



GEF-6 REQUEST FOR PROJECT ENDORSEMENT/APPROVAL

PROJECT TYPE: Full-sized Project

TYPE OF TRUST FUND: GEF Trust Fund

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PART I: PROJECT INFORMATION

Project Title: Promotion of Waste-to-Energy (WTE) options for sustainable urban management in the Democratic Republic of the Congo			
Country(ies):	Democratic Republic of the Congo	GEF Project ID: ¹	9683
GEF Agency(ies):	UNIDO	GEF Agency Project ID:	150127
Other Executing Partner(s):	1.Ministry of Industry 2.Industrial Promotion Fund 3.Ministry of Energy and Water Resources 4.Ministry of Environment and Sustainable Development 5.Provincial Government of Kinshasa	Submission Date:	
GEF Focal Area (s):	Climate Change	Project Duration (Months)	48
Integrated Approach Pilot	IAP-Cities <input type="checkbox"/> IAP-Commodities <input type="checkbox"/> IAP-Food Security <input type="checkbox"/>	Corporate Program: SGP <input type="checkbox"/>	
Name of Parent Program	[if applicable]	Agency Fee (\$)	376,161

A. FOCAL AREA STRATEGY FRAMEWORK AND OTHER PROGRAM STRATEGIES²

Focal Area Objectives/Programs	Focal Area Outcomes	Trust Fund	(in \$)	
			GEF Project Financing	Co-financing
CCM-1 Program 1	Promote Innovation, Technology Transfer and Supportive Policies and Strategies	GEFTF	3,959,589	20,174,000
Total project costs			3,959,589	20,174,000

B. PROJECT DESCRIPTION SUMMARY

Project Objective: To promote waste to energy technologies for sustainable waste management in the Democratic Republic of the Congo						
Project Component s/ Programs	Finan -cing Type ³	Project Outcomes	Project Outputs	Trust Fund	(in \$)	
					GEF Project Financing	Confirmed Co-financing
1. Policy and regulation development	TA	1.1 Strengthened policy and regulatory environment	1.1.1 Municipal solid waste (MSW) assessment report 1.1.2 Policies to enhance MSW and energy utilization drafted for the consideration and approval of the Government of DRC	GEFTF	125,000	45,000
2. Establishment of a sustainable waste collection and sorting system in Kinshasa	TA	2.1 Development of an efficient waste collection infrastructure and building a supply chain for sorted wastes to become useful resources for energy production	2.1.1 Market review updated and roadmap developed 2.1.2 Improved design for a waste collection and sorting infrastructure deployed in Kinshasa 2.1.4 Local businesses capacitated in establishing collection and sorting	GEFTF	152,500	16,208,800

¹ Project ID number remains the same as the assigned PIF number.

² When completing Table A, refer to the excerpts on **Error! Main Document Only..**

³ Financing type can be either investment or technical assistance.

Project Objective: To promote waste to energy technologies for sustainable waste management in the Democratic Republic of the Congo						
Project Component s/ Programs	Finan -cing Type ³	Project Outcomes	Project Outputs	Trust Fund	(in \$) GEF Project Financing Confirmed Co-financing	
			infrastructure as a paid service			
	Inv		2.1.3 Pilot material recovery facility (MRF) processing 250,000 t of wastes - investment initiated at selected waste transfer stations for waste collection and waste sorting	GEFTF	837,500	950,000
3. Demonstration of municipal waste to energy technologies	TA	3.1 Pilot Waste-to-energy (WTE) technologies in industries implemented	3.1.1 Feasibilities and business models developed for local industries to utilize municipal waste and waste from industries as energy sources 3.1.2 Pilot investment 1: 1.35 MWel biomethanisation WTE plant co-fermenting municipal and industrial wastes in industry 3.1.3 Pilot investment 2: utilization of 40,000 t of refuse derived fuels (RDF) processed at industrial facilities 3.1.4 Pilot investment 3: utilization 2,300 t of market wastes for production of bio-briquettes	GEFTF	162,870	29,700
	Inv			GEFTF	1,352,500	1,100,000
4. Replication and scale up	TA	4.1 Potential for replication assessed	4.1.1 Waste collection/sorting, WTE potential and business opportunities for replication projects assessed	GEFTF	75,800	115,000
	Inv			GEFTF	710,000	1,385,000
	TA	4.2 Capacity of key players in municipal administration, target businesses/industries enhanced	4.2.1 Training and capacity programs on waste collection, sorting and utilization of residues organized 4.2.2 Sharing of the best practices from other countries on MSW management, energy recovery and recycling	GEFTF	274,868	76,500
5. Monitoring & Evaluation	TA	5.1 Continuous monitoring and evaluation (M&E) of the implementation of the GEF/UNIDO Project conducted in accordance with established GEF and	5.1.1 Terminal evaluation conducted	GEFTF	80,000	98,000
			5.2.1 Project's progress monitored, documented and recommended actions formulated			

Project Objective: To promote waste to energy technologies for sustainable waste management in the Democratic Republic of the Congo						
Project Component s/ Programs	Finan- -cing Type ³	Project Outcomes	Project Outputs	Trust Fund	(in \$)	
		UNIDO procedures and guidelines			GEF Project Financing	Confirmed Co-financing
Subtotal					3,771,038	20,008,000
Project Management Cost (PMC) ⁴				GEFTF	188,551	166,000
Total project costs					3,959,589	20,174,000

C. CONFIRMED SOURCES OF CO-FINANCING FOR THE PROJECT BY NAME AND BY TYPE

Please include evidence for co-financing for the project with this form.

Sources of Co-financing	Name of Co-financier	Type of Cofinancing	Amount (\$)
Private Sector	Eagle Waste Solutions SARL	In-kind	20,000,000
GEF Agency	UNIDO	Grants	84,000
GEF Agency	UNIDO	In-kind	90,000
Total Co-financing			20,174,000

D. TRUST FUND RESOURCES REQUESTED BY AGENCY(IES), COUNTRY(IES) AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country Name/Global	Focal Area	Programming of Funds	(in \$)		
					GEF Project Financing (a)	Agency Fee ^{a)} (b) ²	Total (c)=a+b
UNIDO	GEF TF	Democratic Republic of Congo	Climate Change	(select as applicable)	3,959,589	376,161	4,335,750
Total Grant Resources					3,959,589	376,161	4,335,750

a) Refer to the Fee Policy for GEF Partner Agencies

⁴ For GEF Project Financing up to \$2 million, PMC could be up to 10% of the subtotal; above \$2 million, PMC could be up to 5% of the subtotal. PMC should be charged proportionately to focal areas based on focal area project financing amount in Table D below.

E. PROJECT'S TARGET CONTRIBUTIONS TO GEF 6 CORE INDICATORS

Update the relevant sub-indicator values for this project using the methodologies indicated in the Core Indicator Worksheet (as used in GEF 7 Endorsement template – Annex E) and aggregating them in the table below. Progress in programming against these targets is updated at mid-term evaluation and at terminal evaluation. Achieved targets will be aggregated and reported any time during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCC.

Project Core Indicators		Expected at CEO Endorsement
1	Terrestrial protected areas created or under improved management for conservation and sustainable use (Hectares)	
2	Marine protected areas created or under improved management for conservation and sustainable use (Hectares)	
3	Area of land restored (Hectares)	
4	Area of landscapes under improved practices (excluding protected areas) (Hectares)	
5	Area of marine habitat under improved practices (excluding protected areas) (Hectares)	
	Total area under improved management (Hectares)	
6	Greenhouse Gas Emissions Mitigated (metric tons of CO ₂ e)	1,495,924 t CO ₂ eq direct emission reductions achieved by EOP and indirect 1,340,139 t CO ₂ eq after 20 years Total 2,893,572 t CO₂eq
7	Number of shared water ecosystems (fresh or marine) under new or improved cooperative management	
8	Globally over-exploited marine fisheries moved to more sustainable levels (metric tons)	
9	Reduction , disposal/destruction, phase out, elimination and avoidance of chemicals of global concern and their waste in the environment and in processes, materials and products (metric tons of toxic chemicals reduced)	
10	Reduction, avoidance of emissions of POPs to air from point and non-point sources (grams of toxic equivalent gTEQ)	
11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment	approximately 900,000 inhabitants, thereof 50% women

Provide additional explanation on targets, other methodologies used, and other focal area specifics (i.e., Aichi targets in BD) including justification where core indicator targets are not provided.

F. PROJECT TAXONOMY

Please update the table below for the taxonomic information provided at PIF stage. Use the GEF Taxonomy Worksheet provided in Annex F to find the most relevant keywords/topics/themes that best describe the project.

The taxonomic information required for this project is provided in Annex F.

Level 1	Level 2	Level 3	Level 4
Influencing Models	(multiple selection)	(multiple selection)	(multiple selection)
Stakeholders	(multiple selection)	(multiple selection)	(multiple selection)
Capacity, Knowledge and Research	(multiple selection)	(multiple selection)	(multiple selection)
Gender Equality	(multiple selection)	(multiple selection)	(multiple selection)
Focal Area/Theme	(multiple selection)	(multiple selection)	(multiple selection)
Rio Markers	(multiple selection)		

PART II: PROJECT JUSTIFICATION

A. DESCRIBE ANY CHANGES IN ALIGNMENT WITH THE PROJECT DESIGN WITH THE ORIGINAL PIF⁵

This section provides additional information and details on the project design, complementing the PIF.

The two main changes lie in

- a) the presidential elections and the subsequent still on-going government-level restructuring. As result, the discussions with the interim government during the PPG phase could be done on technical level only. While the subsequent orientation of the project has been discussed and endorsed during the various meetings and the validation workshop, the request for co-financing letters from the national and provincial government level are still pending, with the valid argument that the final binding commitments have to be executed once the final government will be inaugurated and the high-level government positions are nominated. The recipient government partners, such as the Ministry of Industry and the Industrial Promotion Fund, confirmed their support and commitment in the course of the implementation of the project, as per attached letters. The scope of financial commitment will be discussed during the next budgetary negotiation and is envisaged to be defined during the inception phase of the project. The therefore necessary re-orientation of the project, as outlined below, makes it necessary that the waste-to energy demonstration projects will have to be selected through a call by a national entity.
- b) the identification of six key barriers (described below) to the implementation of actions for sustainable waste management and climate change mitigation at national and local level and

Consequently, the project outputs were reformulated to take the identified issues into consideration.

A sustainable urban management approach must take sound waste management practices into consideration. Managing responsibilities in the field of urban infrastructure, including waste management and energy production & distribution requires, however:

- i) the active participation of all relevant stakeholders, including local, national, civil society and the private sector;
- ii) the promotion of sound waste management by encouraging innovative technologies and methodologies to reduce GHG emissions and waste production (including municipal solid waste) at source; and
- iii) the empowering of strategic initiatives at national, provincial and local level focused on a circular economy approach with waste-to-energy valorization.

However, the adoption of these strategies in the Democratic Republic of Congo (DRC) is hampered by numerous barriers which have been highlighted partly in the PIF already and were better captured during the participative consultations which took place as part of the PPG phase. These barriers are:

- **Barrier 1:** Inadequate planning on future waste generation trends and capacity requirements, inadequate technical skills and experience for promoting an integrated sustainable urban planning approach to enhance environmental benefits through a sound waste management system and efficient reduction of GHG emissions.
- **Barrier 2:** Insufficient or inappropriate legal, institutional and strategic frameworks to phase out unsound waste management practices and reduce GHG emissions.
- **Barrier 3:** Unavailability of appropriate tools, technologies, methods, databases and technical units for sustainable waste management.
- **Barrier 4:** Poor local and national abilities to implement innovative strategies for waste valorization, due to a lack of clear responsibilities of government agencies and financial resources to organize a sound waste collection, sorting, and utilization management scheme.
- **Barrier 5:** Lack of national strategies to enhance the utilization of wastes for energy purposes, to supply larger cities as well as small and isolated rural communities at lower costs.

⁵ For questions A.1 –A.7 in Part II, if there are no changes since PIF , no need to respond, please enter “NA” after the respective question.

- **Barrier 6:** Lack of financial, management, and technical capacities and know-how to develop successful business models that integrate waste as a source of energy production in energy planning in industries and other local businesses.

As a conclusion and result of the stakeholder consultations under the PPG, it is therefore required to rephrase the project focus and specific activities foreseen in comparison to the PIF, as follows:

- **Project to increase the waste collection capacity in selected areas of Kinshasa by introducing waste sorting facilities.** The initial plan in the PIF was to strengthen and expand the waste collection services of the City of Kinshasa as biggest and major city in DRC by expanding the waste collection services to all 24 communes of the city and thus providing waste collection stations to collect, process and transport the waste generated to the landfill site at Mpasa, being the only controlled landfill in the country. The assumption in the PIF was that the waste collection system being installed with the support of previous donor projects in 9 selected communes would be in place and sufficiently operated in the way that majority of wastes of these communes finally end up at the operational landfill. However, as the PPG phase has revealed, the existing waste collection system in the mentioned parts of the city are in fact far from being fully deployed, with waste collection services organized by the municipal operator having deteriorated and the amounts sent to the landfill been reduced over the past 2 years. The inabilities of municipalities in DRC in general to improve their waste management performance, poor financing of solid waste management (SWM) by government and unclear service pricing principles have led to weak control of service quality.

Therefore, in line with the findings of the PPG, the Project shall reinforce and address the waste collection practices in 17 out of the 24 communes (9 initial communes defined in the PIF - Gombe, Barumbu, Kinshasa, Lingwala, Kintambo, Bandalungwa, Kalamu, Ngiri-Ngiri and Kasavubu - plus 8 communes covered by the parallel World Bank/AFD Project – Kimbanseke, Matete, Ndjili, Kisenso, Mont-Ngafula, Lemba, Limete and Masina, see description in component 2) and focus on the qualitative aspects of waste collection by introducing waste sorting facilities that will allow to separate municipal wastes at specific locations and thus valorize and build corresponding value chains for different waste streams (e.g. biodegradable, plastic, wood or paper wastes) – inter alia allowing collected wastes to be sent to specific (industrial) facilities for co-processing and energy generation.

- **Add a focus on strengthening private sector players in the area of MSW and waste-to-energy applications.** PPG activities confirmed that the major challenge for the municipal solid waste management (MSWM) is the inappropriate and insufficient collection capacity in Kinshasa. The city is though not able to meet the pressing needs of growing demand for waste collection and disposal services; it lacks capacity to enforce the waste management regulations and there is also lack of cooperation among public institutions and between public and private sectors.

The Project design is therefore changed compared to the initial PIF; the Project proposes to include a focus on private-sector players engaging in waste management activities and increase their capacity to collect, sort and valorize the use of wastes, specifically by promoting waste-to-energy applications but also recycling and upcycling practices. By doing so, business cases for private sector participation in the sector will be created. The sorting of wastes will allow to increase the opportunities for those businesses that are already engaged in the city and partly acting as licensed partners of the public waste management authority (RASKIN⁶) – but are partly of small size or generally acting on low capacity; it will also allow new businesses to evolve around specific waste streams – e.g. composting, briquetting and energy production from biodegradable wastes, or businesses engaging in the collection, recycling/upcycling of plastic, paper and wood wastes, and selling parts of unusable material as residue-derived fuels (RDF) for energy use into local industries.

Strengthening the private sector is expected to increase the business activities and innovation in the field of municipal waste management – together with a financial incentive mechanism to be developed (see below) – by complementing the activities of the public authorities and at the same time reducing the pressure on the only landfill in town, since the finally disposed waste amounts to be sent to the Mpasa landfill shall be minimized in the medium to long-term, which will reduce the social costs for waste management.

⁶ The Sanitation Authority for Kinshasa (La Régie d'Assainissement de Kinshasa, RASKIN), formerly known as the Sanitation and Public Works Department of Kinshasa (Régie d'Assainissement et des Travaux Publics de Kinshasa, RATPK) is the local government's technical body responsible for sanitation and waste services in Kinshasa City.

- **Waste-to-energy projects will be demonstrated, but not primarily from wastes dumped at the existing landfill of Mpasa.** In the PIF the idea was to focus on achieving the successful implementation of WTE options at the Mpasa landfill site. However, since the landfill is not fully functional and is expected to be rehabilitated under a larger urban development program with support from the World Bank, demonstrating WTE applications directly at the landfill does not make much sense. Energy from waste shall be produced closer to the source of waste and nearby the facilities requiring energy, e.g. industries requiring power and thermal energy for their processes, or otherwise fed into the grid in the form of electricity or being available to replace traditional fuel sources at household level (e.g. briquettes made from bio-wastes replacing charcoal).

The following demonstration projects are foreseen to be implemented under

○ **Component 2**

Business case		Waste sorting
Investment	Installation of material recovery facility (MRF) to sort and process waste at one of the waste transfer stations, including facilities to shredder, a trommel screen, air classifier, frond loader and other manipulation equipment	
Max. capacity	<ul style="list-style-type: none"> • 250,000 t per year • 5000 hours per year of operation 	
Estimated CAPEX (excl. land costs⁷)	approx. 3.35 million US\$,	
Grant proportion (estimation)	25% 0.84 million US\$	

Table 1: Component 2 demonstration project

○ **Component 3⁸:**

The selection of three waste-to-energy business cases to be implemented in component 3 was done considering the waste composition and using the three main fractions in the MSW (biodegradable wastes 64%, plastics 14%, paper 6%) for the production of biogas, RDF and bio-briquettes. The other selection criteria for project cases were: energy production using state-of-the-art WTE within industrial applications (e.g. food, cement) or supporting the development of small-scale businesses (e.g. in the case of bio-briquettes), environmental impact (in terms of tonnes of MSW utilized and CO₂ emissions avoided), and economic profitability. A summary of the three proposed business cases is provided in the Table 2 below.

Business case	Pilot # 1. Biogas production	Pilot # 2. RDF production	Pilot # 3. Bio-briquettes production
Input:	Bio-degradable wastes from MSW collection and industrial processes (co-fermentation), such as spent grains, waste waters, etc. Input (over project duration): <ul style="list-style-type: none"> • 6,0000 t organic MSW • 30,000 t industrial wastes 	Plastic, paper and wood wastes from waste sorting facility or direct collection sources Input (over project duration): <ul style="list-style-type: none"> • 40,000 t RDF raw material 	Market, household and other biodegradable wastes (e.g. restaurants) Input (over project duration): <ul style="list-style-type: none"> • 2,300 t of bio wastes
Output energy:	<ul style="list-style-type: none"> • Biogas, production of power & heat (cogeneration) • up to 2.15 mill m³ biogas/year • up to 12,700 MWh/year 	<ul style="list-style-type: none"> • RDF fuel for combustion and process heat production • up to 40,000 t/a RDF • up to 176,000 MWh/year 	<ul style="list-style-type: none"> • bio-briquettes for cooking, heat and hot-water purposes • up to 360 t/a briquettes • up to 2,000 MWh/year
Estimated CAPEX (excl. land costs)	approx. 4.3 million US\$	approx. 1.1 mill. US\$	approx. 150,000 US\$

⁷ Assumption is that land will be provided by the Provincial Government as in-kind contribution (in case of public land)

⁸ Refer to Table 7 for more details

Business case	Pilot # 1. Biogas production	Pilot # 2. RDF production	Pilot # 3. Bio-briquettes production
Grant proportion (estimation)	25% 1 million US\$	25% 0.28 million US\$	50% 75,000 US\$
Simple payback/IRR (with/without grant)	With grant: 10 years, 14%	With grant: 1 year, 101%	With grant: 1 year, 154%
	W/O grant: 12 years, 9%	W/O grant: 2 years, 85%	W/O grant: 1 year, 72%

Table 2: Component 3 demonstration projects

- Introduction of a financial mechanism in cooperation with the Government of DRC to support waste collection, sorting and WTE applications.** In addition to directly supporting demonstration activities with grants from GEF and the Government of DRC, respective co-financing from Ministry of Industry and Industrial Promotion Fund (FPI), who has prior experience in operating a financial scheme facility, GEF money will be used to develop a financial mechanism for municipal solid waste management in DRC. Combining financial schemes (FPI to provide in total US\$ 10 million, thereof US\$ 3 million in grants and US\$ 7million in soft loans as co-financing) and a guarantee mechanism (with GEF grant of US\$ 710,000 in component 4) is proposed to support the implementation of waste-to-energy (WTE) demonstration projects in Kinshasa, helping government initiatives for the improvement of the energy situation in the country and simultaneously mitigating the severe waste management problems. GEF funding will place the Government in a better position to mobilize co-financing for the project by supporting the development of a sustainable financial support mechanism that will allow to finance demonstration activities and at the same time technical assistance, and thus provide sustainable support for replicating similar activities to other cities in DRC as well.
- New budget structure:** the required GEF contributions for the five project components have been reshifted as follows:

Component	Type	Initial budget (PIF) in US\$	Proposed new budget in US\$	Budget change
C.1: Policy and regulation development	TA	GEF: 150,000 Co-F: 120,000	GEF: 125,000 Co-F: 45,000	-17% -64%
C.2: Establishment of a sustainable waste collection and sorting system	TA	GEF: 80,000 Co-F: 200,000	GEF: 152,500 Co-F: 16,208,800	+90% +8004%
	INV	GEF: 500,000 Co-F: 5,300,000	GEF: 837,500 Co-F: 950,000	+68% -82%
C.3: Demonstration of municipal waste to energy technologies	TA	GEF: 100,000 Co-F: 200,000	GEF: 162,870 Co-F: 29,700	+63% -85%
	INV	GEF: 2,467,038 Co-F: 9,128,400	GEF: 1,352,500 Co-F: 1,100,000	-45% -88%
C.4 Replication and Scale-up	TA	GEF: 404,000 Co-F: 500,000	GEF: 350,668 Co-F: 191,500	-13% -62%
	INV	N/A	GEF: 710,000 Co-F: 8,030,000	+100% +100%
C.5 Monitoring & Evaluation	TA	GEF: 80,000 Co-F: 120,000	GEF: 80,000 Co-F: 98,000	±0% -18%
Project Management Cost		GEF: 188,551 Co-F: 424,000	GEF: 188,551 Co-F: 166,000	±0% -61%
TOTAL		GEF: 3,959,589 Co-F: 15,992,400	GEF: 3,959,589 Co-F: 20,174,000	±0% +26%

Table 3: Comparison of budget lines (PIF versus CEO Endorsement stage)

The recipient government partners confirmed their support and commitment in the course of the implementation of the project, as per attached letters. The scope of financial commitment will be discussed during the next budgetary negotiation and is envisaged to be defined during the inception phase of the project.

