



TETRA TECH
International Development



Tetra Tech International Development

MZ-03 PET Recycling Project Bottle to Bottle (B to B) in Mozambique & Angola

Mini Fiche

September 2022



Table of Contents

Table of Contents.....	2
1. Introduction.....	4
2. Main institutions and planning framework	5
3. Inventory and needs analysis	6
4. Project scope and budget	8
4.1 Project objectives	8
4.2 Proposed investments.....	9
5. Contribution of the project to Clean Oceans Initiative objectives.....	10
6. Financing and cost recovery	11
6.1 Potential for revenue generation	11
6.2 Additional sources of funding	11
7. Main aspects to be considered for the pre-feasibility study	12
8. Environmental and social aspects.....	13
9. Recommendations.....	13

Disclaimer

The authors take full responsibility for the contents of this report. The opinions expressed do not necessarily reflect the view of the European Investment Bank.

The contents of this report are the sole responsibility of the Tetra Tech COPIP Consortium and can in no way be taken to reflect the views of the European Investment Bank or the European Union.

This document is issued for the party which commissioned it and for specific purposes connected with the above-captioned project only. It should not be relied upon by any other party or used for any other purpose.

We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

This document contains confidential information and proprietary intellectual property. It should not be shown to other parties without consent from us and from the party which commissioned it.










Client Name : European Investment Bank (EIB)

Project Name : Clean Oceans Project Identification and Preparation Programme for Sub Saharan Africa

Contract Number :

Partners


TETRA TECH
International Development


Review	01	02
Date	01.09.22	20.09.22
Detail	Draft fiche for submission to EIB	Fiche v2 revised from EIB comments of 15.09.22
Prepared By	Isa Telles  Klaus Buchholz 	Klaus Buchholz 
Checked By	Jonathan Barnes  Klaus Buchholz 	Jonathan Barnes  Klaus Buchholz 
Approved By	Charles Reeve 	Charles Reeve 

September 2022

Tetra Tech International Development Europe Ltd (BV)

92C Jan Luijkenstraat, 1071 CT Amsterdam, The Netherlands

T (+44) (0) 1189 566 066 F (+44) (0) 1189 576 066 w

Registered at the Netherlands Chamber of Commerce Business Register under no : 68702132Vat

Number: NL 85755546B01

Egis Water

889, rue de la Vieille Poste 34965 Montpellier France

T (+44) (0) 1189 566 066 F (+44) (0) 1189 576 066 www.egis-group.com

Registered Office : 889, rue de la Vieille Poste - CS 89017 - 34965 Montpellier Cedex 2, France

