of capturing the benefits derived from avoided GHG emissions. This required sparking interest in the beneficiary municipalities to actively enter into contracts with FEC and to arrange for the landfill operators to make the necessary investments (based on remunerating them from CDM resources). A more active presence from FEC, with Bank support, would have been necessary to maintain the municipalities interest, particularly when faced with the reduction in carbon prices. Any similar program should envisage mechanisms to address this issue at the design stage. Another related lesson is that the CDM as a stand-alone financing incentive is not sufficient, given the amount of work required for registration compared to the low financial incentive especially with recent low carbon market prices. The financing package could have been more efficient if mixed with investment funding.

46 **Performance incentives.** The contract with the operator did not envisage any incentive for achieving the targets in terms of CERs. While there was a contractual obligation between the FEC and the CPF fund; which considered both incentives and penalties, there was no similar structure in place between FEC and the concession. In particular, their contract did not consider a penalty for underperformance, against the general approach taken in other similar projects. In addition, there is no financial relation between FEC and the concession other than the ERPA. As a result, FEC has no leverage over the concession to encourage the necessary investments, not a way to mitigate the risk and obligations in case of underperformance vis-à-vis the CPF. Future contracts should envisage a system of performance incentives to induce the operator to make the required investments. This would provide leverage for achieving the ERPA’s objectives.

47 **Preparing economic and financial analyses together with the assessment of technical readiness of the subprojects.** At the design stage the appraisal memorandum should include a more

detailed evaluation of the economics and technical aspects of the projects, using estimates for costs and benefits but also providing more elements regarding the maturity of the landfills pre-identified. Such an exercise would allow flagging possible sources of risk to the operator and to the sponsoring agency, thereby providing a better visualization of the prospects for incorporating landfills to the CDM program.