- Changes in the initially foreseen GHG emission reductions:**

The initial calculation of CO₂ emission reductions has been refined and updated with the changes made on the project design described above with the following results:

	GHG emission reductions (at PIF stage)	GHG emission reductions (updated during PPG phase)
Direct GHG emission reductions	2,484,107 tons CO _{2eq}	1,495,924 t CO _{2eq}
Indirect GHG emission reductions	3,312,143 tons CO _{2eq}	1,340,139 t CO _{2eq}
Total GHG emission reductions	5,796,250 tons CO_{2eq}	2,893,572 t CO_{2eq}

Table 4: Economic growth forecast for 2019-2023

Direct GHG emission reductions (ERs) are the result of the revised investment activities proposed in project components 2 (waste collection) and 3 (WTE). Due to the fact that the energy recovery of landfill gas cannot be implemented and other changes considered in the initial pilot #3 – the size of the RDF processing plant was considerably downscaled, considering the limited market demand for RDFs produced and available budgetary means – the calculations have been amended accordingly.

Details on the GHG ER calculation can be found in chapter A.1.5 and in Annex J.

The proposed project is consistent with DR Congo's national development priorities. It will make use of MSW being collected and used for energy production ("waste-to-energy") and therefore contribute to a reduction of dumped and illegally disposed of wastes in Kinshasa while providing additional generating capacity of power and heat for industrial applications.

A.1. Project Description

A.1.1 The global environmental problems, root causes and barriers that need to be addressed

Background: waste and energy situation in DR Congo

Waste Situation in DRC

Urban waste management is one of the major challenges for cities in Sub-Saharan Africa (SSA). Growth in population and economic activity leads to an increase in the amounts and heterogeneity of wastes generated⁹. This growth challenges the capacities of municipal solid waste management (MSWM) systems, and despite the estimate that cities in SSA spend up to 40% of their municipal budget for waste management, they find it difficult to provide a sound collection, efficient treatment and recycling, and safe final disposal of solid wastes¹⁰. Yet, in many cities, less than 80% of waste generated is collected and less than 20% treated and disposed of in a sound way¹¹. The consequences of this lack of service provision are firstly perceived at local level: blocked roads and drainages; pollution of air, water, and soils; sanitary living conditions; and subsequently negative impacts on public health and the local environment¹².

However, a lack of a sound MSWM furthermore affects the global environment. Methane (CH₄) from landfills, dumpsites and river dumping as well as CO₂ and other GHGs from open burning of waste, contribute to global warming. Plastics end-up in rivers and oceans, affecting marine habitats. Finally, in-existing or inefficient waste recycling systems fail to substitute primary raw materials and thus lead indirectly to an increase of natural resources.

Waste management has a great GHG emissions reduction potential. The potential for reductions lies in two different areas of waste handling: proper disposal of organic matter that would otherwise emit methane (CH₄), and waste-to-energy applications that can serve to replace conventional energy sources (both thermal and electric) and fossil fuels. Organic matter, for instance in the form of waste, emits large quantities of greenhouse gasses, primarily methane (CH₄), if not

⁹ Hoornweg and Bhada-Tata, 2012; Guerrero et al., 2013

¹⁰ Wilson et al., 2012; Coffey and Coad, 2010; Okot-Okumu and Nyenje, 2011; Kabera et al., 2019

¹¹ Hoornweg and Bhada-Tata, 2012

¹² Wilson, 2007

disposed of properly. For these reasons, a sound MSWM system is one key to solve global environmental problems like the aforementioned¹³.

With respect to both, local and global environmental problems caused by unsound MSWM, the situation in Kinshasa and major cities in the DRC is even more precarious than in many other countries in SSA, which can be seen in the material flow diagram of MSW management in Kinshasa (see Figure 4).

Of the 3.44 million tons of waste generated¹⁴ in the year 2018, only about 212,000 tons were collected by private and public waste collection companies who have, in theory, the capacity and equipment (trucks) to transport the waste to disposal sites outside of the city. Much more waste (approx. 2.05 million tons) was collected by small-scale waste collectors (*pousse-pousseurs*). However, they often lack the equipment to transport the waste over larger distances, and as a consequence, waste is disposed of inappropriately. The same counts for wastes not collected at all which are handled and disposed of by waste generators themselves. Consequently, annually only approx. 22,100 tons of waste are landfilled to the only landfill for Kinshasa located at Mpasa. This landfill is not only far from the city center (30 km), but also experienced some major deteriorations during the last year (e.g. inactive gas and leachate collection, lack of liner and cover), turning it from a sanitary landfill to an open dumpsite. About 1.7 million tons of waste ends in other open dumpsites closer to the city, while approx. 1.35 million tons are disposed of in rivers, and 172,000 tons are burned in the open. The recycling rate is low with about 136,000 tons/year (4% of MSW generated), of which the bulk is domestic reuse of organic waste in gardens. Considering the plastic content in the waste of 14%, up to 190,000 tons of plastic are disposed of into rivers (of which a part will end up in the Atlantic Ocean via the Congo River). This is not only a major threat to marine environments, but also already impairs the operation of water supply and the turbines at the Inga hydropower plant. Finally, the recycling rate in 2018 was estimated at 4%. This is much less than in other cities in SSA, like Nairobi (30%) or Daressalam (18%)¹⁵. Thus, the contribution to natural resource conservation (through the substitution of natural resources by anthropogenic resources like waste) of Kinshasa's MSW management system is comparatively low.

The global environmental problems associated with waste management are obvious. MSW burned in Kinshasa contributes not only to local air pollution, but also to approx. 74,128 tons CO_{2eq}/year of the countries' GHG emissions. Furthermore, large amounts of GHG emissions come from the disposal of biodegradable organic wastes to the landfill (21,441 tCO_{2eq}/year), the open dumpsites (838,258 tCO_{2eq}/year), and the river disposal of waste (1,668,900 tCO_{2eq}/year), while waste collection (e.g. transportation) only contributes with 637 tCO_{2eq}/year. Overall, with 2,603,000 tCO_{2eq}/year, the waste sector of Kinshasa contributes to 1% of the GHG emissions of the DRC.¹⁶

For a more detailed description of the MSW management system in Kinshasa refer to ANNEX I.

According to the legal framework for MSWM as part of the legislation of the protection of the environment¹⁷, municipalities (counties) are obliged to manage waste (collection, transport, disposal, treatment). In addition, there is the 003/2013 Edict from 9th of September 2013 regarding the sanitation and protection of the environment as well as the Ordinance Law no. 13/001 of 23 February 2013, fixing the provincial taxes, charges, levies, and fees and decentralized territorial entities as well as their terms and conditions for distribution, instituting a tax for sanitation, waste removal and household waste. 2013, a national sanitation policy was formulated. For the implementation of the policy, the national sanitation strategy was drafted in 2017, but it has not been enforced¹⁸.

However, the legislative and regulatory regime for the waste management sector in the DRC is not conducive for effective waste management.

Responsibilities of MSW management:

¹³ UN Environment, 2019

¹⁴ This waste generation corresponds to 0.75 kg/capita/day

¹⁵ Kabera et al., 2019

¹⁶ Source: Own calculations based on available studies

¹⁷ Law No. 11/009 of 09 July 2011 on basic principles relating to the protection of the environment and Decree N ° 14/019 of 02 August 2014 laying down rules on procedural mechanisms for the protection of the environment

¹⁸ African Clean Cities Platform, 2018

The Ministry of Environment and Sustainable Development (Ministere de l'Environnement et Développement Durable) of the DRC is responsible for the integrated solid waste management in the country. MSWM activities are decentralized at provincial level and fall under the responsibility of the respective provincial government.

Within the **City of Kinshasa**, the governance of MSWM rests with the National Sanitation Programme (NSP), the Kinshasa City Council and the 24 municipalities that make up the city of Kinshasa, as well as a number of NGOs and individuals who have arisen due to deficiencies in the formal structures of MSWM. Although MSWM activities have been over-centralized by the NSP and the City Council for many years in Kinshasa, these activities have often tended to focus on rich neighborhoods at the expense of poor urban settlements. However, due to weak local government institutions, lack of political will and financial difficulties faced by many local government authorities, MSWM has increasingly become a remit of non-governmental organizations (NGOs), community-based organizations (CBOs) and private companies who have taken on the urban challenges.

Municipal solid waste management in Kinshasa city is a duty entrusted to public funded municipal authorities. RASKIN and FONAK are autonomous bodies with the responsibility to maintain sanitation and public works and is placed under the authority of the **Provincial Ministry of Environment** (PMENV).

RASKIN (La Régie d'Assainissement de Kinshasa) is the sanitation authority for Kinshasa and technical body under the Provincial PMENV and has replaced the Board of Sanitation and Public Works Kinshasa (RATPK) by merging 2 initial structures related to environmental protection and infrastructure into one responsible entity for sanitation and waste services. Currently RASKIN operates only in 9 of the 24 communes in Kinshasa (Gombe, Barumbu, Kinshasa, Lingwala, Kintambo, Bandalungwa, Kalamu, Ngiri-Ngiri and Kasavubu). Within the mentioned 9 communes there are approx. 11 active intermediary waste transfer stations (local temporary dumping sites) in place. RASKIN closed around 41 transfer stations in 2018.

FONAK (Fonds d'assainissement de Kinshasa) is the financing entity under the Provincial Ministry of Environment. The authority receives financial support from the national as well as from the provincial government and pays for sanitation services organized by RASKIN and contracted private operators.

The financial resources for MSWM in Kinshasa are made up of:

- grants allocated by the Provincial and the Central Government;
- products of services rendered to third parties;
- waste recovery products;
- donations and legacies;
- any external funding from both national and international organizations;
- loans contracted with the authorization of the Governor of the City;
- the percentage of administrative management of the projects;
- various interests and penalties;
- taxes and other rights created in his favor and surrendered to him

As a main source of funds a sanitation tax, a national levy imposed on households and industries, is designated, which was initially collected through the DGRK, the tax office of the Provincial Government. The Provincial Government then provided funds to FONAK to finance sanitation operations. This sanitation tax should now be paid directly to FONAK. The revenue collection (sanitation tax) is currently on a very low level, because of the marginal willingness of households to pay for the weak services offered; in fact no detailed information on the amount of revenues collected through that tax has been available. Instead, households as well as many institutions and commercial actors prefer to pay informal waste pickers for waste disposal services¹⁹.

Root causes associated with MSWM

There are several major reasons that affect the current situation of poor MSWM in DRC

- i) The first major root cause for this situation is of financial nature. The available city budget of 6,360,000 US\$/year (0.5 US\$/capita/year) for the municipal public waste operator RASKIN is too low to sustain the collection and disposal of MSW for a city of more than 12 Million inhabitants. African cities with a reported better waste management like Accra

¹⁹ 1st field mission report of the consulting team, 10.-20.02.2019

(Ghana) of Nairobi (Kenya) spend 3-4 times more per capita. Furthermore, RASKIN's unit costs of 36 US\$/ton of MSW collected are 3-7 times higher than in cities like Accra or Nairobi.

- ii) Secondly, the lack of capacities. The total number of 70 waste collection vehicles and 61 collection centers of RASKIN is not sufficient to serve a city of the size of Kinshasa and has to be increased. However, the estimate that only 50% of these 70 vehicles and less than 30% of the collection centers are currently operational²⁰ underlines the demand for capacity not only in terms of equipment, but also on operational and management level. Beside an additional number of collection vehicles, collection centers (small transfer stations for small-scale waste collectors to reloading waste to larger containers), large transfer stations, and a rehabilitation of the landfill in Mpasa is required.
- iii) The third major root cause is directly linked to the lack of capacities for operation and management, namely lack of waste management planning. Contrary to other major cities in SSA, Kinshasa does not have a waste management plan that illustrates the current situation, defines the objectives of future waste management, and suggests the approach how to get there.
- iv) Finally, another root cause is a relatively small recycling and recovery sector. In other cities in SSA, up to 30% of MSW is recycled or recovered by the private sector, meaning that only 70% is left for the Municipality to deal with²¹. In Kinshasa, this recycling and recovery rate is much lower (about 3%). An increase in the recycling and recovery rate would not only reduce the pressure on natural resources, but also reduce the amount of waste to be handled. The public costs for recycling and recovery of waste are usually lower as waste collection and landfilling, as in countries in SSA, this sector usually operates without subsidies²². Therefore, however, new markets for secondary raw materials should be established, not only for recycling, but also for the recovery of energy from wastes that cannot be recycled.

Energy Background

From the currently 85.3 million inhabitants²³, the majority of Congolese residents (according to 2014 statistics: about 70%) live below poverty line and only 9% (2014 figure) have access to electric grid. The proportion of people in rural areas with access to electricity is 5.8% while 36.3% of urban areas are electrified. But there are access deficiencies. For instance, the number of power outages experienced translates into lower rates of electrification due to widespread restrictions in hours of service, voltage fluctuations and impromptu blackouts. For example, Kinshasa is estimated to have an electrification rate of 90%, but although they are connected to the grid, 21% of households receive less than four hours of electricity supply daily, translating into a much lower average electrification rate. Access to modern fuels is very low. In 2012, only 2% of people in rural DRC were using non-solid fuels and 11% of urban areas. For the rest, the only power supply alternative is via decentralized generators/mini-grids run on imported oil and coal.²⁴

A major factor are the exorbitant costs of imports in general and for energy sources in specific, for both importers and consumers who operate under extremely difficult and unpredictable economic and political conditions. As a result, it has to be assumed that over 60 million Congolese predominantly rely on ligneous fuels (wood, charcoal, plant residues, etc.) for their basic energy needs, a major factor in destruction of the forests and rise of GHG emissions. With envisaged steady increase in population volume and in the absence of affordable and climate-friendly power supply alternatives, GHG emissions from rural energy use in DRC are set to grow.

Energy supply in the country is characterized by the dominance of biomass fuel and hydropower for electricity production, but otherwise with neglectable share of other renewable energy sources compared to the amount of imported oil. The energy intensity (the ratio of the quantity of energy consumption per unit of economic output) of the economy was 20.4 MJ per US dollar (2011 US\$ at PPP) in 2015, being the highest in the world and in average three times the level of other Sub-Saharan countries (7.2 MJ/US\$), and four times the world average (5.1 MJ/US\$)²⁵. Regarding power supply and given

²⁰ According to information from RASKIN

²¹ UN Habitat, 2010; Wilson et al., 2012; Kabera et al., 2019

²² UN Habitat, 2010

²³ The World Factbook (CIA, 2018)

²⁴ World Energy Outlook Special Report: Africa Energy Outlook (IEA, 2014)

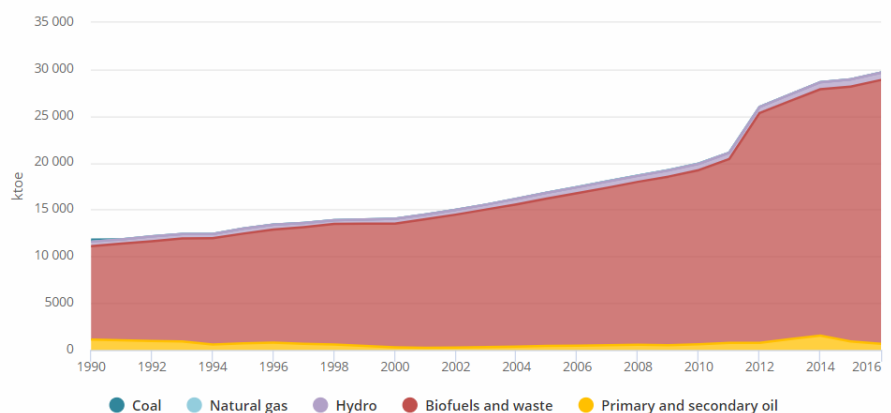
²⁵ The World Bank (2015) - <https://data.worldbank.org/indicator/EG.EGY.PRIM.PP.KD?view=map>

the overload and poor condition of the production, transportation and distribution facilities, energy services are deteriorated. This results in frequent and widespread blackouts.

The Primary Energy supply in DRC was about 30,000 ktoe (~349,000 GWh) in 2016, dominated by biomass (93%), electricity (4%) and oil (3%) sources.

Total Primary Energy Supply (TPES) by source*

Congo, Democratic Republic of 1990 - 2016



IEA World Energy Balances 2018

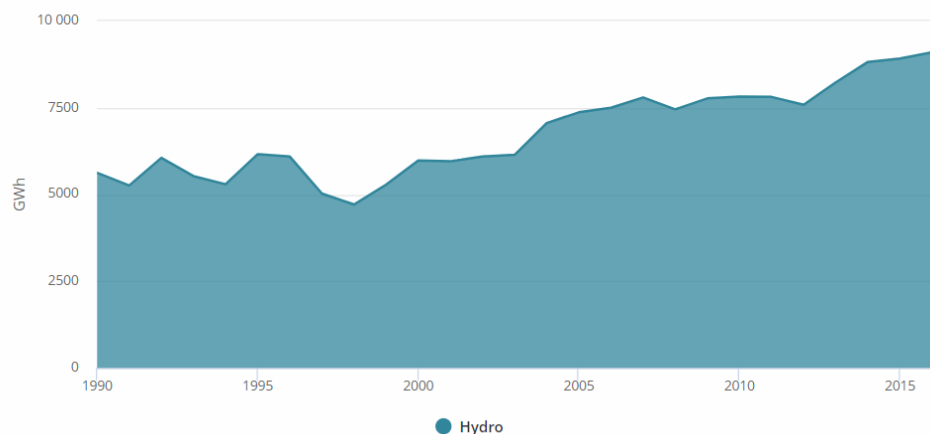
* TPES here excludes electricity and heat trade

Figure 1: Primary Energy Supply in DRC by source (Source: IEA World Energy Balance 2018)

Electricity supply is coming approximately 98% from hydroelectric sources, 2% from fossil fuels (thermal power plants). Other renewable energies, e.g. solar, wind or geothermal, are not utilized at major scale. The generation in 2016 was about 8,800 GWh and therefore covered less than 3% of the primary energy demand in the country. Final energy consumption in 2016 was at about 3,600 kWh/capita, far below African average (5,580 kWh/capita).

Electricity generation from renewables by source

Congo, Democratic Republic of 1990 - 2016



IEA Renewables Information 2018

Figure 2: Electricity generation in DRC (Source: IEA World Energy Balance 2018)

The hydro-electric potential in DRC is estimated at approximately 100,000 MW. However, only about 2,500 MW are installed, or 2.5% of the total potential. Despite this significant hydropower potential, there was until recently no political incentive and no fiscal or economic stimulus towards private initiatives, and the financial, environmental and administrative capacities were limited.

A handful of large industrial enterprises maintain their own production capacity, however, there is no country-wide statistic available that accounts for privately owned energy and power production capacities.

In 2014, a new electricity law was adopted in the DRC, enabling the energy sector to be opened to more independent producers of traditional and renewable energy. The liberalization of the electric power sector in the DRC and the opening of the electricity market to any operator wishing to start power production and operation are important measures of the New Electricity Law, set in motion by the Government of the DRC to attract investors to the energy sector, to promote a national energy emergence and make the DRC an energetic power.

The energy sector in the DRC is regulated by Law No. 14/011 of 17 June 2014 which aims in particular at:

- Effective liberalization of the sector;
- The promotion and harmonious development of supply in urban, pre-urban and rural areas;
- Qualitative electricity supply to all kind of needs;
- The guarantee of fair competition between operators and users' rights.