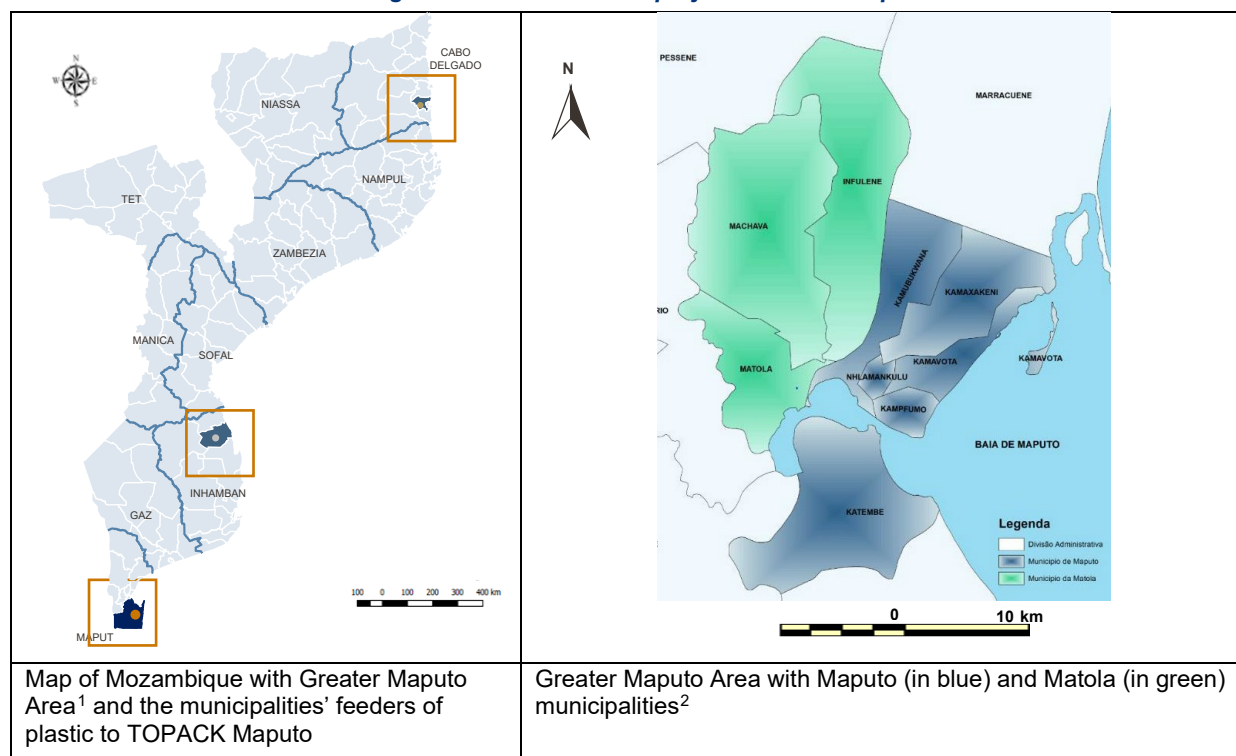
Registered in France No : 493 378 038 00266 (RCS Montpellier)

1. Introduction

Project summary information

Name of the project	PET Recycling Project (Bottle to Bottle)
Location	Mozambique & Angola
Promoter	Main promoter: TOPACK
Sectors covered	Solid waste management, circular economy.
Main components	Introduction/improvement of waste collection and segregation Promoting the waste market by acquisition of selected waste Support and promotion of recycling and production of new PET products. Reduction of virgin PET pellets Rehabilitation and improvement of the waste management
Estimated budget	€ 21.68 million (for PET recycling in Mozambique and Angola)
Population summary	Mozambique: 3 158 465 inhabitants (INE, 2017) in the Greater Maputo area (Maputo, Matola, Marracuene and Boane districts) from which almost 90% are in Maputo and Matola, the most urbanised areas of the country. Angola: 8.3 million inhabitants of Luanda (is 30% of total country's population)
Contact People	enquiries@copip.eu

Figure 1: Location of the project in Mozambique



¹ Austral Consultores map
² Map., 2005

2. Main institutions and planning framework

Main institutions involved	<p>TOPACK, a company recycling plastic for 20 years in Mozambique is the project promoter.</p> <p>In Mozambique TOPACK will be working with the following organisations: The Ministry of Land and Environment through the National Directorate of Environment (DINAB) through the Waste Management Department is responsible for the policies, regulation and monitoring the implementation of waste management in the country (domestic, industrial, hazardous and other), promoting initiatives for good management of effluents and solid waste.</p> <p>The Ministry of Industry and Commerce promotes control of the production and marketing of plastic.</p> <p>The FNDS³: under the supervision of the Minister for Land and Rural Development is promoting urban waste infrastructures in contributing to the operationalization of the strategic objectives of governance in the economic, social and environmental perspective.</p> <p>The municipalities are responsible for the operability of the waste management system in the urban area of its jurisdiction according to their waste management plan (PGIRSU⁴:) approved by the DINAB. For the Greater Maputo Area the Sanitation Sector of each of the Municipalities deals with the operational aspects of waste collection. Since 1997, the responsibility for management of water and sanitary systems has been legally transferred to the municipalities.</p> <p>Several Associations, NGOs, Private Sector, Cooperation partners, Communities, Civil Societies and Academies are active in the area of plastic litter, rivers and ocean and thus are potential PET suppliers to TOPACK.</p> <p>In Angola TOPACK will be working with the following organisations:</p> <ul style="list-style-type: none"> • ANR – National Agency for Waste Management. • Provincial Directorate for Environment, Waste Management and Communal Services. • Municipal Directorate for Environment and Waste Management.
Planning framework: strategies and policies	<p>Mozambique has developed a twelve-year Integrated Solid Urban Waste Management Strategy for 2013 – 2025 (MICOA), approved and published in 2012. Based on this strategy several developments took place under the decentralized policies of the country and giving responsibility to the municipalities for the preparation and implementation of their solid waste management plans.</p> <p>The Ministry of Sea, Inland Waters and Fisheries (MIMMAIP) promoted a crucial study of the plastic waste in the country in identifying the biggest problems and pointing to rapid impact actions, including recycling programmes in order to draw up a plan to combat marine litter.</p> <p>The project described in this sheet aims to be aligned with these strategies and the main related legal framework that includes the following texts⁵:</p> <ul style="list-style-type: none"> • Environment Law no. 20/97 of 1 October having an Integrated Management Strategy for Urban Solid Waste (2013-2015); • Decree 94/2014 of 31st of December – Regulations concerning urban solid waste management; • Decree 83/2014 of 31st of December - Regulations concerning hazardous waste management;

³ FNDS, National Fund for Sustainable Development

⁴ PGIRSU, Integrated Management Plan of Urban Solid Waste

⁵ Source : <https://www.mta.gov.mz/ambiente/gestao-de-residuos-solidos/>

	<ul style="list-style-type: none"> Decree 79/2017 of 29th of December –Regulations Concerning Extended Producer and Importer Responsibility of Packaging; By-laws of each Municipality. <p>For Angola the following polices are valid:</p> <p>Presidential Decree 181/2014 of 28th July (establish the National Agency for Waste Management with the mandate of dealing with all waste related issues countrywide).</p> <p>Presidential Decree 190/2012 of 24th August (Regulation on Waste Management).</p> <p>Law 5/1998 of 19th, June (Environment Basis Law).</p> <p>Presidential Decree 51/2004 of 23rd July (on Environment Impact Assessment).</p> <p>Presidential Decree 59/2007 of 13th July (on Environmental Licencing).</p> <p>Executive Decree 14/2015 of 29th January (on Registration of private companies for waste collection and sewage treatment).</p> <p>Executive Decree 234/2013 (Determine the Guidance for development of Provincial Master Plans for Waste Management).</p> <p>Presidential Decree 194/2011 of 7th July (Regulation on responsibility for environmental damages – “polluter payer principle”).</p> <p>Presidential Decree 160/2014 of 18th June (Regulation on Management of wastes from Hospitals and Health Services).</p>
Capabilities	<p>For Mozambique and Angola:</p> <p>Institutional, technical and financial capacities for waste management are very limited in the country. Neither the central government nor the municipalities have the necessary means, namely human resources with the enough capacity to manage the waste. The institutional framework is complex, and mandates besides not being always clear have overlapping areas difficult to coordinate and several uncovered areas. The numerous waste programmes and projects planned and in implementation in the country do not have an overralling coordination unit.</p> <p>In this situation, a private company such as TOPACK could provide nationwide coordinated collection activities (at least for PET bottles).</p>

3. Inventory and needs analysis

Solid waste management	<p>Mozambique:</p> <p>In the Greater Maputo area, a person produces an average of 0.90 kg of waste per day and the total waste production is estimated at 2 294 tonnes/day. The collection and transport rate is 49% (census INE, 2017) and there is no waste separation. Maputo is improving on it's waste management planning as a result of its scale and support in implementing its PGIRSU⁶. Matola is still in the process of finalizing and approving its PGIRSU⁷. The Municipality of Maputo City, is the only one that has its approved waste management regulation (on the cleaning</p>
-------------------------------	--

⁶ The WB has been the main support agency to Maputo Municipality in the area of urban waste management. Currently through PTUM Programme.