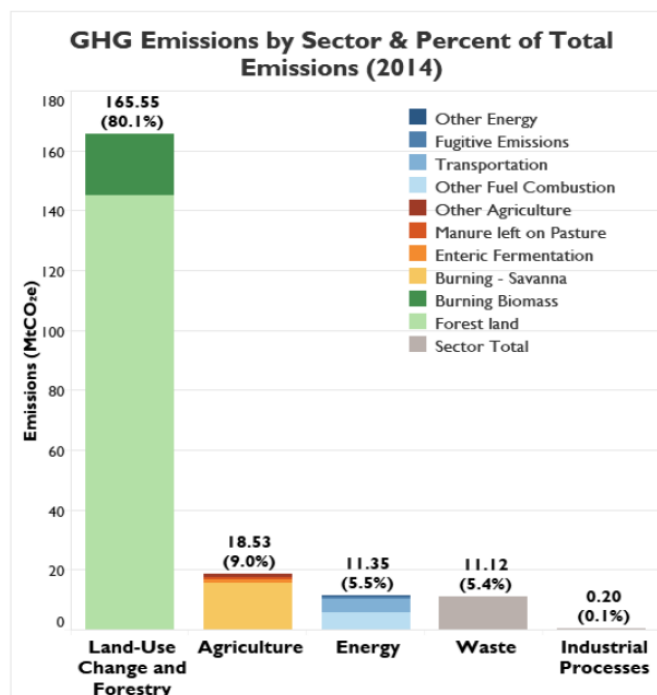
This law applies to activities of production, transmission, distribution, import, export and marketing of electricity implemented by any operator.

Root causes associated with energy production

- The Energy Policy of the DRC, which was approved in 2009, is mainly based on implementing large quantities of electricity from hydropower throughout the country with the aim of interconnecting them into one electrical grid. Apart from the hydro, there is no clear policy or strategy supporting the development and implementation of other renewable energy sources such as solar, biomass/biogas or waste-to-energy which represent a huge potential of clean energy for the country. Instead, the country still has to import mainly fossil fuels at high cost, e.g. industry is using hard coal and fuel oil as an expensive and environmentally harmful source of energy
- On the level of energy distribution, the system is poorly developed, leaving a large area of the country, especially in rural areas, without electricity. The distribution network has suffered both theft and lack of maintenance. The generation equipment is overloaded, the lines and unreliable. In areas with access to electricity, the service is not reliable due to frequent power outages.
- Although an Electricity Law is in place since 2014, the institutional and regulatory framework is still lacking an operational National Regulatory Authority for the Electricity Sector (Autorité Nationale de Régulation du secteur de l'Electricité/ANRE). ANRE has been formally established to control the market operations and issuing market-based rules for licensing new operators, granting access to the transmission and distribution grid, as well as approving electricity tariffs. However, the Authority is not yet operational and thus impedes the implementation of the provisions of the New Electricity Act applicable to the legal operating regimes and public electricity service in the DRC. Private-based operators and power producers are therefore not so much interested to engage in new energy production opportunities.
- Energy use from biomass is also a major root cause for increased deforestation: since there is hardly any alternative to using charcoal and wood for cooking and other household uses, the competition for land for tree plantations increases, with all adverse effects related to deforestation (increased logging, loss of soil, etc.). Alternative sources for producing briquettes e.g. from biodegradable wastes are available, but only at a very limited scale.

Greenhouse gas emissions

DRC has presented three greenhouse gas (GHG) inventories to the United Nations Framework Convention on Climate Change. According to the third and latest inventory from 2014, the Land Use, Land Use Change and Forestry (LULUCF) sector (> 90%), agriculture (2,9-4,5%) and energy (2,6-4,4%) together



represent between 95.5 and 98.9% of DRC GHG emissions, mostly from shifting cultivation, fuelwood for cooking and informal logging.²⁶

GDP increased 21% from 1990-2014, while GHG emissions increased only 2%. However, GDP first decreased 45% from 1990 to 2001, amidst hyper-inflation, political crisis, economic dislocation, conflicts, and instability. Since 2001, the situation has gradually stabilized, and GDP growth has resumed. From 2002 to 2014, GDP increased 113%, while GHG emissions increased 6%.²⁷ In 2014, the DRC emitted more GHGs relative to GDP than the world average, indicating room for improvement. As of 2014, services contributed 38% of DRC's GDP, followed by mining and extraction (22%), industry (21%), and subsistence agriculture (19%).²⁸

The DRC's Intended Nationally Determined Contribution (INDC) notes that agriculture employs nearly 70% of the labor force. In its INDC, the DRC pledged conditionally to reduce GHG emissions by 17% by 2030 compared to 1990 levels from LULUCF, agriculture, and energy. In LULUCF, DRC identified potential interventions including afforestation and reforestation, sustainable management of timber operations, rehabilitation of mining and oil operations, and fighting of bush fires. The TNC states that improving the implementation of climate change mitigation policies and measures should involve institutional and human resources capacity building, and that insufficient implementation is due to constraints including the absence of a national climate change policy, strategy and action plan, insufficient allocation of public financial resources, insufficient integration of environmental considerations into sectoral policies, and a lack of intersectoral cooperation. Upon the DRC's ratification of the Paris Agreement in December 2017, the INDC became its first NDC.

Figure 3: GHG emissions by sector and percent of total emissions (2014)

The energy-related INDC published in August 2015 were to raise the population access rate to electricity, which is currently very low: 15% at the national level (1 per cent in rural areas, 30% in urban areas) whereas the average in sub-Saharan Africa is about 24.6%. The rate in 2012 was 16.4%.²⁹

Deforestation

DRC has the second largest swath of rainforests in the world—152 million hectares³⁰ accounting for more than 60% of the rainforest in the Congo Basin. Historical rates of deforestation over the period of 1990-2010 (0.34%) represent 10 million hectares of lost forest, equivalent to half a million hectares lost each year³¹. **This corresponds to GHG emissions of approximately 275 million tCO_{2eq}/year.**

Because of the increasing rate of deforestation and forest degradation, in 2008 DRC went from being a net sink to becoming a net emitter.

In 2018, the DRC submitted its first national [Forest Reference Emission Level \(FREL\)](#) to UNFCCC, stipulating that:

- **For the period 2000-2010**, 6 410 391 .44 (+/- 735 925.03) hectares were deforested, at an annual rate of 0.23%.
- **For the period 2010-2014**, 7 005 535.30 (+/- 813 005.33) hectares were deforested, an increase of almost 11% to the rate of deforestation.

This indicates that for the period 2000-2014, a total of more than 13 million hectares of forest have been lost, **meaning almost 1 million hectares every year.**

In the Congo Basin, population density, small-scale agriculture, fuelwood collection and forest's accessibility are closely linked to deforestation, whereas timber extraction has no major impact on the reduction in the canopy cover. Three

²⁶ Central African Forest Initiative (CAFI): <http://www.cafi.org/content/cafi/en/home/all-news/drc-forests---frequently-asked-questions/what-are-the-greenhouse-gas-emissions-of-drc-.html>

²⁷ World Resources Institute Climate Analysis Indicators Tool (WRI CAIT 4.0, 2017). Global Warming Potentials (GWPs) are the 100-year GWPs from the Intergovernmental Panel on Climate Change (IPCC) Second Assessment Report (SAR).

²⁸ International Monetary Fund (IMF). Democratic Republic of the Congo – Country Report – Selected Issues, August 2015.

²⁹ Democratic Republic of the Congo, DRC's TNC to the UNFCCC, 2015.

³⁰ MECNDD, 2015. Protocole méthodologique et résultats de l'analyse de changement de couvert forestier 1990-2010 de la RDC

³¹ Megevand, Carole & al., 2013. *Deforestation trends in the Congo Basin : reconciling economic growth and forest protection. Directions in development. Environment and sustainable development*. Washington DC: World Bank.

converging studies³² of current and future drivers of deforestation and forest degradation led to a national consensus in 2012. This consensus was confirmed in the National REDD+ Strategy adopted by the Council of Ministers in 2012. The expansion of subsistence activities (slash and burn agriculture and fuel wood collection) have been the main direct causes of deforestation and forest degradation.

This phenomenon is reinforced by a mix of underlying factors, demographic pressure being the major one. DRC has the third largest population growth in absolute terms (predicted to grow from the current 80 million to 120 million by 2030, almost 200 million by 2050 and reaching almost 380 million by 2100)³³. DRC is already a highly food insecure country, ranked 107th out of 113 countries in the Global Food Security Index. This growing population will need more food, more shelter, and more fuel³⁴.

³² Rapport de synthèse présentant et comparant les résultats des différentes études menées sur les causes de la déforestation et de la dégradation des forêts en RDC, FAO – The synthesis report which sets the national consensus on the drivers of deforestation was based on four qualitative and quantitative studies, by the Université Catholique de Louvain, civil society, FAO and UNDP

³³ United Nations, Department of Economic and Social Affairs, Population Division (2017). World Population Prospects: the 2017 revision, Key findings and Advance Tables. Working Paper No.ESA/WP/248.

³⁴ Central African Forest Initiative (CAFI): <http://www.cafi.org/content/cafi/en/home/all-news/drc-forests---frequently-asked-questions/what-contributes-most-to-deforestation-and-forest-degradation-in.html>

Key Barriers associated with waste management and energy production in DRC

The key barriers to the development of waste-to-energy projects from MSW that have to be considered by the Project are.

- **Inadequate planning on future waste generation trends and capacity requirements.** Serious insufficiencies in institutional capacities for effective and long-term urban planning in DRC are a major barrier to sustainable urban and other land use planning. They are also a barrier to the collection of reliable data on motorization, GHG baseline data and GHG emissions factors, and to technical know-how on international best practices for approaching urban planning and management in an integrated way, thereby taking into consideration environmental issues while tackling challenges of spatial development, infrastructure (transport, waste facilities, etc.), and social development (sanitation, etc.).
- **Insufficient or inappropriate legal, institutional and strategic framework** to i) phase out unsound waste management practices, ii) increase recycling and energy recovery from waste, and iii) to reduce Global Environmental Problems (GHG emissions, plastic marine littering, resource conservation). Urban planning institutions in DRC are limited in their capacity to design, plan and implement effective and integrated sustainable waste management and urban development programs and policy. Furthermore, they are limited by scarce financial resources, inadequate regulatory frameworks, lack of coordination in policy development and planning, and inadequate learning and scaling up from other interventions in the regions.
- **Unavailability of appropriate tools, technologies, methods, databases and technical units for sustainable waste management.** This barrier relates to the limited knowledge, capacity and facilities for the sound management of waste at both disposal and source stages, and to the financial resources and market-based mechanisms for collection, re-use or disposal.
- **Poor local and national abilities to implement innovative strategies for waste valorization,** due to a lack of clear responsibilities of government agencies and financial resources to organize a sound waste collection, sorting, and utilization management scheme. Non-skilled, uninformed and poorly equipped people under socio-economic stress, including women, unemployed young and children, handle different kinds of waste daily in various ways that expose them and the environment to their adverse effects of. The proper collection, sorting and waste-to-energy use can therefore generate additional revenue sources, which, in turn, may have a positive impact on poverty reduction, economic diversification and resilience to climate change and other shocks. Also, the set up of a formalized financing scheme can help to create a favorable context for new operators from private sector to engage in sound waste management practices and constituting additional income sources.
- **Lack of national strategies to enhance the utilization of wastes.** There is huge potential for the use of wastes and other sources, such as renewable energy technologies, to supply larger cities as well as small and isolated rural communities at lower costs. However, the lack of proper policy, technological advancements, political and economic instability, low level of awareness and educational background are the main challenges hindering the development, deployment and commercialization of WTE and other renewable energy systems for distributed power generation in the DRC.
- **Lack of financial, management, and technical capacities and know-how to integrate waste as a source of energy production in energy planning.** Since waste has not been treated a useful resource so far, there are hardly successful business models applied in DRC showing that MSW and residues from economic activity provide a value and can benefit industry and local businesses to develop a value chain for sorted wastes and provide them useful energy sources (e.g. organic wastes for biomethanisation, RDF for replacing coal and other fossil fuels as an alternative secondary raw material). Capacity and know-how need to be established and demonstrated through pilot activities. In addition, the GHG emission aspect with particular respect to substitution of GHG emitting fuels (charcoal, fossil fuels) by waste-derived low-carbon alternatives (ecological briquettes from organic MSW to substitute charcoal, biogas and RDFs from MSW to substitute fossil fuels) is currently not been considered in any policy strategy.

Without GEF intervention, these barriers may continue to exist, with the result that the present scenario of poor MSW management in the City of Kinshasa and other parts of the country, without appropriate practices and national engagement, will remain with little or no significant improvement. Fossil fuel-based energy consumption and deforestation activities to produce biomass fuels will continue to increase with adverse effects on the environment and GHG emissions.

By mitigating some of the identified barriers, the proposed WTE project will provide opportunities to enhance the waste collection practices and allow private sector to increase its business activities and investments for waste sorting, recycling and waste-to-energy use.

A.1.2 The baseline scenario or any associated baseline projects

A.1.2.1. Baseline scenario

Under a business-as-usual scenario, the volume of waste generated in urban areas of DRC would continue to grow unabated. The three underlying trends driving the ever-proliferating waste generation in DRC's cities – namely economic expansion, rapid population growth and urbanization – are expected to continue. GDP growth reached 5% in 2015 and projects economic growth to average 6.5% in 2016-17, before decreasing to an average of 4% in 2018-19 (see Table 5).

Economic growth	2019	2020	2021	2022	2023
Real GDP growth	4.1%	4.3%	4.4%	4.6%	4.7%

Table 5: Economic growth forecast for 2019-2023

Source: CEIC data, <https://www.ceicdata.com/en/indicator/democratic-republic-of-congo/forecast-real-gdp-growth>

A recent World Bank study³⁵ argues that the Democratic Republic of Congo has the third largest urban population in sub-Saharan Africa (estimated at 43% in 2016) after South Africa and Nigeria. It is projected that DRC's urban population will increase from 35 million in 2018 to over 71 million in 2040. The growth is expected at a rate of 4.1% per year, which corresponds to an additional 1 million residents moving to cities every year. If this trend continues, the urban population could double in just 15 years. Thus, with a population of 12 million and a growth rate of 5.1% per year, Kinshasa is poised to become the most populous city in Africa by 2030. Such strong urban growth comes with two main challenges – the need to make cities livable and inclusive by meeting the high demand for social services, infrastructure, education, health, and other basic services; and the need to make cities more productive by addressing the lack of concentrated economic activity.

DRC is urbanizing at much lower income levels than elsewhere in the world, including the average for the countries of Sub-Saharan Africa. The country's gross domestic product (GDP) per capita, US\$712 (purchasing power parity), is less than one-third of an average country at a similar level of urbanization.

Its main economic center is Kinshasa. Its economic growth potential lies chiefly in the production of food and export crops, and related manufacturing and agro-processing activities. It has access to foreign markets and suppliers through the only seaport in the country, at Matadi, and through Kinshasa International Airport. It is a neighbor of relatively more affluent countries, such as Angola, the Republic of Congo, and Gabon.

The informal sector is the largest employer, with an estimated 60–80% of jobs. Informality is hard to define in the Democratic Republic of Congo, and most studies label companies “informal” based either on firm size (such as fewer than five employees) or on registration status. The informal sector is weakly monitored, though a study in 2004 by the National Institute for Statistics in the Kinshasa region reported nearly 540,000 nonregistered enterprises in the capital alone, producing annual value added of 485 billion Congo francs (approx. US\$ 300 million at current prices). These enterprises generated 70% of employment in the region (692,000 jobs), against the formal private sector's 12% and the public sector's 17%³⁶.

Thus, in the absence of the UNIDO-GEF project, under the business-as-usual scenario, the approach to waste management in DRC would continue to be disorganized, haphazard and under-resourced.

The MSWM system in Kinshasa in the baseline year (2018) is illustrated in Figure 4 left. For the future, it can be assumed that the amount of waste generated will increase due to growth in population and economic activity. This growth was between 2-7 % in the last years, and a conservative estimate of 3% per year was assumed. To increase the amount of waste

³⁵ The World Bank (2018): DR of Congo Urbanization Review

³⁶ The World Bank (2014): Diagnostic de l'accessibilité urbaine à Kinshasa et proposition de plan d'action.

collected by RASKIN and private operators, major investments in the MSWM infrastructure (collection centers, transfer stations, collection and transport vehicles and machinery) are required, and the unit costs for MSW collected must be decreased. Given the financial situation in Kinshasa, the only investment in infrastructure assumed to be undertaken is the construction of a transfer station (waste collection and transfer to landfill only). Together with an improvement of the financial and operational management, this investment will reduce the unit costs for MSW collected, due to reducing the number of roundtrips to the disposal sites and thus fuel consumption, as well as transport time³⁷. The reduction of the unit costs for MSW collection and transport costs assumed are from currently 36 US\$/t to 18 US\$/t in the year 2024 and 12 US\$/t in the year 2044. Furthermore, assuming that the budget for MSW management will remain at the current level, the assumed efficiency measures will lead to an amount of MSW collected from currently 212,455 t/a in the year 2018 to 424,900 t/a in the year 2024 and finally 637,365 t/a in the year 2044. The amount of waste recycled may increase until the year 2044, for plastic from currently 3% to 40%, for paper and cardboard from currently 1% to 30%, and for metals from currently 10% to 90%. The recycling rate for organic waste is assumed to remain at 5%, due to lack of markets for products like compost. These assumptions are derived from the establishment of new plastic and paper recycling companies and the resulting increase in the recycling rate recorded for the first months of 2019³⁸. Until the year 2044, the recycling rate will thus climb to 13% of MSW generated, which is in the middle range if compared to other cities from SSA³⁹. It is furthermore assumed that the MSW which requires final disposal, will be disposed of to the landfill, open dumping, river disposal, and open burning in the same distribution as in the year 2018. The results of the calculation of material flows under these assumptions are shown in Figure 4.

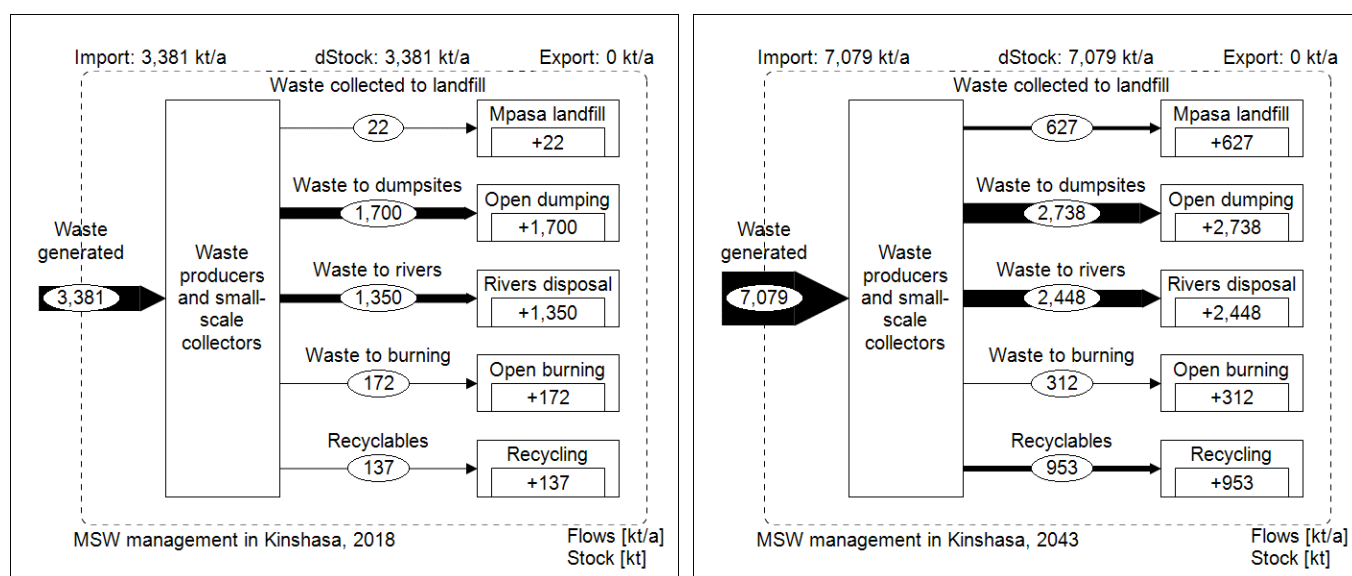


Figure 4: Material Flows MSW management in Kinshasa - Baseline 2018 (left) and baseline scenario 2043 (right)

To wrap up, the efforts to reduce and sustainably manage urban waste flows would be sporadic and would not be sufficient to address the prevailing barriers.

With respect to energy generation from waste under this baseline scenario, it is extremely unlikely that the market for waste-to-energy projects such as biomethanisation or use of RDFs would develop. As a consequence, in the business-as-usual scenario, private developers of waste-to-energy projects will unlikely enter the MSW sector to implement and operate power plants. Institutional and financial support for these initiatives is limited and knowledge of energy projects within the waste sector is insufficient. In order to develop a market for MSW-based on-grid electricity or heat generation, a number of key market interventions are necessary to remove barriers to project development. This would result in continual growth in methane emissions from waste sources, a limited supply of energy from wastes, and other negative environmental impacts such as water pollution.