⁷ The Spanish Cooperation is supporting the Municipality of Matola to prepare its PGIRSU, planned to be submitted by June 2022

	<p>components of the Municipality of Maputo), published in the BR⁸ and which adopted the principle of mandatory waste separation.</p> <p>Collection activities are carried out by municipalities and by private companies. The municipalities have contracts with private entities for the collection and disposal of the solid waste. In Matola the existing containers are not sufficient for the quantity of waste. Several neighborhoods are without proper waste facilities access, the waste is not collected and the population burns and buries waste in their plots and public grounds.</p> <p>Maputo has only one dumpsite, Hulene, located in the middle of Maputo city and is planned to be deactivated as the control and recovery are poorly managed and it creates a severe public health threat for the city. Treatment is absent and the only sorting is done by waste pickers for selling the waste to associations, recycling companies or suppliers of waste to the South African industry. Two new areas for future sanitary landfills (Matlemele and Katembe) are already identified and Mavoco the only hazardous landfill of the country is active for hazardous waste management⁹.</p> <p>All the plastic consumed in the country is imported as there is no production of plastic in Mozambique¹⁰. The plastic waste generate per capita is 6.1 kg/year from which 10% leaks into the marine environment and only 1% of it is recycled. Around 99% of the plastic waste is mismanaged and 32% of plastic collected is improperly disposed either in dumpsites or in unsanitary landfills. The most critical polymers are PET (bottles and food wraps) and LDPE (bags, container leads).</p> <p>Additionally, about 1 700 tonnes of plastic waste are deposited annually in Mozambican waters¹¹ transported by the water storm systems and the rivers, and dumped near the coastline (in only 7 mains points of the country). The country is located in the end line of 9 international river basins spread along its 2,600 km of coastline. The Greater Maputo main plastic pollution discharging points are through the six rivers flows¹² that enter the bay of Maputo to the Indian Ocean. These are considered the highest plastic pollutions points in the country. The weakness of municipal waste management in the country and the lack of identified areas for the different type os waste, conduct to the development of some undesirable alternative practices and to the proliferation and accumulation of waste with all health and environmental impacts.</p> <p>Angola:</p> <p>In the city of Luanda, 75 % of the population lives in informal settlements known as musseques, under extremely unhealthy conditions with little or no services and few income opportunities. The solid waste problem is a permanent crisis as the accumulations of uncollected waste become breeding grounds for diseases.</p> <p>The capital Luanda alone produces 6 000 tons of solid waste every day, which the city has struggled to manage. Meanwhile, storm runoffs and sewer overflows, mean that a lot of waste ends up in the ocean. At the same time, waste from the oil and gas sector and other industrial activities may pose a serious environmental concern.</p> <p>Five large waste collector companies transport daily 70% of collected waste to landfill. Mulenvos Landfill is the largest landfill in Angola. It is located in the Municipality of Viana 12 km in the west part of Luanda and has been in operation</p>
--	---

⁸ Bulletin of the Republic in 2008

⁹ Decree No. 45/2004 (all hazardous waste generated in Mocambique must be treated in the industrial landfill of Mavoco). EnviroServ holds environmental permits ; Decree No. 18/2016 (Hazardous waste disposal) and 09/2017 (management of hazardous industrial waste at the Mavoco industrial landfill in Bebeluane-Maputo).

¹⁰ IUCN, 2020 NATIONAL GUIDANCE FOR PLASTIC POLLUTION HOTSPOTTING AND SHAPING ACTION

¹¹ Minister of the of Sea, Inland Waters and Fisheries (MIMMAIP), 2020 refering NATIONAL GUIDANCE FOR PLASTIC POLLUTION HOTSPOTTING AND SHAPING ACTION

¹² Incomáti, Infulene, Matola, Umbeluzi, Tembe and Maputo rivers

	since December 2007. Thousands of children are either living on the landfill property, or rely on it as a source of income. The informal sector (waste pickers) is responsible for much of the waste management activities and waste recycling in the city, but without any job security and with little recognition.
--	---

4. Project scope and budget

4.1 Project objectives

The PET Recycling Project in **Mozambique** sets the following objectives for the municipalities belonging to the Greater Maputo Area:

- Increase the rate of plastic waste collection, sorting and recycling;
- Promote the collection of PET plastic for recycling purposes;
- Increase the rate of PET plastic collection, by promoting its collection, sorting and press for further transport to the PET recycling unit in Maputo;
- Implement recycling process converting PET bottles already used into PET raw material (rPET) and into preforms with food certification for the final user;
- Creating an initial capacity of recycling 16 tonnes of PET/ day in 2023 (1 shift) to 25 tonnes/day in 2025
- Increase the coordination among all the actors in the area of plastic waste management, namely plastic recycling, and interaction among the existing and planned programs.

To create a solution suited to the specific objective of linking the environmental goals of plastic waste management and clean ocean initiatives to the social development goals of waste add value for income raising the intervention of the project was planned to cover three main related areas:

- Contributing for the improvement of waste collection directly linked to PET sorting and recycling to feed the new planned PET recycling line, through interventions in the municipalities;
- Promoting the involvement of the private sector in the process of collection and sorting solid waste, paying particular attention to plastic waste, adding value for income raising;
- Constructing a PET recycling unit in the country through a private company already with 20 years of experience in recycling plastic in the country, as a contribution to the circular economy.

As the company **TOPACK** has already built a PET bottle recycling factory in **Luanda/Angola**, the focus will be on an improved collection system in order to ensure the sufficient feedstock. About 60 new technology collection centers are planned to be built with costs of each about 48 000 EUR.

4.2 Proposed investments

TOPACK proposes to acquire the following equipment for installing the infrastructure for the new recycling PET line in the existing factory in Maputo.

Table 1: Summary of Investments for the PET recycling line in Maputo/Mozambique

Type of investment				
Washing line				
Bottle and flake sorting system				
Extrusion line				
Water Treatment Station (WTS)				
Civil works				
Trucks, Forklifts, other				
Creation of a PET sorting station				
Equipment for pressing and compacting plastic				
Warehouse				
Sum Mozambique				
Euro 11 310 145				

This budget is realistic as is based in TOPACK experience in the market and in the business plan of the company for future investment plans.

Table 2 : Investments for the improvement of Plastic sorting, i.e. PET collection in Luanda/Angola

Type of investment				
Awareness building campaign				
Collecting and transport equipment for private sub-contractors				
5 tonne electric trucks				
Electric Tricycles				
Plastic collecting centres				
Sorting centres				
Simple equipment for pressing and compacting plastic				
Equip the centres with PV roof to operate the electric vehicles and the machinery				
TOTAL Angola – Euro 10 370 000				
Sum Mozambique & Angola – Euro 21 680 145				

The entire project would therefore cost **EUR 21 680 145**. Savings could be made through good planning of the different capacities needed for pre-collection, collection and transport of waste or by introduction of phases by priority.