³⁷ Coffey and Coad, 2010

³⁸ UNIDO Consultant Team, 2019b

³⁹ Kabera et al., 2019

Even though it is assumed that more plastic will be recycled, the disposal of plastic waste to water bodies will increase, from currently 190,991 t/a to 371,850 t/a. The larger amount of plastic recycled will be overcompensated by an increase in the waste generation due to population growth, as well as an assumed change in the waste composition, from today's 14% of plastics to 18% in the year 2044.

Furthermore, when using these assumptions to estimate the development of the global environmental problem of GHG emissions from MSW management in Kinshasa, the result is that GHG emissions will be 11.9 million t CO_{2eq} during the period 2020-2023, and 82.7 million t CO_{2eq} in the period 2024-2043 (see table below).

	Year/Period	Collection	Landfill	Dumping	River disposal	Burning	Total
MSW (t)	2018	212,455	22,104	1,700,077	1,349,804	172,188	
MSW (t)	2020-2023	1,345,548	1,028,297	6,688,451	5,696,312	726,651	
MSW (t)	2024-2043	10,091,613	10,091,613	41,490,559	37,095,554	4,732,101	
GWP (t CO_{2eq}/a)	2018	6,751	22,136	851,286	1,689,731	67,815	2,637,719
GWP (t CO_{2eq}/5yr)	2020-2023	42,754	1,029,806	3,349,133	7,130,840	286,187	11,838,720
GWP (t CO_{2eq}/20yr)	2024-2043	334,158	10,531,956	21,609,410	48,300,930	1,938,494	82,714,947

Table 6: GHG Emissions of MSW management in Kinshasa, Baseline scenario

A.1.2.2. Baseline project

In addition to the baseline projects mentioned in the PIF, the following activities have been identified during the PPG stage.

a) Associated baseline projects: governmental projects and initiatives that the project will build on

The power tariffs to consumers are at the rate of US\$ 0.04/kWh for low level consumers and US\$ 0.11/kWh for middle level consumers. This very low electricity tariffs are also considered as a barrier for private investment in the energy sector. There is no established policy or institution in DRC for fixing electricity supply price to the end users or to manage the incentive/subsidy provided on the price of electricity. Government of DRC fixes the prices arbitrarily from time to time. This indicates the institutional weakness in the energy sector and the need for establishing policies and regulatory bodies. The power deficit at the current rate of consumption is estimated to be around 600 MW. If part of the generated MSW could be effectively utilized for power generation, it could help reduce this power deficit in the country.

DRC joined in December 2012 the SEforALL Initiative with a national agenda and a strategy⁴⁰. The goals set under this strategy are i) increasing the access to electricity in urban areas from 35% in 2011 (for an estimated urban population of 25.5 million inhabitants) to 100% in 2030, and ii) increasing the access to electricity in rural areas from a very low level of 1% in 2010 (for an estimated population in rural areas of 47.3 million) to 100% in 2030. Combining the urban and rural areas, the goal is to increase the access to electricity from a level of 9% in 2011 (for an estimated population of 72.8 million inhabitants) to 100% in 2030 (for an estimated population of 143 million inhabitants).

To reach these ambitious objectives by 2030, a final electricity consumption of about 149,528 GWh (or 12,857 ktoe) is expected by 2030, corresponding to a multiplication by 24 of the 2011 consumption level, or 11.25 times the average electricity consumption per capita, from 0.008 toe/capita (i.e. 93.04 kWh) in 2011 to 0.09 toe/capita (i.e. 1046.70 kWh) in 2030.

This difference appears to be considerable and superior to all previous growth forecasts in the electricity sector in DRC, since the ambition is to make electricity available to the entire population. One way identified in the SEforALL Strategy to fill the gap in terms of electrification rate or low population access to electricity is hydropower.

⁴⁰ http://www.cd.undp.org/content/dam/dem_rep_congo/docs/eenv/UNDP-CD-RAPPORT-ENERGIE-DURBALE-POUR-TOUSHORIZON-2030.pdf

DRC Energy Statistics	2010	2012	2014	2016
Access to electricity (% of population)	12.9%	15.4%	13.5%	17.1%
Urban (% of urban population)	37.7%	40.8%	42%	47.2%
Rural (% of rural population)	0.8%	1%	0.4%	N/A
Access to clean fuels and technologies for cooking (% of population)	3.8%	3.8%	3.9%	4.0%
Population, total (million)	65.9	70.3	74.9	78.7
Renewable energy consumption (% of total final energy consumption)	96.8%	95.5%	92.9%	N/A
Renewable electricity output (% of total electricity output)	98.9%	99.9%	99.9%	N/A
Electric power consumption (kWh per capita)	102.5	110.2	106.9	N/A

Table 7: Country energy statistics DRC, Source: The World Bank

Universal access to electricity by 2030 (the objective of SEforALL), would mean for the DRC closing the following gaps:

- At the national level, a rate of access to electricity rising from 9% in 2011 (for a population of 72.8 million) to 100% in 2030 (for a population of 143 million inhabitants);
- In urban areas, access to electricity increased from 35% in 2011 (for an urban population of 25.5 million) to 100% in 2030 (for an urban population of 48.4 million inhabitants); and
- In rural areas, an electricity access rate of 1% in 2010 (for a rural population of 47.3 million);

It requires the significant untapped potential in renewable energy sources – apart from large and small/medium hydropower – i.e.: mainly solar, wind, biomass/biogas to be lifted.

In DRC, the usage of WTE potential has been mainly untapped. SNEL, the national grid company, has been facing serious challenges. Within the MSW framework, the Provincial Government of Kinshasa received support under the co-operation framework of the European Commission. The “Sanitation program and urbanization of the city of Kinshasa” (PAUK Project) was implemented during 2007-2010. PAUK focused on municipalities of Barumbu, Gombe and Kinshasa. It also enabled the development of transfer stations for household waste in these three municipalities and the landfill site at Mpasa located 30 km east of the city. Following successful implementation of PAUK, a successor project entitled “Project to support the rehabilitation and urban sanitation in Kinshasa” (PARAU) was implemented during 2010-2015 with further support from the European Commission. This program achieved implementing MSW management in 9 out of 24 communes of Kinshasa with a capacity of handling 11,000 m³ of municipal waste every week. The project employed around 140 staff and established transfer stations for household waste and a technical landfill site at Mpasa.

The PARAU program ended in August 2015 and the Board of Sanitation and Public Works Kinshasa (RATPK) and later RASKIN as successor organization has taken up the responsibility for the continuation of the project since then. Within the mentioned 9 communes there are approx. 20 active intermediary waste transfer stations (local temporary dumping sites) in place. RASKIN closed around 41 transfer stations in 2018. Mainly household waste is collected by informal waste pickers from the end-users and dumped at the remaining transfer stations. The informal waste pickers pay a local fee for dumping waste at the transfer stations. According to RASKIN the waste is currently transferred on a daily basis (Monday to Sunday) to Mpasa landfill using 15 trucks (waste loading capacity approx. 8t) and additional 10 arm-lifting trucks (waste loading capacity approx. 4t). In addition, the Office of Roads and Drainage (OVD) collects waste from drainages, and RASKIN transfers the waste to Mpasa landfill. Mpasa landfill is operated as well by RASKIN. Currently there is no landfilling, but only waste dumping on site. Since December 2018, no truck has reached Mpasa landfill due to a damaged bridge on the access road.

b) Associated baseline projects: private sector enterprises and entrepreneurs

Waste collection (relevant for Component 2 – waste collection)

BAM'S Clean is a private company and provides services for cleaning buildings and gardens. Waste collection is part of their services. BAM'S Clean subcontracts other enterprises for waste collection of their clients. The waste is sorted on site or at their premises instead of using the official transfer stations. Biodegradable waste is used for composting and there is a partnership with Clean Plast for the recycling of plastic waste. Paper waste is burned on site. The company operates in three communes using 3 trucks and an additional smaller transport vehicle for high densely populated areas. Once a week the remaining waste is transferred to Mpsa landfill. BAM'S Clean has around 200 employees, but only 20 employees are involved in waste collection services.

Rayon Vert is a private company providing services of pest control, office and facility cleaning, gardening and waste collection. The enterprise employs 254 staff and operates only in Kinshasa. Among Rayon Vert's customers there are 2 breweries, 12 embassies, 2 five-star hotels, Brussels Airlines, 25 Rawbank branches, a catering service and many restaurants and private households. In total 70m³ of waste are collected weekly and dumped at the transfer stations by the company. The main components of the collected waste are biodegradable (food and garden waste). The company is generally interested in engaging in sustainable projects and has in the past provided, according to own information, several proposals to the Provincial Government and RASKIN on optimizing waste collection in communes. Yet these proposals remained unheard due to lack of budgetary means at the City level.

Biowaste collection and treatment (relevant for Component 3 - Biogas)

Beside waste collection companies specialized in collecting bio- and garden wastes (BAM'S Clean, Rayon Vert), a number of NGOs/CBOs process biowaste into compost (e.g. BENELUX AFRO CENTER, Congo Green, Compost Congo, Les amis de la Nature et Jardin). The amounts of biowaste treated are about 1 t/day for each of the NGOs mentioned.

Plastic, paper and cardboard recycling (relevant for Component 3 - RDF)

Harimex, a former metal scrap dealer and smelter, is the largest registered plastic recycler in Kinshasa⁴¹. The company recently started medium-scale operation and currently recycles 3,000 t/month of mainly PET, HDPE and PP. The plastic waste comes from packaging industries and collection of recyclables from MSW. For a large-scale operation, Harimex imported equipment to its new recycling facility, but currently waits for the official license to operate by the Provincial Government of Kinshasa.

A number of other plastic recyclers in Kinshasa (among them NGOs/CBOs mentioned above, such as BENELUX AFRO CENTER, Congo Green, Consol, Intelligentsia, Compost Congo, Les amis de la Nature et Jardin, and others such as Kasai Integral développement, Congo Salubrite, CEPADYC, FEAPD, APISA) are registered at RASKIN. However, each of these small companies recycles only 1-3 tons per month.

Marsavco is a company in Kinshasa that produces products of personal care (soaps, shampoo, etc.) and food (oil, etc.)⁴². The company needs about 3,000-4,000 t/a of plastics, mainly HDPE and to a lesser extent PET and PP for packaging. Due to the high prices for raw materials on the one hand, and the large amount of plastic waste generated in Kinshasa on the other hand, Marsavco is interested to purchase recycling materials for their packaging production.

All Pack Industries⁴³ is a paper and cardboard recycler in Kinshasa. The production of 140 t/month (50% of the plant's capacity) uses only waste paper and cardboard. A major challenge for All Pack are their energy costs for steam produced from heating oil, as the plant consumes 50 m³ fuel/month at costs of 40,000 US\$. According to All Pack, a Chinese competitor in Kinshasa spends half of that cost by using biomass (wood), and All Pack thinks about investing into a biomass system as well.

Biobriquette production (relevant for Component 3 - Biobriquettes)

Founded in 2018, **Makala Bio** is a start-up that produces biological briquettes for commercial selling as alternative to the common charcoal (Makala). The start-up company is based in Kinshasa – Pompage/Mont-Ngafula and has nine staff in total (management and labour workers). The company collects 3.5 t of organic wastes per month as feedstock for their

⁴¹ UNIDO Consultant Team, 2019a

⁴² <https://www.marsavco.com/>

⁴³ <https://www.moncongo.com/all-pack-industries>

briquette production. Sources of the feedstock are wastes from nearby markets and collection of organic household waste (but no food waste) in the neighborhoods by themselves and using other individuals for pre-collection (waste pickers). Makala Bio pays 50 CFR per kg (~0.3 US\$/kg) of sorted organic waste to waste pickers, who deliver the waste to the Makala Bio production facility directly. Used feedstock are residues from banana, maize, cassava, beans, groundnuts, sugar cane, etc.; but no char dust from charcoal. Starch flour for the binder is available at the millers/grinders for free (junk); also use (local) clay is used as binder. For the carbonization process 10 kilns (self-produced) are used and 1 manual press for the briquette production itself. The current monthly briquette production is 1000 kg per month, the price per kg is 1,000 CDF (compare with charcoal price 1,300 CDF/kg). In addition, recycled cardboards are sold for briquette lightening. The quality of the briquettes is checked regularly by an institute located in Limete. Besides local buyers in Pompage/Mont-Ngafula there are a number of bulk buyers (Regal Supermarket, GG Market, restaurants and bakeries), mainly located in Gombe. Due to the high demand or interest of bulk buyers, Makala Bio plans scaling up the business and to extend in other communes of Kinshasa.

c) Associated baseline projects: financial institutions and other donor-funded initiatives

AFD/ASUREP

Agence Française de Développement (AFD) is currently implementing a water supply project (two-phase project until 2020, total budget 24 million EUR). The project supports 26 water user committees (ASUREPs) in the Eastern part of Kinshasa province. Part of the intervention is a sanitation pilot project including waste management. NGOs, namely ADIR and Toilettes du monde, are involved in the implementation activities. To finance sanitation and waste management activities, a water tariff of approx. US\$ 1.6/m³ of water was introduced in the areas of operation. The collected waste is sorted on site (nearby the ASUREPs) and biodegradable wastes are used for composting and urban farming. Parts of the remaining waste are also used for refilling erosion areas.

JICA

Japan International Cooperation Agency (JICA) is developing a study on waste characterization in residential households within 3 communes in Kinshasa (Gombe, Kalamu and Kimbaseke respectively high, medium and low-income areas). The specific objective is to understand from a bottom-up approach the quantity of waste being generated at household level, in different developed communes as well as the classification of wastes according to 10 categories. The wider objective is also to train RASKIN staff on how to collect waste data correctly. A further engagement of JICA in SWM is currently under discussion, and, depending on budget availability, will be defined on a year-by-year case⁴⁴.

A.1.3. The proposed alternative scenario, GEF focal area strategies, with a brief description of expected outcomes and components of the project

The proposed alternative scenario aims i) to reduce the negative impacts, particularly those of global environmental relevance caused by current MSW management practices (i.e. GHG emissions, plastic maritime litter, lack of natural resource conservation), and ii) to provide sustainable energy from MSW. The focus lies on Kinshasa in the implementation phase and upscaling on a national level in the aftermath.

The first step to achieve these objectives is to assist municipal and national stakeholders in MSW policy and regulation. Explicitly formulated laws and by-laws that can be enforced with the given capacities, clearly defined responsibilities, and a transparent financial and management structure is the prerequisite for any functioning MSW management. To do so, the existing MSW management including its physical, social, legal and economic aspects has to be investigated and assessed, in order to provide the information required for a MSW management strategy and master plan. This strategy and master plan can then be the basis for the formulation of policies and regulations. Based on the findings retrieved during the preparation of the proposal at hand, this information (e.g. MSW generated, collected, and disposed of; MSW handling practices; stakeholders involved in MSW management; revenues from MSW waste collection) is widely lacking or not well structured. Thus, component 1 of the project focuses on MSW management policy and regulation in Kinshasa.

⁴⁴ 1st field mission report of the consulting team, 10.-20.02.2019

In the next step, MSW collection and transport must be improved to reduce MSW disposal techniques (i.e. open dumping and burning, river disposal) that impair human health, the environment, and natural resources. The proposed project will not be sufficient to significantly increase MSW collection alone, but it can contribute to reduce the amounts of MSW collected and transported to final disposal sites by supporting the private (and public) sector with logistical support, technical, and financial assistance in diverting parts of the MSW for recycling and energy recovery. The thereby created value chain for MSW hitherto unused will reduce the amount of MSW to be collected and particularly transported to the landfill. Preferably, this waste diversion for recovery (e.g. by waste picking or sorting) should be carried out in the city of Kinshasa (and not at Mpasa Landfill as initially proposed in the PIF document), in order to reduce the expenditures for and emissions of waste transport to the final disposal sites and at Mpasa Landfill. To increase the impact of the contribution of the project at hand, however, complementary investments into the MSW management infrastructure are highly desired. Thus, potential synergies to other planned projects and interventions, funded by both, national and international sources, must be fully exploited.

There are a number of options to recover energy from waste, and three examples for potential pilot cases are exemplarily described in Component 3 of the project. These three examples are i) the co-processing of organic MSW in a biogas plant treating waste from the food industries.; ii) the production of refuse derived fuels (RDF) for the cement industry; and iii) the production of coal briquettes from organic MSW as RDF for domestic use. Beside these exemplarily business cases other options of energy recovery from waste are possible, like producing steam from organic MSW of high calorific value (garden and park waste) for local pulp and paper industries. The selection of the three business cases was done considering the following criteria:

- waste composition and using the three main fractions in the MSW (biodegradable wastes 64%, plastics 14%, paper 6%) for the production of biogas, RDF and bio-briquettes;
- energy production using state-of-the-art WTE within industrial applications (e.g. food, cement) or supporting the development of small-scale businesses (e.g. in the case of bio-briquettes);
- environmental impact (in terms of tonnes of MSW utilized and CO₂ emissions avoided); and
- economic profitability (expressed in simple payback and internal rate of return generated).

What is not considered due to a lack of feasibility are waste incineration plants which are considered to be too expensive in operation, as well as the generation of electricity from the landfill gas at Mpasa landfill. The latter would not only require a cost-intensive upgrade of the landfill, but also large investments to connect the landfill gas generation to the grid. Altogether, the elements described in Component 2 and 3 will form the basis of an integrated MSW management system, exemplarily shown in Figure 5.

Component 4 of the project will provide capacity building for both, public and private stakeholders, not only to guarantee a sustainable operation of the pilot cases, but also to upscale them to other enterprises, industrial sectors, and locations in Kinshasa and the DRC. The monitoring and evaluation of the project is carried out under Component 5.

COMPONENT 1: POLICY AND REGULATION DEVELOPMENT

Under this component, the requirements of supportive environment for sustainable waste management will be formulated and provided to government for its consideration and future enforcement. Key partners under this project component are Ministry of Environment and Sustainable Development (MEDD) leading the policy development and implementation activities concerning MSW in the DRC, the Provincial Ministry of Environment in Kinshasa (PMNV), the Ministry of Industry (MOI), the Ministry of Energy and Water Resources (MERH), the Ministry of Finance (MOF), the Provincial Ministry of Planning (PMP), and ANAPI (Agence Nationale pour la Promotion des Investissements).

According to the legal framework for MSWM as part of the legislation of the protection of the environment⁴⁵, municipalities (counties) are obliged to manage waste (collection, transport, disposal, treatment). In 2013, a national sanitation policy was formulated. For the implementation of the policy, the national sanitation strategy was drafted in 2017, but has not been enforced so far. A national levy in the form of a sanitation tax has been in place to provide a basic

⁴⁵ Law No. 11/009 of 09 July 2011 on basic principles relating to the protection of the environment and Decree N ° 14/019 of 02 August 2014 laying down rules on procedural mechanisms for the protection of the environment

financing of the MSW system. Due to marginal willingness of households to pay for the weak services, the revenue collection is currently on a very low level, which leaves the municipal waste collection and management system basically without proper financial sources.

In 2014, a new electricity law was adopted in the DRC, enabling the energy sector to be opened to more independent producers of traditional and renewable energy. The liberalization of the electric power sector in the DRC and the opening of the electricity market to any operator wishing to start power production and operation are important measures of the New Electricity Law, set in motion by the Government of the DRC to attract investors to the energy sector, to promote a national energy emergence and make the DRC an energetic power. This law applies to activities of production, transmission, distribution, import, export and marketing of electricity implemented by any operator.

Outcome 1.1: Strengthened policy and regulatory environment

The outcome of strengthened policy and regulatory environment for Municipal Solid Waste Management (MSW) and Waste-to-Energy (WTE) will be achieved through the following activities.

Output 1.1.1: Municipal solid waste (MSW) assessment report - gap analysis concerning the instruments and policies already in place

As a basis for strengthening the policy and regulatory framework a MSW management strategy report for Kinshasa including a detailed gap analysis as well as policy recommendations shall be developed within the first year of the GEF Project.

The DRC lacks policies and regulatory frameworks for effective enforcement of MSWM practices. Weak or absence of institutional and legal frameworks significantly impede the development of energy/material recovery options from the wastes. The gap analysis will be conducted on policy aspects and shall lead to policy recommendations for appropriate MSWM practices. This will also include recommendations for effective law enforcement. Best practices from other Sub-Saharan African countries and cities will be considered for this purpose.

The PMU will lead the activities with the support of the MEDD leading the policy development and implementation activities concerning MSW in the DRC and coordinating the inter-ministerial negotiations to propose, adopt and enforce an improved MSW policy in cooperation with the Provincial Government of Kinshasa.

Output 1.1.2: Policies to enhance MSW and energy utilization drafted for the consideration and approval of the Government of DRC

Policy amendments shall be developed through technical assistance and in close cooperation with all relevant governmental stakeholders to ensure the approval by the Government of DRC.