5. Contribution of the project to Clean Oceans Initiative objectives

Solid waste component	Increase selected plastic collection. Reduction of waste leaching into the numerous streams, which leads to the Maputo Bay and to the Ocean. Introduction, promotion and support of the circular economy. Creation of skilled jobs in waste recovery.
------------------------------	--

6. Financing and cost recovery

6.1 Potential for revenue generation

- Topack, a private company doing business in Angola, has proposed a project comprised of investments which will improve the PET collection system in Luanda Angola through private subcontractors and investments which will facilitate Topack's PET recycling line in Maputo Mozambique. The project is expected to strengthen the capacities of waste collection and separation services provided by private subcontractors. It is expected that it will create initial capacity for recycling of 2 tons per hour or 16 tonnes of PET/ day in 2023 (1 shift) increasing to 25 tonnes/day in 2025. The PET will be used for the manufacture and sale of specialized packaging products including pallets for customers in the beverage sector for clients like Coca Cola and Heineken, yielding approximate revenues of 10 mio. and 15.6 mio. Euro respectively per year, to be verified.
- Break even revenues for PET recycling covering investment and O&M costs will need to be confirmed in the context of the potential scale of domestic and export markets for PET product sales to determine realistic revenues which can be achieved and to make a preliminary assessment of the extent to which these are likely to cover the investment and operating costs of the private operator Topack.
- The extent to which the municipalities will be involved needs to be further confirmed. So, whilst the PET Recycling Project in Mozambique sets several objectives for the municipalities concerning collection, sorting and recycling which could be helpful for the Topack project it is not clear to what extent achievement of these objectives will be complementary to the Topack project nor how they will be implemented and financed by the municipalities. At the present time it is reported that municipalities do not collect, separate and transfer feedstock for Topack. Instead Topack obtains its plastic feedstock from private collectors which include waste pickers, private companies and NGO's and pays them accordingly. The financial viability of this approach may be improved if municipalities did become more involved in the context of reinforcing the process, by facilitating improved collections, recovery and separation measures and improved cost recovery concerning these initial aspects of the value chain. Cost recovery of these initial steps in the process may be improved in three main ways:
 - i) Imposition of nominal levies on cans and bottles combined with a closer coordination with Topack for the purposes of exploiting synergies and potential economies of scale
 - ii) Increased tariffs on households (in accordance with affordability & willingness to pay)
 - iii) Introducing full cost recovery tariffs for commercial and institutional entities

The feasibility of introducing these approaches will be investigated in the PFS should this progress.

- Topacks proposed investments are in the realm of the private sector and are clearly defined in Table 1 of this fiche. These do not include any additional costs arising from interventions aimed at meeting objectives defined for the municipalities in the PET Recycling Project in Mozambique. It is possible therefore that all of the relevant O&M and loan repayment costs circumscribed by Topacks proposed investment schedule in Table 1. will be covered by revenues from the sale of manufactured PET products on the domestic and international markets. A preliminary assessment of profitability will therefore be made in the PFS. If it appears that the project will be financially viable the investment may qualify for a corporate loan from a private commercial bank.

6.2 Additional sources of funding

Alternatively, a loan from the EIB could be extended to Topack based on more competitive lending terms versus a private bank. This could serve to further encourage the investment by virtue of having potentially positive impacts on public policy objectives, such as improved support for circular economy initiatives or mitigating environmental and social externalities which would otherwise be ignored or not be fully internalized. If it is found that revenues do not fully cover Topacks investment, O&M and loan costs, the EIB may wish to request the EU to consider providing an investment grant or in extremis a grant to cover O&M costs, the latter albeit on a fixed term basis and subject to strict conditionalities. These latter could be designed, for example, around a commitment by Topack to introduce alternative revenue initiatives or cost reduction measures or other unspecified requirements possibly related to

improved level of service targets or obligations in relation for example to improved collection, separation and transportation activities.

In the case where grants or subsidies are envisaged there will be a need to justify these by identifying additional economic benefits potentially arising from pricing adjustments reflecting social rather than private costs and/or from additional net economic benefits resulting from project related environmental and social impacts. Similarly, and if feasible the Government of Mozambique may wish to consider providing subsidies if the project proves not to be financially viable, but which nevertheless is expected to capture desirable economic benefits if allowed to proceed.