Draft policy documents will be prepared to include the national level regulations needed to strengthen the central, regional and local body governments for proper enforcement of MSWM practices. Guidelines and standards for waste collection, waste sorting, transportation, processing and disposal methods will be proposed. The policy will include the country level framework needed to support the development of WTE technologies in the country. Tax incentives or duty exemptions on import of equipment for WTE technologies especially with respect to MSW shall be included as well.

Recommendations for policy amendments will be introduced in the national /provincial legislation to:

- establish a long-term financing of the waste management operations in DRC (sanitation fee/taxation strategy and policy);
- allow private entities to establish and operate waste collection/waste transfer stations including questions of taxation;
- support the utilization of waste components for recycling and energy use (waste hierarchy); support the utilization of waste components for recycling and energy use (waste hierarchy);
- property provision (i.e. land for MSW management infrastructure) and licensing for environmental activities

The policy paper prepared as described above will be submitted for the consideration of the government by end of year 2 from GEF Project start.

Main partners for the implementation of this output are – under the lead of the PMU – the MERH as the main responsible governing body on energy policy, together with SNEL, the national electricity provider, and MEDD, MOF and the Provincial Government of Kinshasa (represented through the PMP, PMENV and RASKIN/FONAK).

COMPONENT 2: ESTABLISHMENT OF A SUSTAINABLE WASTE COLLECTION AND SORTING SYSTEM IN KINSHASA

This component will focus on improving the coverage, effectiveness and reliability of the waste collection system in the city as well as the introduction of a waste sorting system at the transfer stations. Key partners under this project component are the City provincial government of Kinshasa, RASKIN and FONAK, MOI, MENV, as well as NGOs and CBOs active in waste collection and transportation.

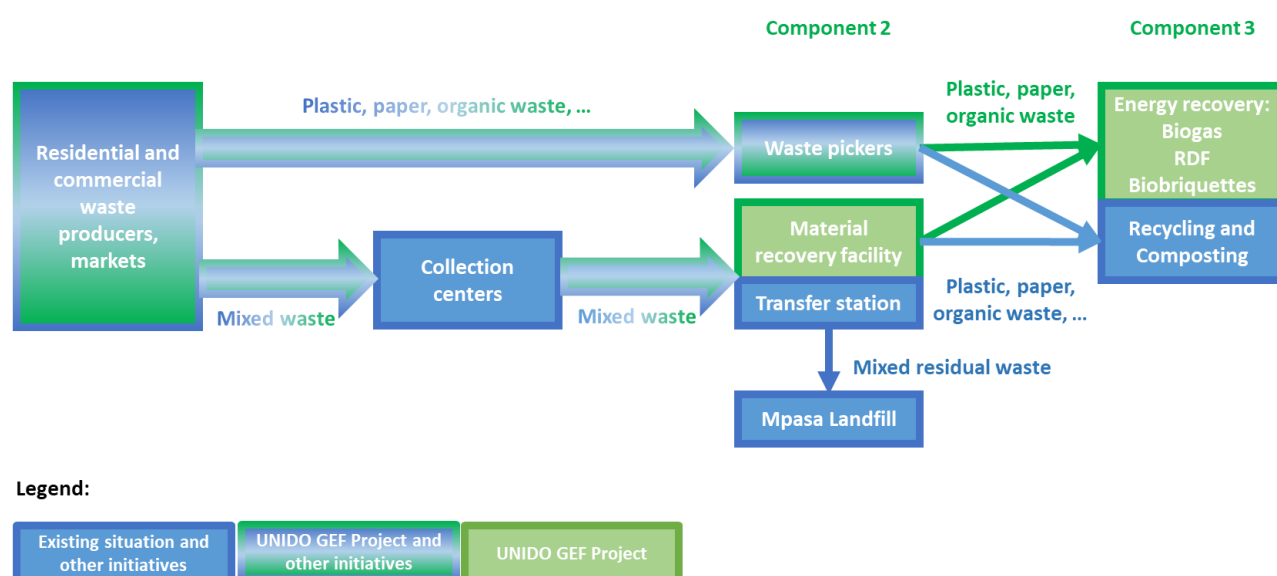
Component 2 of the GEF Project can be embedded in the planned activities by AFD and World Bank in the waste management sector in Kinshasa. At the end of 2019, the AFD waste management project “TOPETOLA - Let’s make it clean” is expected to start in co-operation with the World Bank. The project duration will be 4 years with the possibility of a two-year extension. Implementation area will be the catchment of N’djili River in the East and South of Kinshasa Province.

The produced wastes from residential and commercial areas as well as market wastes shall be pre-collected by private enterprises (awarded through a tender process Output 2.1.3). These wastes (or at least the most suitable fractions) are then send to a material recovery facility (MRF) established under this project to sort out recyclable and recoverable MSW. Ideally, this MRF will be situated in the city (to reduce transport costs) at the MSW collection facilities, such as large-scale transfer stations. Such a station is not in place yet, but information suggests that at least three of these are required and will be built by other projects in the future. If not, another suitable location will be found in the project. The remaining wastes neither recycled, nor recovered, shall then be transferred to Mpasa landfill, which is planned to be rehabilitated with some contribution of the World Bank.

Parallel to the planned MRF, there are a number of private recycling initiatives collecting certain waste components like plastic bottles for pellet production or bio-degradable wastes for briquette production and others. Those private enterprises, some of them are even registered partners of RASKIN, can be invited for a call for tenders for waste collection and waste sorting (Output 2.1.3). The MSW fractions sorted out at the MRF will be send to recyclers and energy recovery, thus they do not need to be landfilled.

Additionally, to this reduction of MSW to be landfilled, MSW fractions pre-sorted and pre-collected by waste pickers will be used for recycling and energy recovery (see Component 3). This MSW does not have to be processed in the MRF but can be delivered directly to recyclers and energy recovery. Even though not covered in this Component 2, the project’s support of these recyclers will indirectly improve MSW collection by reducing the amount of MSW to be collected by waste companies.

Figure 5 gives an overview on the proposed scheme and particularly the embeddedness of the MRF and the waste pickers in the MSW collection scheme in Kinshasa.



Outcome 2.1: Development of an efficient waste collection infrastructure and building a supply chain for sorted wastes to become useful resources for energy production

MSWM will be improved through technical assistance including trainings for public and private actors in the process of waste collection and operationalization of a sorting facility. The outcome of efficient waste collection infrastructure will be achieved through the following activities:

Output 2.1.1: Market review updated, and roadmap developed

The prime focus of any sustainable waste management is the waste collection system. The success of the waste management depends on effective range covered by the waste collection system. The resources available (equipment, trucks, workforce, etc.) at each stage of waste collection, handling and transfer to disposal facilities will be updated in a market review. Based on this review, a roadmap will be developed towards sustainable waste management practices (collection and sorting) by addressing the market and operational challenges, during the project implementation phase. The roadmap will take into account the responsibilities of key stakeholders (public and private) involved in the project implementation and provide directions for future organization of responsibilities. Stakeholder consultations and field trips for verification will be conducted under the lead of the PMU. The roadmap will also take into consideration the development of demonstration units under the Project and also future replication projects in this sector.

Output 2.1.2: Improved design for a waste collection and sorting infrastructure deployed in Kinshasa

Collection of wastes is currently established through approx. 20 municipal controlled waste collection centers (small transfer stations to collect wastes only; waste disposal to landfill) in 9 communes of Kinshasa. Sorting of wastes is not yet considered in the existing municipal MSW concept and the small municipal controlled waste collection centers.

By end of year 1 from project start international experts shall elaborate a detailed technical design concept for an integrated waste transfer station (infrastructure investment) including procedures for collecting *and* sorting of different waste fractions for further use, in particular for Waste-to-Energy purposes. The technical assistance will also support the development of a tailor-made business plan for the operation of the proposed waste sorting facility at the transfer station.

Already in the strategic and conceptual planning stage of the infrastructure investment the operational strategy/concepts need to consider in detail operational aspects of the infrastructure system until the end of its technical lifetime. The infrastructure investment needs to take into account the availability and capacities of the operational staff. Under the lead of the PMU, together with specialized waste management experts the technical and economic feasibility of the infrastructure will be elaborated with realistic input parameters (e.g. current and future energy cost, demand and selling potential, etc.) and scenarios for the project's lifetime as well as further extension options. The actual design shall consider national standards, innovations from international practice, and the suitability of materials and products in the region and specific micro situation, as well as the availability of tear and wear parts for operation and mobilization of land. For the provision of land and relevant permissions and licenses, the project will engage with the Provincial Government of Kinshasa (through RASKIN) to ensure the deployment of the necessary waste collection and sorting infrastructure at one of the newly established transfer stations.

This activity will be developed in parallel to the larger MSW projects to be initiated by the World Bank and AFD in the N'djili River catchment (part of Kinshasa province) which will consider installation of waste collection centers and transfer stations across Kinshasa. The map below shows the potential location of three waste transfer stations (see blue points) in the locations *Voie Poids Lourds*, *Zone industrielle de Limete*, and *Bd. Lumumba next Echangeur de Matete* (source: The World Bank).

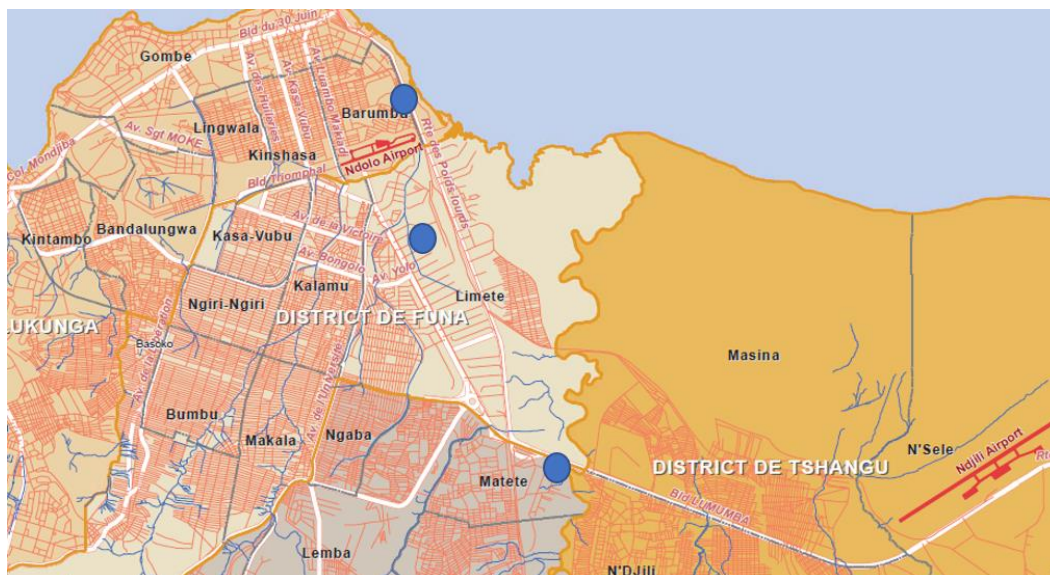


Figure 6: Potential locations of future main transfer stations in Kinshasa⁴⁶

The assumption is that this Project will develop and co-finance the sorting infrastructure at one waste transfer station, even without realization of WB/AFD projects. However, the development of the concept of the transfer station and a material recovery facility shall be made in collaboration with WB/AFD and other relevant public and private stakeholders (see output 2.1.3).

Output 2.1.3: Pilot material recovery facility (MRF) processing 250,000 t of wastes - investment initiated at selected waste transfer stations for waste collection and waste sorting

After the approval of the design concept for waste transfer stations as well as the business model for operating such facilities, pilot investments will be initiated. The current MSW framework does not foresee the separate collection and sorting of municipal wastes at dedicated facilities

At the beginning of year two a call for tenders will be launched by the MOI and the Industrial Promotion Fund (FPI) with potential assistance from UNIDO, where potential private operators will be invited to bid for the operation of MSW collection, sorting and operation of MSW components, such as bio-degradable wastes, plastics (bottles/packaging), paper and others. The final approval of the selection results will be presented to the PSC for their consideration.

The awarded companies (investor/operator) shall receive investment support through a financing mechanism that will be established with FPI. 25% of the investment cost could be provided as grant, additional investments supported through state-funded soft loans. This start-up support can be used for investments such as the acquisition of transportation and sorting equipment.

Service contracts between private operators and the municipality, as well as the authority responsible for MSWM in Kinshasa, need to be drafted. The legal framework to allow such third-party services will be amended under Component 1, to allow the transfer of funds from the waste/sanitation tax to private operators. Other sources of funding are fee collection at the waste collection centers as well as selling of waste components for recycling and WTE options. The private operators shall benefit from the business model developed under output 2.1.2.

The basic outline of the material recovery facility (MRF) is presented below. The MRF will produce three main fractions, which are organic wastes, a light fraction containing of mainly plastics and paper, and fine materials. These three fractions can be simply sorted by shredding, screening (separating the fine fraction from other fractions) and combined screening and air classifying (separating the light fraction of paper and plastic from heavy fractions). The remaining heavy fraction consists mainly of organic waste and can, depending on its quality, be used for composting, in a biogas plant, or landfilled. The fine fraction will be landfilled too, while the light fraction can either be directly used as RDF raw material, or undergo a manual sorting using the help of conveyor belts. The outputs of this final process are recyclable materials (paper and

⁴⁶ Source: The World Bank (2019)

plastic) and raw material for RDF production. This basic plant design can be easily extended further processing, for instance by manual sorting of recyclables from the light fraction at sorting conveyor belts and magnetic separation of the organic fraction (recovery of ferrous metals and improvement of the purity of the organic fraction). Component 3 will describe the further use of those components for WTE production in detail. An overview of the preliminary material recovery facility design including material flows at full capacity, as well as the estimated investment costs, are presented in Table 8 and Figure 7.

Item group	Item	MSW treated	Capacity / unit	Costs / unit	Units (lines)	Investment
		t/hr	t/hr/unit	US\$		US\$
Land	Building land 10,000 m ²				1	\$ 800,000
Building	Civil works				1	\$ 2,000,000
Machinery and equipment	Shredder	100	25	\$200,000	2	\$ 400,000
	Trommel screen	100	25	\$200,000	2	\$ 400,000
	Air classifier	50	12.5	\$100,000	2	\$ 200,000
	Front loader			\$100,000	2	\$ 200,000
	Other equipment				1	\$ 300,000
Investment total						\$4,300,000

Table 8: Estimated investment costs for a material recovery facility, capacity 250,000 t/a and 5,000 operation hours/a

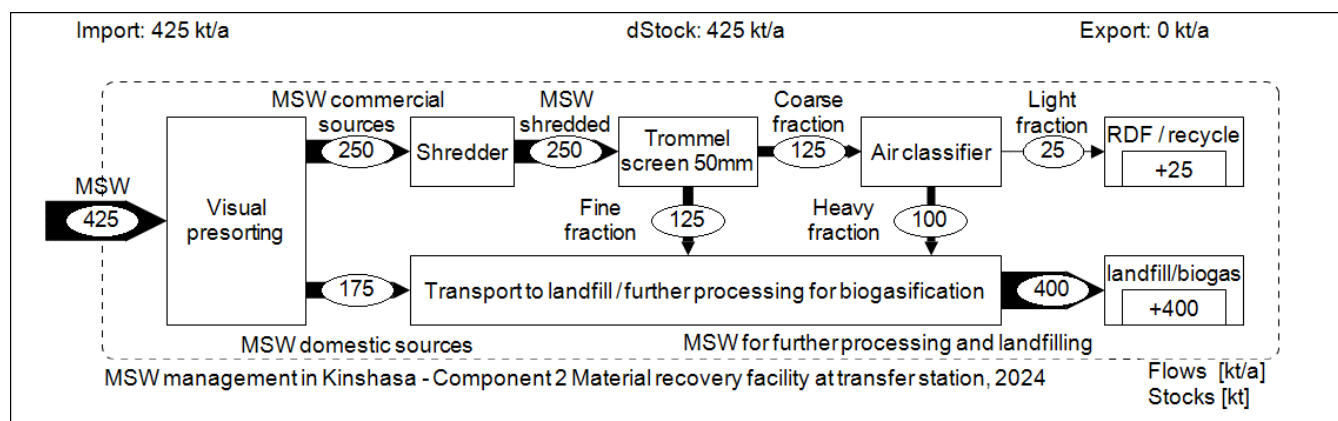


Figure 7: Material recovery facility – preliminary plant design (Component 2 - Waste Collection and Component 3 - WTE)

The installation of the MRF (investment costs approx. 4.3 million US\$) at one selected waste transfer station shall be supported through GEF Project funding (max. grant rate assumed with 25% of the eligible investment costs). The future operator of the MRF has to report on a monthly basis on the operations to the Provincial Government for monitoring purposes.

An initial Environmental and Social Impact Assessment (ESIA) has been developed for the investment case (see Annex L) that will require an update and full assessment to be undertaken during the Project, once the final site selection has been made and in order to understand all implications.

Output 2.1.4: Local businesses capacitated in establishing collection and sorting infrastructure as a paid service

To operate the described infrastructure sustainably, capacity building will be needed. The capacity development of public and private actors (e.g. RASKIN, FONAK, private enterprises, NGOs, CBOs) in the waste collection and waste sorting processes, notably the human capacity building of their key personnel, shall accompany the planned pilot investments by strengthening service delivery structures. The measures will increase the efficiency of the use of funds through improved technical and managerial skills and expertise.

Manuals and operational procedures (including training needs identification) need to be defined already in the construction phase of the waste sorting facility, and the familiarization with the infrastructure by the operator needs to start some time before the actual taking-over of the assets.

Following trainings shall be conducted, organized by the PMU and supported by international and national experts:

- At least 15 local waste collection and recycling companies receiving trainings and business development support

- Training of operator staff organized during start-up and test-run of waste sorting facility
- Contractual agreements facilitated between waste collectors, recyclers and industries (RDF supply) for long-term supply of materials.

All trainings will be documented by training/workshop reports including attendance lists.

COMPONENT 3: DEMONSTRATION OF MUNICIPAL WASTE TO ENERGY RECOVERY TECHNOLOGIES

This component has a slightly different focus than initially foreseen in the PIF. The focus will be on achieving the successful implementation of WTE options in Kinshasa, but not at the Mpasa landfill site. During the PPG phase, it was realized that installing WTE demonstration projects at a landfill that is currently not 100% operational and is furthermore away from the major energy users does not make much sense, technically and economically. The proposed project will rather demonstrate three specific applications of WTE technology close to major energy users, which are located either directly in Kinshasa metropolitan area (e.g. industrial or residential users in town) or can be reached through specific logistics by e.g. transporting residue-derived fuels (RDF) to industrial locations where the waste will be used as fuel to produce heat for industrial processes.

The aim of this component is to bring state-of-the-art WTE technology and best practices to the country in the form of highly replicable innovative technology applications using MSW residues. The penetration of waste residues being utilized for energy generation is nearly zero but provides generally high potential for demonstration and replication in DRC. The Project therefore **prioritizes: (i) the collection of municipal solid wastes and sorting into fractions that can be used, among others, for energy production; (ii) the logistics behind the collection, sorting and transferring the waste residues to those sites where they are being processed (fuel production) and finally utilized as fuel for energy generation (industries, SMEs, residential users) and (iii) finally generation of electricity and heat from waste residues for industrial and other applications.**

The Project and specifically this component focuses on three business cases that will help to mitigate the waste situation in the cities in the long-term and are best described by the following illustration and table. These are (1) utilizing biodegradable municipal wastes in a co-fermentation for biogas and energy production in industrial facilities (e.g. food industry); (2) direct combustion of residue-derived fuels in existing industrial kilns for thermal energy production (e.g. cement industry); and (3) production of bio-briquettes from organic municipal wastes replacing the widespread use of charcoal in households and public/private enterprises (e.g. for cooking, heat and hot water production).

An initial Environmental and Social Impact Assessment (ESIA) has been developed for the three pilot cases (see Annex L) that will require an update and full assessment to be undertaken during the Project, once the final site selection has been made and in order to understand all implications.

Supply Chain waste-to-energy production

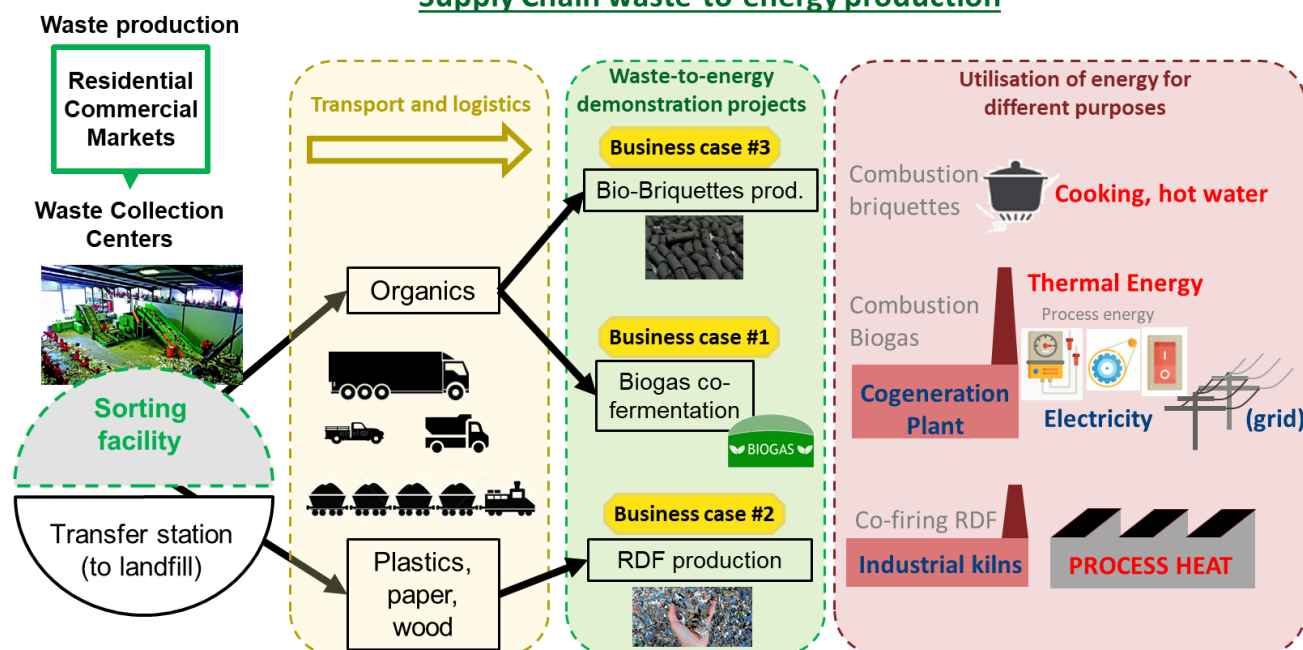


Figure 8: Illustration of the three business cases and their linkages

Business case	1. Biogas production	2. RDF production	3. Bio-briquettes production
Input:	bio-degradable wastes from MSW collection and industrial processes (co-fermentation), such as spent grains, waste waters, etc. Input (over project duration): <ul style="list-style-type: none"> 6,0000 t organic MSW 30,000 t industrial wastes 	plastic, paper and wood wastes from waste sorting facility or direct collection sources Input (over project duration): <ul style="list-style-type: none"> 40,000 t RDF raw material 	market, household and other biodegradable wastes (e.g. restaurants) Input (over project duration): <ul style="list-style-type: none"> 2,300 t
Output energy:	biogas, production of power & heat (cogeneration) Quantity: up to 2.15 mill m ³ biogas/year up to 12,700 MWh/year ⁴⁷	RDF fuel for combustion and process heat production Quantity: up to 40,000 t/a RDF up to 176,000 MWh/year ⁴⁸	bio-briquettes for cooking, heat and hot-water purposes Quantity: up to 360 t/a briquettes up to 2,000 MWh/year ⁴⁹
Estimated investment costs:	approx. 4.3 million US\$, or 3,000 US\$/kW _{el}	approx. 1.1 mill. US\$	approx. 150,000 US\$
Financing sources:	equity from industries/businesses, GEF grant, state-funded soft loan / grant from newly developed financing mechanism (FPI)	equity from industries, GEF grant, state-funded soft loan / grant from newly developed financing mechanism (FPI)	equity from local businesses, GEF grant, state-funded soft loan / grant from newly developed financing mechanism (FPI)
Target stakeholders:	larger businesses and industries (e.g. food processing, breweries)	large industries (e.g. cement), recyclers	households, small businesses, NGOs/CBOs

⁴⁷ assumption: 21 MJ/m³ (5.9 kWh/m³) biogas

⁴⁸ assumption: 16 MJ/kg (4.4 kWh/kg) RDF

⁴⁹ assumption: 20 MJ/kg (5.5 kWh/kg) briquettes

Business case	1. Biogas production	2. RDF production	3. Bio-briquettes production
Interventions by project:	<ul style="list-style-type: none"> TA support for supply chain model and business planning (incl. feasibility) co-financing of WTE technology secure off-take agreements for energy (either process energy for industry or grid) explore new dedicated financing facility for application to this business case 	<ul style="list-style-type: none"> TA support for supply chain model and business planning (incl. feasibility) co-financing of transportation, collection and on-site equipment secure supply agreements incl. transportation logistics explore new dedicated financing facility for application to this business case 	<ul style="list-style-type: none"> TA support for supply chain model and business planning (incl. feasibility) promotional support licensing and permission support quality assurance secure supply agreements explore new dedicated financing facility for application to this business case
GEF/UNIDO contribution:	TA + investment grant support for equipment purchase e.g. 100 % TA, up to 25 % investment grant	TA + investment grant support for technical adaptations & transport logistics e.g. 100 % TA + max. 25 % investment grant	TA + investment grant support for heat utilization e.g. 100 % TA + 50 % investment grant
Targeted number of supported investments:	1	1	2-3

Table 9: Business cases to be developed by the Project

Key partners under this component are the MOI, FPI, MERH, RASKIN, and industries and local businesses (incl. NGOs, CBOs) located in Kinshasa and surroundings. The demonstration plants to be foreseen in this GEF project are detailed in this project component.

Outcome 3.1: Pilot Waste-to-energy (WTE) technologies in industries implemented

State-of-the-art technology and best practices will be introduced for the first time in DRC in the form of highly replicable innovative WTE applications using different waste residues from the improved collection and sorting facility. The successful implementation of WTE demonstration projects will lead to additional energy production capacities and increase the interest and number of private sector players actively participating in innovative waste management solutions.

Output 3.1.1: Feasibilities and business models developed for local industries to utilize municipal waste and waste from industries as energy sources

The Project will launch a call for proposals for innovative WTE projects in selected project categories (e.g. the business cases presented above in Table 9). Applications will be allowed for business cases generated in or around Kinshasa province and addressed towards private businesses and industries.

Terms of Reference will be developed by the PMU in accordance with international best practice and in agreement with Project Steering Committee, addressing the following criteria (inter alia):

- Amount and type of MSW utilized
- Type of WTE application and expected amount of energy (electricity, heat) to be produced (with priority given to cogeneration opportunities)
- share of renewable energy generated (and amount of fossil fuels reduced) and consumed out of total energy demand of the business/industry
- Amount of energy to be sold to other parties (including to the national grid)
- Foreseen transportation and logistics of wastes to the WTE facility
- size of enterprise (small and medium will be favored in receiving higher % of grants)
- gender mainstreaming action plan (e.g. number of foreseen women employees, women benefitted) and related targets to enhance gender equality
- environmental policies implemented

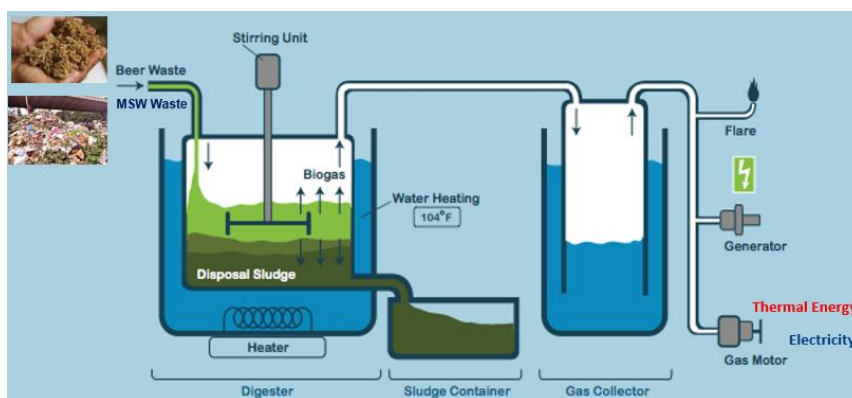
It is expected that at least 5-10 applications will be received. Out of these, the most suitable 3-5 applications will be supported with the preparation of a business plan and feasibility studies. Support will be provided as technical assistance (TA) provided under the project. The 2-3 best (most fitting applications to criteria mentioned above) will receive further support with technical, financial development and investment support. GEF grant funding from the project will be utilized to kick start these pilot projects and leveraged with a financing mechanism to be developed (part of component 4). It is expected that the grant funding intensity will be decided considering the size and financial capacity of applicants (e.g. higher grant % for small businesses).

It is proposed to establish an Expert Appraisal Group (EAG) to provide objective advice and assessment of the potential WTE projects. Such independent committee will be able to provide feedback on the technical merits of the projects to a) the PMU for a GEF incentive; b) to Mol/FPI for the allocation of financing/grants; and c) financing institutes. This will be needed for the demonstration projects, but it will also provide additional assurances to local FIs and PMU for further replication using the financial scheme in the future. The EAG is indicatively expected to be made up of 5 experts. The experts will be selected through a competitive process and technology guidance notes for the EAG reviews will be prepared by the PMU. These guidance notes will be prepared in consultation with Mol/FPI, financing institutes and UNIDO who will use the outputs from the EAG.

The following outputs 3.1.2 until 3.1.4 are related to the implementation of 3 demonstration projects as summarized in Table 9. Assumptions on technical and financial details related to the proposed business cases are described in Annex K.

Output 3.1.2: 1.35 MW_{el} biomethanisation WTE plant co-fermenting municipal and industrial wastes in industry

The first business case considered is the co-fermentation of organic MSW with food processing waste in a biogas plant. The food processing industry can supply the plant with feeding material of constant quantity and quality, and at the same time consume the heat and power supplied by the biogas plant, thus reducing the consumption of fossil fuels for heat and electricity demand. To reduce transport and transmission distances, the biogas plant should be located in the vicinity of relevant food processing industries (of which several are located in areas like Limete, Kinshasa – e.g. breweries, fruit juice producers etc.). As the waste from food processing industries will in many cases not be sufficient to produce enough energy for the industries, other feeding materials for the biogas plant are required. A source available in abundance are organic wastes that can be co-digested with the food processing waste. These wastes can come from different sources, like source-segregated MSW from markets, pure organic wastes from other food processing industries, or organic residues from the material



recovery and sorting facility. In the case of the latter, it is advised to only use these residues from more or less homogenous input fractions, i.e. market wastes instead of mixed household or commercial waste. It is assumed that approx. 20% of the food industry wastes can be co-sourced from organic MSW residues (e.g. in the range of about 3,000-5,000 t/a). The major benefit for industries will be the potential amount of self-supply of energy produced from wastes and thus the energy cost savings in the form of avoided electricity from the grid or fossil fuels (usually hard coal or fuel oil for heat production) which are assumed in the business case to be in the range of 30%. Since the proposed investment is of rather large scale (Typical size of investment US\$ 1 to 4 million, depending on the size of the plant) this project type is mainly addressed towards larger businesses or industries.

Output 3.1.3: Pilot investment 2: utilization of 70,000 t of refuse derived fuels (RDF) processed at industrial facilities

The second business case is the production of RDFs for the cement industry. The raw materials for RDF consist mainly of plastic, paper, wood, and textiles that cannot be recycled. The RDF raw materials are transported and delivered to a central RDF facility in Kinshasa where they are compacted, baled, and transferred by train to the cement factories about 250 km in

the West of Kinshasa. The RDFs would then substitute hard coal imported from Southern Africa. The two sources for the RDF raw materials are described hereafter:

The first source is provided by approx. 500 waste pickers who collect unrecyclable plastic, paper and cardboard with their pushcarts. Each waste picker can collect approx. 100 kg of high calorific RDF raw material per day, making in total 15,000 t/a (on a 300 days/a basis) or approx. 2.5% of the plastic, paper and cardboard waste generated in Kinshasa. The collection costs are 5 US\$/waste picker/day, which translates into 600,000 US\$/a or 50 US\$/t of high calorific RDF raw material. The second source is the MRF as described in Component 2. One of the outputs of this material recovery facility is the light fraction, which mainly consists of plastic, paper and cardboard. This light fraction or parts of it are the raw material for RDF production. Large material recovery facilities can process about 250,000 t/a of MSW. Assuming a plastic content of 14% and a paper and cardboard content of 6% in the processed MSW, and that half of the plastic, paper & cardboard will be diverted for recycling, the remaining will result in 25,000 t/a of RDF raw material. The yield (RDF quantity), but also the quality (in terms of heating value) of the RDF raw material from the MRF can be increased by only processing MSW rich in plastics and paper, i.e. from areas with more business activities (like Gombe⁵⁰) or MSW loads collected from commercial waste producers (supermarkets, offices). Both sources can supply in total 40,000 t/a of RDF raw material, at prices lower than the price for hard coal of 180 US\$/t. Considering the heating value of the RDF, a price of maximum 120 US\$/t RDF at the cement factory seems appropriate.

The RDF facility that receives the raw materials can be operated by a company and is preferably located in the industrial area of Limete, Kinshasa, close to a freight railway station. There, the RDF raw material consisting of about 70% plastics and 30% paper and cardboard is solely compacted (and post-screened, if required) and baled to a density of 600 kg/t. Then, it is shipped to the cement factories by train and truck for 50 US\$/t. There, it is further processed to RDF. The RDF collected by waste pickers is supposed to have a heating value of 15-20 MJ/kg (4.2-5.5 kWh/kg), and the RDF from the MRF facility a heating value of 11-18 MJ/kg (3-5 kWh/kg), thus on average about 16 MJ/kg (4.5 kWh/kg). Hence, 1 t of RDF would substitute 0.62 t of hard coal (heating value 26 MJ/kg or 7.2 kWh/kg). Of the total hard coal demand of the three integrated cement plants in the DRC, which is currently approx. 180,000 t/a, a total of 13% (24,600 t/a) of hard coal can then be substituted by 40,000 t/a of RDF. Figure 9 shows the scheme of the RDF facility.

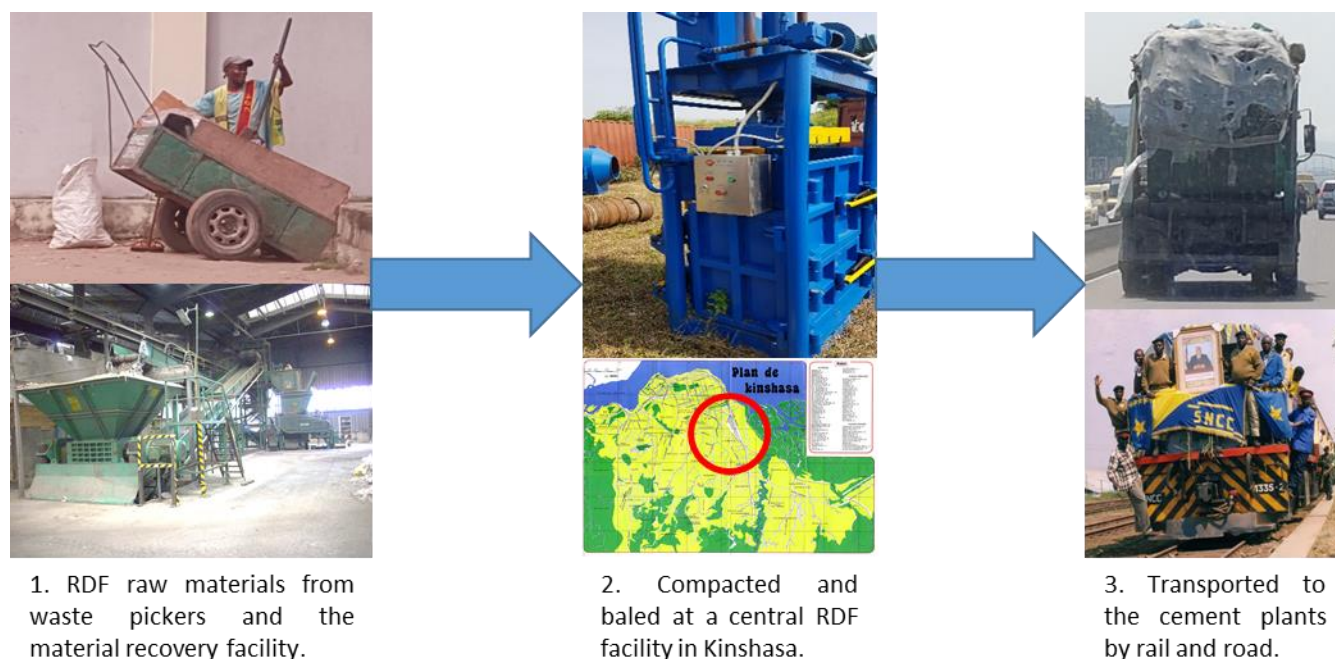


Figure 9 Scheme of Output 3.1.3: Utilization of refuse derived fuels (RDF) at industrial facilities⁵¹.

⁵⁰ Ukondalema, 2016

⁵¹ Sources: Wikimedia Commons Contributor (2015). First train in Kindu, DRC.jpg. Wikimedia Commons, the free media repository. Wikimedia Commons Contributor (2014). Kinshasa 2001.jpg. Wikimedia Commons, the free media repository.

Output 3.1.4: Pilot investment 3: utilization 2,300 t of market wastes for production of bio-briquettes

Ecological briquettes are compacted combustible material that are created from biomass residue (biodegradable waste), charcoal dust or coal dust and can be used as an alternative form of fuel for heating or cooking. Ecological briquettes are products of the densification process, which is a two-part process that involves compaction (reduction in volume) and binding (ensuring the product remains in the compacted state). Especially in combination with energy saving stoves, that should be also promoted, briquettes can become a sustainable and affordable alternative to the traditional fuels. The ecological briquettes production process is a two-step process.

Briquettes can be made from almost any type of biomass source with sufficient energy content and density and other desirable characteristics, such as low moisture content, low ash content and uniform formation (granular). The main sources of feedstock for briquette production include agricultural, wood processing, household, municipal and charcoal processing waste, as well as animal manure.

- c) Agricultural waste includes husks (rice, coffee, coconut), bagasse, pineapple pulp, sisal fiber, maize cobs, maize stalks and nut shells (macadamia, peanut);
- d) Wood processing waste includes sawdust, woodchips, tree barks and wood shavings;
- e) Household and municipal waste includes paper, food waste and wood;
- f) Charcoal processing waste includes charcoal dust and specks.

Carbonization
of feedstock



Extruding
or pressing



Drying



The first step is the carbonization of feedstock. For the carbonization process simple kilns are needed. After carbonizing the agricultural residues, the char-powder is sieved and stored. The main production process should be done on a central large-scale production plant with motorized machines (extruders or presses) to assure constant high quality and enough quantity to meet the demand. The feedstock shall be collected regularly at a fixed unit price from the different providers (pre-collectors) and transported to the production site.

COMPONENT 4: REPLICATION AND SCALE UP

Discussions during the PPG stage revealed that lack of awareness and confidence in WTE technology and the MSW management in general among private sector remains one of the major hurdles. In addition, the banking sector is not really developed leading to missing financing opportunities among businesses. However, during the PPG stage the interest of the FPI organized under the Ministry of Industry has signalized to offer a mix of state-supported soft loans (with lower interest rate) and grants to projects developed under the UNIDO-GEF initiative, however, they expect partial risk guarantee to cover partially non-performing loans (mainly issued to SMEs) be covered through GEF funds. Hence, under this project component, efforts will be taken to establish a financial mechanism using a combination of subsidies, lower interest rate based on partial risk guarantee assured through the GEF Project. Such a scheme will be detailed once the amounts of funds to be made available by the Government of DRC will be available during the project implementation stage.

As of now, the level of investments in energy projects apart from hydropower is very low. One major reason for this is the lack of conducive environment for investments and still de-facto monopoly energy supply market. Hence to mitigate this barrier, a specific financial incentive scheme for promoting investments in WTE projects will be created.

Outcome 4.1: Potential for replication assessed

The outcome of the below activities is that all preparatory works and support measures required for any future scale up projects are made available and that interest from private sector and municipal operators across other DRC cities based on the successful implementation of pilot activities in Kinshasa increases.

Output 4.1.1: Waste collection/sorting, WTE potential and business opportunities for replication projects assessed

Other than the development of WTE projects in Kinshasa, the proposed project will also carry out a nation-wide assessment on the WTE potentials in the country. This will help in identifying other potential sites for WTE projects in DRC. Five potential sites will be identified during the country wide study and feasibility studies will be conducted for these sites. If the projects are found to be feasible, a detailed business plan will also be developed to identify the funding options, considering the availability and extension of the financial incentive scheme to be developed under this component (see output 4.1.2). This will serve as an initiation for the replication projects.

Private sector service providers, entrepreneurs and other NGOs/CBOs will be encouraged to take up the implementation of potential replication projects in other sites. Banks and financial institutions will be encouraged to engage in the financial incentive scheme and provide competitive loans in addition to the FPI mechanism for these projects.

The results of this assessment will be included in a nation-wide replication strategy that will be developed and published/promoted during the year 4 of the project intervention.

Project activities will be led by the PMU in cooperation with international and national experts.