Clarification will be needed from the EIB about which agency would provide the necessary loan guarantee for Topack. It is possible that the National Treasury of Mozambique could do so. Alternatively, the EIB may seek guarantees in the form of collateral on land or equipment owned by Topack as an alternative and in the spirit of best practice private sector lending. Some initial implications for financing and co-financing modalities will be explored with the EIB as the PFS progresses, assuming it does so. These would be firmed up in the feasibility study assuming this occurs via a creditworthiness analysis conducted by the EIB with support from COPIP.

7. Main aspects to be considered for the pre-feasibility study

The summary below indicates the main points of the methodology to be followed in the pre-feasibility study to determine the economic value of the project and justify its financing, where a positive financial rate of return is not possible and subsidies are required. Other technical aspects are also included below.

Technical :

- Verification of waste generation and required facility capacities for plastic selection.
- Waste characterisation and development of a market study for the different waste streams;
- Opportunities to introduce separate collection to improve the performance of recovery activities;
- Marketing of recovered plastic materials and quality criteria;
- Current operation of collection and transport of waste and verification of improvement needs;
- Identifying the real cost of PET collection and recycling.

Financial :

- Assess the financial viability of Topacks investment proposals;
- Assess the financial viability of municipalities proposed investments in line with the PET Recycling Project for Mozambique assuming these can be defined;
- Assess any potential financing gap arising from Topacks investment proposals in the context of project costs and sales revenues;
- Assess any potential financing gap arising from the municipality's investments in line with the PET Recycling Project assuming these can be defined and in the context of affordable tariffs and other financial instruments;
- Identify any other potential economic, environmental and social benefits that could be used to justify closing funding gaps arising;
- Carry out a financial analysis of project costs and revenue streams (discounted costs and revenue streams over 20 years);
- Conduct a cost-benefit analysis of potential economic, environmental and social impacts (quantifying these impacts where possible);
- Estimate financial and economic rates of return as appropriate. If the financial rate of return is negative, determine if an economic rate of return is positive when quantified economic, environmental and social benefits are included;
- Identify potential financing arrangements for the COPIP project (grant/loan/loan conditions) to bridge the funding gap.

Institutional :

- Identify technical assistance needs to determine beneficial institutional delegations and responsibilities (O&M, financial management, managerial capacity, monitoring).

8. Environmental and social aspects

Main environmental aspects	<p>Situation of the landfills in Matelele (Mozambique) and Mulevenos (Angola).</p> <ul style="list-style-type: none"> Investment in tricycles equipped with solar panels, indispensable for collection in less accessible areas, would be to equip the actual plastic waste pickers. Electrification of (pre-) collection vehicles together with solar energy could be considered as a method to reduce gasoline cost; Create capacity for sorting and recovery centres covering initial investment costs. <p>Environmental damage and leaching of waste accumulated in the numerous illegal dumps, the rehabilitation of which is not included in the project.</p> <p>Environmental constraints on site selection for sorting, pre-treatment, recycling and composting plants.</p>
Topics to be covered in the ESIA	<p>The standard ESIA aspects would be covered in the pre-feasibility specification. The main topics to be included in the ESIA are :</p> <ul style="list-style-type: none"> Environmental impact of the non-remediation of illegal dumping; Impact on air, water and soil of the new PET factory in Maputo; Carbon footprint of the project.

9. Recommendations

Based on the findings of the PET Recycling fiche, the fiche has been ranked and is summarised below.

Ranking measure	COPIP ranking
EUD Priority	1
EIB Priority	1
Promoter Priority	3
Impact	2
Likelihood to proceed	1
Sub Total	8 out of 15

Note: priority ranking scale 1 = low ranking 2 = medium ranking 3 = high ranking

With the total score of 8 it is recommended this COPIP project does not progress to Pre-Feasibility Stage within the current COPIP programme as the scoring range for a Pre-Feasibility Study approval is generally between 13 to 15.