Output 4.1.2: Financing mechanism for scale-up of waste collection/sorting and WTE applications established

A GEF-related investment support allocation of total US\$ 2.9 million (components 2, 3 and 4) will be reserved for setting up the financial incentive scheme including a possibility to issue direct grants for demonstration projects in component 3 (as mentioned depending on the size as well as the financial capacity of the project), from which about US\$ 0.7 million will be reserved to provide a partial risk guarantee fund (funded by GEF), and combined with a financial scheme (funds provided by the Government of DRC, through FPI) using the principles of incremental cost for supporting private investments in WTE projects directly participating in the project. Installed capacity-based incentives shall be given to the demonstration projects based on the level of investment needed. Such incentives shall be disbursed on a pro-rata basis on the development in project implementation.

Using respective co-financing from Ministry of Industry and FPI, who has prior experience in operating financial facilities, an appropriate financing scheme at lower interest rates (compared to commercial interest rate) for around US\$ 10 million (according to PIF) will be proposed for the benefit of developers of pilot and replication projects. The credit risk guarantee fund will be considered in addition to cover the risk of non-performing loans (e.g. in the range of 15-20% of loan volume) from GEF funds through a revolving mechanism.

Guidelines for implementation of this financial incentive scheme will be developed in the course of the Project together with the Ministry of Industry and FPI. Around US\$ 75,000 of the GEF grant will be used to develop the replication strategy and create the modalities and facilities of the proposed financial scheme to be used for other waste-to-energy projects in the future.

This scheme will be used for providing a combination of GEF incentives and government-led financing (through the existing soft loan and grant scheme offered by FPI) to the demonstration projects to cover incremental cost. The financing will facilitate replication projects. The level of subsidy will depend on which category the project falls into as well as on the technology, the application and the financial returns or viability gap of the project, without the GEF-UNIDO support. This is expected to be between 10% and 30% of the capital costs, as experiences from other similar projects developed and implemented by UNIDO with GEF support (e.g. in Tanzania, Kenya or India) have shown. The GEF grant can be used to directly support pilot projects or by using parts of the grants for setting up a guarantee facility that will allow backing up non-performing loans under the financial scheme.

An exit strategy will be developed in the course of the setup of the financing scheme by the PMU in cooperation with the relevant government stakeholders, and discuss with the owner of the existing fund, the Ministry of Industry, on the future ownership of the fund after project termination.

Selection criteria and selection procedure for identification of demonstration projects

The procedure suggested will include calls published and a two-stage selection process (refer to output 3.1.1); initially an Expression of Interest will be submitted (including pre-feasibility studies and/or business plans) and assessed against the selection criteria. The Project will disseminate the information about project calls and will support potential applicants in

delivering the applications. Successful project applications at the first stage will enter into negotiations regarding the FPI soft loan and the possible GEF subsidy and will be further receiving technical assistance in the second stage by the Project.

Since DRC is ranked 150 from 157 in the Gender Inequality Index (GII)⁵² and is a country, in which sexual violence was commonly used as a weapon of war⁵³ and maternal mortality is amongst the highest in the world⁵⁴, the selection criteria for companies establishing the demonstration projects will be gender sensitive. In particular, all companies participating in the project as beneficiaries are required to have effective measures to eliminate sexual harassment in the workplace and provide maternal healthcare.

The allocation of demonstration projects will fall into two categories:

Category 1: Projects for installation of waste collection and sorting facilities, including investments in transportation equipment for waste and recycling materials.

Category 2: Projects for installation of waste-to-energy technologies using any of the major waste sources:

- i. Utilization of biodegradable (organic) wastes, incl. food and market wastes, garden wastes or bio-wastes from industrial activity
- ii. Utilization of wood wastes from processing and/or construction activities (other than covered under (i))
- iii. Utilization of plastic wastes
- iv. Utilization of paper wastes

Technical assistance will be provided through the GEF project to facilitate the demonstration projects' development and their implementation.

As a conclusion, since the WTE technology has not been introduced at all in DRC, it is essential that the financial support is provided upfront to drive the private investments for the initial demonstration projects. Discussions during the PPG phase as well as experiences gained in other developing countries have proven that it is not possible to have demonstration projects without any financial support. Also, the technology and the market is at a very early development stage for WTE investments in DRC and hence, technology popularization cannot be done directly without demonstration projects.

Outcome 4.2: Capacity of key players in municipal administration, target businesses/industries enhanced

The following activities will be carried out to improve the capacity of all stakeholders involved in MSW management and WTE sectors in the country:

Output 4.2.1: Training and capacity programs on waste collection, sorting and utilization of residues organized

Workshops will be organized by the PMU and conducted for the following three target groups: (i) Government officials, (ii) public and private MSW service providers (e.g. RASKIN, FONAK, private waste collection & recycling businesses, NGOs/CBOs), (iii) WTE operators (industries, businesses).

The workshops will mainly focus on issues of rapid urbanization, new and improved government policies (linkage to component 1), infrastructure enhancement, investment strategy, public participation, awareness on business opportunities cost saving benefits of MSW and planning for Integrated Solid Waste Management (ISWM), and benefits of WTE technologies. It will also bring together the experiences of service providers and other stakeholders in MSW management.

Capacity building activities will result in the following:

- g) At least three training sessions for each of the 3 target groups conducted, in different DRC cities (across the country)
- h) Train at least 45 personnel from each of the target groups
- i) Up to 25% women participation

In addition, it will also share the success and lessons learnt from demonstration units and need for replication of similar projects throughout the DRC. The lessons learnt from demonstration units will be properly documented and presented in

⁵² <http://hdr.undp.org/en/indicators/68606#>

⁵³ <https://www.unfpa.org/news/empowering-women-and-girls-democratic-republic-congo>

⁵⁴ <http://hdr.undp.org/en/indicators/89006>

the stakeholder workshops as part of the knowledge management activities. These materials prepared will serve as document for evaluating the project achievements as part of Monitoring and Evaluation component 5.

Output 4.2.2: Sharing of the best practices from other countries on MSW management, energy recovery and recycling

The PMU will organize for government officials from the concerned ministries a study tour to MSW management projects implemented in other countries for better understanding and applying suitable technologies in the DRC. The replication projects will take the best practices followed in MSW collection, disposal, handling, energy recovery and material recovery for recycling by the other countries for their effective implementation.

The overall success of the project lies in understanding the importance of waste management by the general public and other relevant stakeholders. Hence, the project will encourage and support all types of promotional activities such as awareness campaigns, advertisements, hand-outs, posters, etc., on effective waste management. NGOs will be involved to educate various stakeholders such as schools, hospitals, institutions, households, etc., on waste categorization and source segregation. The awareness campaigns will also focus on the concepts of 3Rs (reduce, reuse and recycle).

Methodologies/tools will be developed to use the collated information for better planning and decision making. Case studies will be prepared and presented to increase more investments in similar projects using the trained capacity that is created. An annual report and periodical newsletter on best practices, information on country level projects and key indicators of progress made under the project will be prepared and distributed to key stakeholders and agencies. Full scale project demonstration site visit and seminars will be organized, and the project experiences will be disseminated to various interested stakeholders in order to increase the replication potential of the project. Various tools, such as leaflets, website, etc. will be used for effective dissemination.

A national conference will be organized in the framework of the Project covering topics as the growing urbanization and urban infrastructure challenges, and specifically on MSW management and on waste-to-energy promotion. The event should provide the country the opportunity to invite international experts and representatives from other Sub-Saharan countries to exchange experiences and discuss way forwards. The event could be also hosted under the UNIDO-promoted SADC Centre for Renewable Energy and Energy Efficiency (SACREEE) where DRC is a partner state, to address the issues of MSW and energy development in the region.

COMPONENT 5: MONITORING & EVALUATION

The overall objective of this component is to ensure continuous monitoring and evaluation (M&E) of the implementation of the UNIDO-GEF project conducted in accordance with established GEF and UNIDO procedures and guidelines. This will be achieved through:

- Establishment of Project Management Office (PMU) and Project Steering Committee (PSC)
- Establishment and implementation of an adequate and systematic monitoring, evaluation (M&E) and reporting of all project indicators following UNIDO and GEF procedures to ensure successful project implementation;
- Timely and continuous dissemination of project activities and results through the PMU

All monitoring and evaluation tools and documents, such as the monitoring plan, progress reports, final evaluation report, and thematic evaluations (e.g. training needs assessment), will include gender dimensions, and report with respect to an baseline for gender related targets.

Outcome 5.1: Continuous monitoring and evaluation (M&E) of the implementation of the GEF/UNIDO Project conducted in accordance with established GEF and UNIDO procedures and guidelines

This will allow not only the monitoring of the project's progress in terms of the components and outcomes, including GHG emission reductions to be achieved, but also the construction of an overall project impact assessment on a rolling periodic basis. The analysis of the M&E and impact assessment results of the different components will allow for periodic reviews of the project's results framework and subsequent implementation strategies and work plans and measurement of progress against GEF Core Indicators, co-financing, gender, stakeholder engagement, environmental and social risks and corresponding management plans as relevant. Beyond this tailor-made M&E approach, the proposed GEF Project will also follow the UNIDO's standard M&E approach for GEF funded projects.

Output 5.1.1.: Terminal evaluation conducted.

The activities include the preparation of the M&E plan and its acceptance, annual project implementation reports (PIRs), mid-term and final evaluations, and the project terminal report. The PMU will prepare the Terms of Reference (TORs) for the recruitment of an independent evaluator that will perform the terminal (final) evaluation of the project. Achievements made up to this stage should be identified and compared against baseline and targets, impacts and sustainability of results assessed in order to evaluate the overall project performance during its implementation period. This evaluation should be carried out three months prior to the end of the project.

Output 5.1.2: Project's progress monitored, documented and recommended actions formulated

The PMU will develop a detailed working plan for the execution of the project (schedule, roles, responsibilities, milestones, etc.). This plan should consist of all the necessary items to be applied during project execution and should be designed following GEF and UNIDO procedures. The plan should have a logical framework that captures the identified indicators per outcome and/or output.

A proper M&E framework should consist of the following:

- *Monitoring process*: it refers to the continuous process of collecting data on the agreed indicators to provide information on the extent of progress and achievements made. Monitoring should be conducted following specific procedures to collect and manage information, data and variables. Procedures already in place in the country to track variables and synergies with other ongoing initiatives will be taken into consideration.
- *Evaluation process*: it refers to the action of assessing the achievements in comparison to the original baseline scenario (at any given moment during implementation) and to the expected targets. A proper evaluation frequency will be selected in accordance with the type of activity under execution and the targets (i.e. minimum once a year).
- *Reporting process*: refers to the systematic and timely provision of essential and useful information showing how the country is progressing toward the achievement of the project's goals. Reporting will take place a periodic intervals and result in the publication of progress reports and corresponding monitoring and evaluation reports.

The National Project Coordinator will be responsible for the design of the M&E framework and to provide the necessary capacity building to those involved in the implementation of the M&E framework.

Assessment of the project results and preparation of learning, good practice and case studies for dissemination of the benefits of WTE projects and the productive applications achieved through these projects will be provided. Lessons learnt will be summarized and publicized towards the end of the project, using available distribution channels (website, social media).

Component 5 activities will be carried out through well-defined responsibilities of the project management unit (PMU) as described under the Section A.6 (Institutional arrangements and co-ordination) of this document. GEF resources will be used for technical assistance and hiring experts for independent evaluation of the project (refer to section C).

A.1.4. Incremental/additional cost reasoning and expected contributions from the baseline, the GEFTF, LDCF, SCCF, CBIT and co-financing

The proposed project is developed under the GEF-6 Climate Change Mitigation Focal Area Strategy Program 1 ('promote timely development, demonstration and financing of low-carbon technologies and mitigation options') with the objective to "promote innovation, technology transfer and supportive policies and strategies. GEF resources therefore play a key role in piloting emerging innovative solutions, including technologies, management practices, supportive policies and strategies, and financial incentive mechanism in combination with improved MSW management and waste-to-energy solutions.

By means of this Project, global environment management indicators will be developed as a part of the national energy and environment management systems in DRC and practices under the international conventions to which the Democratic Republic of Congo is a party and thus will be improved.

The Project will look into solutions contributing towards integrated urban management and infrastructure investments that include municipal waste management and clean energy solutions, and structural resilience against projected climate change effects such as fluctuations in energy sources and demands and extreme environmental and socio-economic

impacts. Through the GEF intervention, the regulatory and policy environment for the waste management sector will be strengthened. The Project will contribute to the twin goals of establishing an effective MSW management for Kinshasa city and promoting WTE projects in DRC. This intervention will also help offsetting the GHG emissions from the currently inappropriate waste management system. More employment opportunities will be generated through these project activities helping to alleviate the existing poverty level in the country.

Based on the successful demonstration of this proposed project, it is envisaged that similar waste-to-energy generation projects will be replicated and scaled up in the future. This will be achieved through mitigation of risks and barriers, engagement of public-private partnership/investment and creation of conducive policies/support mechanisms.

In the absence of this GEF project, the approach to waste management in DRC would continue to remain largely disorganized and under-resourced, and valuable resources (e.g. in the form of organic wastes, plastics, paper and wood) will remain unutilized and disposed of illegally or inappropriately. Waste-to-energy applications will not be established at all or only marginal in number and scope, and, at best, remain limited to a small number of applications in large-scale industries. The GEF budget will be used to kick-start the valorization and supply of collected and separated wastes at special material recovery facilities and enable the production of energy sources that can be used in small-scale businesses or households, but also larger businesses and industries.

This will be done through a combination of technical assistance and investment support. The project will explore and develop a dedicated credit support option to allow project sponsors to obtain grants and soft loans through a financial schemes and will aim for a maximum triggering effect for the type and size of most relevant waste-to-energy applications. The project is expected to leverage significant private sector investment through the Call for Proposals during the implementation phase. UNIDO's best practice suggests that a limited triggering financing support, combined with tailored technical assistance typically yields the best results.

During PPG, project preparation team had difficulties to obtain co-financing letters from the public sector due to the recent national and provincial elections and new governments not in place so far. Therefore, the stakeholders to be engaged through that Project have expressed their interest and commitment and general willingness to financially contribute to the Project activities but have not been able to issuance formal statements by now. Apart from governmental contributions to establish a financial incentive scheme in the form of a Fund set up within FPI, co-financing for the investments in the waste collection, sorting and WTE demonstration projects will be ensured by target enterprises. Depending on the size of businesses involved, between 20% - 70% of the investments are expected to be materialized by beneficiaries' own sources (in the form of equity). Further co-financing will be obtained from the National Government's (MOI and FPI) as well as UNIDO's cash and in-kind contributions from national activities on policy development, research, capacity building and awareness creation.

A.1.5. Global environmental benefits (GEFTF) and/or adaptation benefits (LDCF/SCCF):

GHG emission reductions (ERs) are the result of the project components 2 (waste collection) and 3 (WTE). They can be distinguished in ERs achieved through the project (direct) and others achieved by the replication and scale-up of project components in Kinshasa and other cities in the DRC (indirect). A further distinction is made between direct ERs during the project period (2020-2023) and the post-project period (2024-2043).

Details on the GHG ER calculation are found in Annex J.

Direct GHG emission reductions

Under Component 2, waste collection will become more efficient, and raw materials for RDF production are diverted from the amount of MSW to be transported to the landfill.

Under Component 3, MSW will be diverted from the disposal routes MSW dumped, disposed of into rivers, landfilled, and burned. These means a reduction of the generation of CH₄ from landfilling, dumping, and river disposal of organic MSW, as well as the reduction of CO₂, CH₄ and N₂O from open burning of MSW. Furthermore, fossil fuels will be substituted by renewables, in the case of Pilot 1 heavy heating oil by biogas from organic MSW, and in the case of Pilot 2 hard coal by paper and cardboard MSW. In the case of Pilot 3, charcoal from primary forests will be substituted by bio-briquettes from organic MSW. The direct GHG emission reductions achieved by these measures are shown in Table 10.

The associated ER of GHG are 123,450 t CO_{2eq} for the project period and 1,372,474 t CO_{2eq} for the post project period.

	Technology	Waste processed t	Emission reduction		
			t CO _{2eq}	t CO _{2eq} /a	t CO _{2eq} /t MSW
1. Direct project emission reductions 2020-2023 (4 yrs)	Component 2				
	Collection	35,000	178	89	0.01
	Component 3				
	Biogas	36,000	34,012	6,802	0.94
	RDF	70,000	80,568	16,114	1.15
	Bio-briquettes	2,310	8,870	1,774	3.84
	Total	143,310	123,450	24,690	
2. Direct post-project emission reductions 2024-2043 (20 yrs)	Component 2				
	Collection	500,000	2,539	127	0.01
	Component 3				
	Biogas	378,000	349,152	17,458	0.92
	RDF	800,000	926,316	46,316	1.16
	Bio-briquettes	25,200	97,006	4,850	3.85
	Total	1,703,200	1,372,474	68,624	

Table 10: Direct GHG emission reductions of Component 3, post-project (2025-2044)

Indirect GHG emission reductions

Indirect GHG emission reductions are assumed for a replication and scale-up of the proposed pilots to a national level in the post project period 2025-2044. For replication of the biogas demonstration, it is assumed that a second major brewery in Kinshasa will co-digest 18,000 t/a, while three smaller breweries in other cities in the DRC (Lubumbashi, Bukavu, and Kisangani) will co-digest each 3,000 t/a. Thus, in total, 27,000 t/a of organic wastes (MSW and industrial wastes) will be co-digested in addition to the described project case. For the RDF demonstration, it is assumed that small-scale RDF collection will be extended in Kinshasa and implemented in the cities of Boma and Matadi. Both cities are much closer to the cement factories (50 km), costs for transport should be lower and thus, the amount of money to be paid to waste pickers higher, resulting in an assumed amount of 10% of MSW annually generated to be used as RDF. Both would result in additional 15,000 t/a of RDF. In addition, a second large-scale RDF production plant may be erected in Kinshasa, producing the same amount of RDF as the one described in the Pilot case (25,000 t/a). Given an urban population of 25 million⁵⁵, the potential of upscaling of bio-briquetting is huge and in contrast to biogas and RDF not limited to cities with a substantial industry in their vicinity (food processing, cement production). However, within the course of this project it is assumed that 100 potential producers are trained, and 20 of these, start to produce 12 t/a of bio-briquettes, which equals over a period of 20 years in total 840 t/a of organic MSW. The assumptions regarding emission reductions are shown in the table below.

The associated indirect post-project ER of GHG are 1,340,139 t CO_{2eq}.

	Technology	Waste processed t	Emission reduction		
			t CO _{2eq}	t CO _{2eq} /yr	t CO _{2eq} /t MSW
3. Indirect post-project emission reductions 2024-2043 (20 yrs)	Component 2				
	Collection	500,000	2,539	127	0.01
	Component 3				
	Biogas	360,000	332,526	16,626	0.92
	RDF	800,000	926,316	46,316	1.16
	Bio-briquettes	16,800	64,670	3,234	3.85
	Total	1,676,800	1,340,139	67,007	

⁵⁵ World Bank. 2017. Democratic Republic of Congo urbanization review : productive and inclusive cities for an emerging Congo (English). Directions in development; environment and sustainable development. Washington, D.C. : World Bank Group.

	Scale-up factors	t MSW/year	Assumption
3. Indirect post-project emission reductions 2024-2043 (20 yrs)	Biogas	18,000	15,000 t/a is co-digested in a second large brewery in Kinshasa, and 3,000 t/a in three smaller breweries in other cities
	RDF	40,000	The MRF capacity in Kinshasa is doubled to 250,000 t/a MSW treated (25,000 t/a), and waste pickers deliver another 15,000 t/a of RDF raw materials, from Kinshasa, but also from the cities of Boma and Matadi (500,000 capita).
	Bio-briquettes	840	100 producers trained, and of these, 20 start to produce 12 t/a of bio-briquettes, which equals 840 t/a of MSW input

Table 11: Indirect GHG emission reductions of Component 3, post-project period 2025-2044

Reduction of marine littering of plastic waste

By increasing the amount of plastic to be recovered as RDF, the amount of plastic disposed of into rivers is assumed to be directly reduced by 8,403 t during the project period (2020-2024) and by 83,335 t in the post-project period (2025-2044). The indirect reductions of plastic marine littering during the post-project period are in the same range as the direct reductions (83,335 t).

Natural resource conservation

The recovery of MSW to different types of fuels and energy will reduce the pressure on natural resources, i.e. fossil fuels by the substitution of fuel oil and hard coal by biogas and RDF (Pilot 1 and 2), and virgin rain forests by substituting charcoal with bio-briquettes. The regarding direct and indirect natural resource conservation estimates are shown in Table 12.

	Period	Pilot 1 (biogas substituting fuel oil)	Pilot 2 (RDF substituting hard coal)	Pilot 3 (bio-briquettes substituting charcoal)
		t fuel oil	t hard coal	ha virgin rain forest
Direct natural resource conservation project period	2020-2023	15,240	67,692	17
Direct natural resource conservation post project period	2024-2043	152,400	492,308	119
Indirect natural resource conservation project period	2024-2043	152,400	492,308	76

Table 12: Direct and indirect natural resource conservation of Component 3

A.1.6. Innovativeness, sustainability and potential for scaling up

Innovation

The Project aims to facilitate innovation and technology transfer, with supportive policies and strategies. It proposes an innovative solution for the twin problems of lack of waste collection capacity and energy production by developing the whole value chain, from the waste production until the supply of valuable waste residues for productive energy use by means of WTE based technologies.

The innovative approach for improving the inappropriate waste collection situation in Kinshasa will be the first-of-its-kind in DRC, with a waste sorting facility built on a major waste transfer station and introducing a new dimension to not only treat MSW as refuse, but, alongside a long-term requirement towards prevention and recycling of waste, start treating wastes as valuable resources and fuels for energy production. So far, there has been almost no awareness among the governmental decision-makers and only very little among private businesses and end users. The Project will create

awareness and capacity by supporting and developing new business models associated with the sourcing of wastes and, among supporting the waste management responsibilities of the public operators, enable business-to-business (B2B) solutions in the organization and utilization of waste resources.

Also, a financial incentive mechanism will be set up for attracting investments in WTE technology. It will support small-scale entities such as NGOs/CBOs and small businesses as well larger enterprises and industries to establish private operations and investment in the areas of waste collection, transportation and logistics, operation as well as energy production. Public sector will benefit from capacity-building and technical assistance to be provided in the policy and institutional framework, and further establishing public-private partnerships to overcome the current lack of personal and financial capacities observed in this field. Initial demonstrations facilitated in Kinshasa and best-practice cases from other countries in the region will lead to replication in other cities and parts of the country, and it is expected that, as a result of the project, more WTE projects will be established across DRC.

Sustainability

The design of each project activity and selection of counterparts is premised on ensuring long-term sustainability of the change that this GEF project will catalyze. Fundamentally, there needs to be national ownership of all interventions and their mainstreaming into the operations of the national entities to ensure that institutions will be responsible for taking actions forward beyond the project implementation period. Since MSWM is of overall importance for a country that is facing a dynamic development of urban population growth and public services have not received the attention required over many years, the Project will contribute towards the transformation of the municipal solid waste management to a more sustainable, service-oriented basic infrastructure by addressing the following market-based mechanisms:

- a) Efficient waste collection and sorting system ensuring properly collected and environmentally safe treatment of waste residues, including their transportation to processing facilities;
- b) Generation of revenues from waste collection, waste processing and waste-to-energy plants that are invested and operated under public and private sector cooperation;
- c) Technology transfer to be achieved and local skills developed to manage waste processing and WTE plants, capacities built among governmental decision-makers, operators and final beneficiaries of wastes being treated as resources (including for energy production).

Environmental sustainability. In the long-term, the improved waste handling, collection, transportation for re-use, recycling (for recyclable materials) and recovery of waste residues for energy production will help mitigating the severe negative environmental impacts on human health and environment that currently prevail – (i) Uncollected wastes placed on the ground result in unsanitary conditions, (ii) polluted water flowing from waste dumps and disposal sites can cause serious pollution for the surface water and the surrounding environment, (iii) flies and mosquitoes breed in some constituents of solid wastes, flies and rats are very effective vectors that spread diseases, (iv) dangerous items such as broken glass, razor blades, needles and other healthcare wastes pose risks of injury or poisoning, particularly to children and people who are engaged in waste sorting and handling, and finally (v) burning waste on the streets can cause major air pollution, affect the climate change by increasing GHG emissions, beside the effect on human health by causing illness (respiratory diseases) and the risk of fire can spread to the adjacent properties, and make unsecured disposal sites dangerous.

Economic & financial sustainability. The demonstration projects under component 3 are real investment projects where the owners would provide equity and secure debts/loans from the FPI fund and other financing sources. The installations will be done only after conducting a proper resource assessment study, feasibility study and business plan. Efficient waste collection system ensures that wastes are properly collected and transferred to plant sites. Before the actual plant operation, the O&M staff would be trained by the equipment supplier. Appropriate warranties, guarantees and after sales service agreement will be obtained from the technology suppliers. As such, the owners (i.e. the industries) will have a vested interest that the sub-projects operate successfully for them to recover their investments and also repay the loans. As such, given the commercial interest in sustaining the operations of the projects, the different proponents will have an interest in keeping the projects running and hence sustain the global environmental benefits beyond the project lifetime. Furthermore, the providers of debt investments to these projects will provide continuous monitoring for the projects and provide support where required.

Social sustainability. The Project addresses the lack of technical and managerial capacity in the public waste management sector and will enhance initiatives established with the involvement of the private sector. Business start-ups, but also non-government organizations (NGOs) and community-based organizations (CBOs) are usually the main subjects involved in waste management, since they represent informal actors in the urban waste management system, however, they contribute effectively to the public waste collection services.

Specific technical training and general capacity building measures are included in the project components 2 and 4 to improve the capacity on public and private levels. The trainings will include target-specific sessions ensuring that staff from various stakeholders will be in a position to mainstream improved waste collection and waste-to-energy solutions in their institutions and be in a position to provide similar trainings to representatives in other regions of the country. The project will also provide training to government agencies for creating conducive policies with incentive mechanisms to make the investment feasible to the end-user.

In addition, employment opportunities will be increased for both women and men in the waste management business and thus local and national economy will be reinforced. Also, social sustainability will be strengthened due to the systematic gender mainstreaming of the project during the whole project cycle.

UNIDO has remarkable experience in implementing WTE projects across the developing countries in Sub-Saharan Africa. It has implemented projects in South Africa, Tanzania, Kenya, Nigeria, etc., and several other projects are under implementation. UNIDO's experience and lessons learnt from all these other projects and partnership in African regions will be used as and when required for sustainable operation of the proposed project.

Replicability

Improved capacity building in public and private sector will remove significant knowledge barriers regarding waste management. Support policies and availability of grants and loans from a national fund under the FPI will encourage service companies, private entrepreneurs to invest into waste management logistics and operation, and especially into waste-to-energy facilities, leading to additional scale-up projects. The proposed project will also provide technical assistance in developing feasibility studies as well as business plan reports for demonstration projects. Public private partnerships established will encourage future scale up projects under similar approach. The successful implementation of proposed business models and demonstration projects will create confidence for further investment in replication and establishment of new businesses in the waste sector across the country.

The replication potential is significant, based on the enormous amount of wastes uncollected and disposed of in uncontrolled manner, together with the huge potential to valorize wastes and creating a circular economy, and thus initiating a low-carbon transformation of the waste management sector in DRC.

Replicability will be ensured through the documentation and widespread dissemination of the project demonstration results. The dissemination of the results of the sub-projects, including results from their energy performance monitoring, and barrier removal activities will also provide a better understanding of the success/failure factors and issues regarding such projects. Likewise, the demonstration projects will showcase the ownership and management structures employed for consideration by future projects. Publication of case studies of successful implemented projects will be used for future project development. The replication factor will also be enhanced through more informative exchange, awareness raising, public participation, demonstration and site visits.

Word of mouth is one important factor for replication among local businesses, entrepreneurs and investors entering this market, so it is crucial that the pilot installations show economic success in new business segments with a large potential for growth – which is very likely for the anticipated demonstration projects. Waste-to-energy applications are expected to act as game changers which will be picked up by local (and eventually international) market enablers, and it is also expected that apart from the public-private financing scheme to be established with the support of FPI, the commercial financing sector and policy makers will further enable the environment for this type of investments. Through technical and financial feasibilities to be prepared, entrepreneurs will see other potential benefits (technology and business innovation; competitive power, socio-economic benefits) that will further boost demand for investments and related services in the field of MSW management.

A.2. Child Project?

If this is a child project under a program, describe how the components contribute to the overall program impact.

N/A

A.3. Stakeholders.

Please provide the Stakeholder Engagement Plan or equivalent assessment. (Type response here; if available, upload document or provide link) In addition, provide a summary on how stakeholders will be consulted in project execution, the means and timing of engagement, how information will be disseminated, and an explanation of any resource requirements throughout the project/program cycle to ensure proper and meaningful stakeholder engagement.

Select what role civil society will play in the project:

- ☐ Consulted only;
- ☐ Member of Advisory Body; contractor;
- ☐ Co-financier;
- ☒ Member of project steering committee or equivalent decision-making body;
- ☐ Executor or co-executor;
- ☒ Other (Please explain):

Waste management plays an important role in civil society, since individuals but also organizations (public bodies, private businesses) are affected by a dysfunctional MSW management system. The Project will have several dimensions of engagement, one is awareness among the general public and the other is building capacity specifically at the level of business development and technical management and operation of waste management and waste-to-energy facilities. The role of civil society is important since the project also expects to involve CBOs and NGOs in running local initiatives (e.g. through “waste management associations” or similar) and demonstrating how successful community management can be a driving force to improve public services.

Key stakeholders were involved in the preparation of the project at many levels (collection of data, formulation of objectives, activities and results framework, validation of the project documents, etc.).

A list of different stakeholders from public and private sector involved in waste management and waste-to-energy is available in the mission reports conducted at PPG stage. During the preparation of the project, consultations with these stakeholders were pursued to gather information, documents and opinions on projects aspects. Fieldwork visits in Kinshasa took place in order to make direct observations, and interview key stakeholders. Individual meetings with representatives of national and provincial ministries, public administration officials, private sector, civil society organizations, NGOs and academia were conducted.

Consultations were also held between UNIDO, the World Bank, AFD, JICA and the EU Delegation to DRC to understand the different approaches of the development partners and aligning/coordinating the foreseen priority areas in the support of waste management projects in DRC. Especially the considered projects by World Bank (within their Urban Development Program Initiative) and AFD (considering a follow-up intervention for a sanitation pilot project including waste management in the N’djili area of Eastern Kinshasa) have been closely discussed concerning potential synergies and common development (e.g. the mentioned waste sorting facility considered in the investment part of component 2 is expected to be located also in N’djili area).

A validation workshop was organized where the PPG consultants presented the content of the CEO endorsement document, enriching it and thereafter, discussing with more than 60 stakeholders and validating it. The specific report on field work and workshop is available for consultation.

The project will consolidate the different stakeholder roles during the initial implementation phase. The main stakeholders and roles foreseen in the Project are described in the table below. A Stakeholder Engagement Plan will be elaborated and completed during the project inception phase following the stakeholder engagement policy of the GEF⁵⁶.

Stakeholder	Information and Key Roles
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⁵⁶ Refer to <https://www.thegef.org/documents/stakeholder-engagement>

Stakeholder	Information and Key Roles
United Nations Industrial Development Organization (UNIDO)	As the GEF implementing agency, UNIDO will maintain the overall oversight on the project implementation, manage the overall project budget and supervise the project execution. In addition, upon request of the government, UNIDO will provide execution support for the procurement of goods and services, as well as recruitment of experts. UNIDO will fulfil this responsibility by appointing a Project Manager and mobilizing services of its other technical, administrative and financial branches at UNIDO Headquarters and the UNIDO national office in the Democratic Republic of the Congo.
Ministry of Industry (Mol⁵⁷)	Industry is one of the Government's priority sectors like agriculture, infrastructure, energy, health, education, housing, hydrocarbons, etc. In its vision, the Government adopted a development approach called "self-centered and integrated," consisting in a balanced deployment of economic and industrial growth poles. The development strategy of the industrial sector is mainly focused on the creation of Special Economic Zones (SEZ), agro-industrial parks and growth poles. The Mol will support in establishing the financial incentive scheme in cooperation with the Industrial Promotion Fund (FPI). It will provide assistance in providing licenses and other permits to the service providers and private entrepreneurs involved in the MSW sector and WTE power plants and their grid connection facilities. Furthermore, the Mol will be part of the Project Steering Committee (PSC) and thus – with other governmental partners – guide the project development and ensure replication of successful MSW management and WTE projects across the country.
Ministry of Energy and Water Resources (MERH⁵⁸)	The Ministry of Energy and Water Resources manages the entire energy sector with the exception of hydrocarbons managed by the Ministry of Hydrocarbons (according to the ordinance n ° 12/008 of June 11, 2012). The MERH is one of the main executing partners for this Project on behalf of the Government of DRC and will nominate a member for the PSC. It will be especially responsible to support the policy-making aspects related to the promotion of WTE applications (component 1) and furthermore support the implementation of the WTE demonstration projects by providing relevant permissions, licenses and appropriate tariffs for produced energy to be sold to the national grid (in cooperation with SNEL, see below).
Ministry of Environment and Sustainable Development (MEDD⁵⁹)	The MEDD is a (national) government ministry responsible for the sustainable management of forests, water resources, wildlife resources and the environment. It is coordinating the implementation of national policies for the sustainable management of the environment and therefore also responsible for MSW. Furthermore, the MEDD hosts the GEF Focal Point in DRC. The Ministry of Environment and Sustainable Development is expected to be a member of the Project Steering Committee and furthermore be involved as leading governmental agency responsible for MSW in the policy-making component 1.
Industrial Promotion Fund (FPI⁶⁰)	The Industrial Promotion Fund, a public company under the Ministry of Industry, was established by Ordinance No. 89-171 of August 7, 1989. As part of the reform of Public Enterprises, the Promotion Fund of Industry was transformed into Public Establishment. Its ultimate goal is to strengthen the financial structure of the institution and enable it to diversify its resources to generate the monopoly of the Industry Promotion Tax as a resource. FPI has a priori an interest in supporting private sector projects (industries as well as SME), if these projects are expected to run in stable conditions, are properly managed with the ultimate target to generate revenue. The main role of FPI in this Project will be to set up in cooperation with UNIDO and the Government of DRC a financial incentive scheme in the framework of the existing Fund, covering a combination of the available state-supported financing mechanism for the investments needed for the demonstration projects. The waste management fund shall provide long-term financing.

⁵⁷ Ministère de l'Industrie

⁵⁸ Ministère de l'Énergie et des Ressources Hydrauliques

⁵⁹ Ministère de l'Environnement et Développement Durable

⁶⁰ Fond de Promotion de l'Industrie (FPI)

Stakeholder	Information and Key Roles
	<p>The call for components 2 and 3 to be supported through the above mechanism will be done through FPI.</p> <p>The projects exit strategy for the to be established financial incentive scheme will be decided by the Project Steering Committee.</p>
National Electricity Company (SNEL⁶¹)	<p>SNEL is the main electric utility in DRC organized as a private company whose sole shareholder is the Congolese State. It is responsible for the generation, transmission, distribution and marketing of electricity in DRC. It runs all power plants (mainly hydro) and in addition manages a grid of more than 16,000 km.</p> <p>SNEL will be involved in the development of the pilot projects and provide support in the relevant electricity connections to the grid and establishment of power-purchase agreements.</p>
National Investment Promotion Agency (ANAPI)	<p>ANAPI is a public technical institution endowed with a legal status and management autonomy. It is placed under the supervision of the Planning Minister. Among its main missions is the promotion of specific investment opportunities in DRC and to improve investment climate in the country.</p> <p>ANAPI will be supportive during the pilot project realization by facilitations to investors seeking land premises and access to public infrastructure (incl. energy), support to obtain special licenses, and granting customs, fiscal and para-fiscal benefits.</p>
The Provincial Government of the City of Kinshasa	<p>Provinces of DRC have their own executive system and their own administrations. National administrations do also have branches that have the same power at the province level, subject to constitutional provisions allocating power to different areas of the state.</p> <p>Provinces have a crucial role to play on the policy level (e.g. financing and operation of MSW management), access to funds, and the licensing of private operators. This requires an awareness of the provincial authorities about the opportunity to develop improved MSW and also WTE applications. Particular attention will be paid to the relationship between PMU and provincial and local institutions, so that they facilitate and assist project managers in their efforts.</p>
Provincial Ministry of Planning (PMP)	<p>PMP is in charge of overall spatial planning and city planning. It also drafts the budgets for all infrastructure development projects. PMP will be consulted in component 1 during the policy drafting and development of the solid waste strategy report, since it relates also to long-term urban and spatial planning issues that are governed by the provincial level. PMP furthermore acts as a focal point for the World Bank's Urban Development Program that is envisaged to implement a MSW component in parallel to this UNIDO-GEF implemented project. Exchange with other projects will be therefore crucial and requires coordination.</p>
Provincial Ministry of Environment (PMENV)	<p>The PMENV is representing the authority representing the City authority of Kinshasa and is responsible for all urban environmental-related issues, including MSW management. PMENV holds the technical and operational responsibility of waste management and is the owner of the Mpasa landfill and the waste collection centers and dump sites across the City. PMENV will be part of the PSC and serve as the responsible authority to implement the component 1 policy improvements on the provincial/municipal level. It furthermore will be involved in the design and legalization of the planned investment projects, primarily related to the improved waste collection and sorting facility (component 2) but also concerning pilots foreseen in component 3. The operational entities of PMENV, RASKIN and FONAK will be involved in the project's capacity improvement and training activities as well as information dissemination.</p>
RASKIN and FONAK	<p>The Sanitation Authority for Kinshasa (La Régie d'Assainissement de Kinshasa, RASKIN), formerly known as the Sanitation and Public Works Department of Kinshasa (Régie d'Assainissement et des Travaux Publics de Kinshasa, RATPK) is the local government's technical body responsible for sanitation and waste services in Kinshasa.</p> <p>FONAK (Fonds d'assainissement de Kinshasa) is the financing entity under the Provincial Ministry of Environment. The authority receives financial support from the</p>

⁶¹ Société nationale d'électricité (SNEL)

Stakeholder	Information and Key Roles
	<p>national as well as from the provincial government and pays for sanitation services organized by RASKIN and contracted private operators.</p> <p>RASKIN and FONAK are autonomous bodies with the responsibility to maintain sanitation and public works and are placed under the authority of the PMENV. Both institutions will be consulted in the policy framework activities (component 1) and included in the capacity building activities under component 2 and component 4.</p>
Eagle Waste Solutions SARL	<p>Eagle Waste Solutions is a Congolese private limited company based in Kinshasa working on the waste management from households and industry as well as recycling. The company confirmed their support and commitment as per attached co-financing letter and will be contributing to strengthening the policy and regulatory environment (component 1), establishing a sustainable waste collection and sorting system (component 2), demonstrating municipal waste to energy technologies (component 3) and supporting a replication and scale up strategy (component 4).</p>
Service providers in the area of municipal solid waste management	<p>During the PPG phase, apart from RASKIN, the municipal waste management operator of Kinshasa, several waste management businesses (refer to section baseline projects section A.1.2.2.b), including small scale collection companies, entrepreneurs engaging into waste collection, sorting and recycling, have been identified in and around Kinshasa. They comprise small for profit-making enterprises (often called and referred to as “NGOs”) or CBOs and are usually interested in scaling-up their businesses, but are relatively limited in the amount of personal, technical and financial resources. Companies like Harimex, All Pack Industries are among the bigger players becoming active in the plastic and paper recycling businesses, others (BENELUX AFRO CENTER, Consol, Intelligentsia, Compost Congo, Les amis de la Nature et Jardin, Kasai Integral développement, Congo Salubrite, CEPRADYC, FEAPD, APISA) are registered at RASKIN, however, are only limited in collection and recycling capacities.</p> <p>The Project will invite providers of innovative business models and provide technical assistance in capacitating and establishing additional private-operated waste collection, waste sorting and transportation facilities. RASKIN will support the permission and licensing procedures during the pilot activities.</p>
Local businesses and industries becoming energy producers and end users	<p>Local businesses and industries that are in the demand of energy for production purposes will be addressed by the WTE component of the Project. During PPG stage major industries identified were from food industry sector (e.g. breweries), cement factories (for RDF utilization),</p>
Universities and research institutions	<p>The Department of Environmental Sciences at the University of Kinshasa is headed by Prof. Emanuel Makaly Biey. He and his team carried out a number of studies on waste collection, processing, and landfilling. Being the former head of RATPK, Prof. Biey furthermore has a good insight in waste management in Kinshasa. The Department of Chemistry at the same University carried out studies on waste disposal practices and landfill leachate composition (B.K. Mavakala, Crispin K. Mulaji, P.T. Mpiana, V. Elongo, J-P. Otamonga). On biogasification of waste, a number of researchers from the DRC carried out sophisticated studies, including Léonard Ukondalemba Mindele from the Department of Environmental Sciences at University of Kinshasa.</p>
Gender Focal Points and Associations promoting gender equality and women’s empowerment	<p>Stakeholders will also consider relevant gender focal points and experts, as well as local and international associations and/ or agencies promoting gender equality and women’s empowerment, in particular those focusing on the nexus between gender, waste, energy needs and entrepreneurship. It could also include cooperation with the World Health Organization, UNFPA.</p>

A.4. Gender Equality and Women's Empowerment.

Provide the gender analysis or equivalent socio-economic assessment. A preliminary gender review has been conducted based on desk research. A gender analysis will be conducted during project inception phase.

Does the project expect to include any gender-responsive measures to address gender gaps or promote gender equality and women's empowerment? (yes ☒ /no ☐) If yes, please upload gender action plan or equivalent here. The project includes gender-responsive measures to address gender gaps or promote gender equality and women's empowerment. Please see
If possible, indicate in which results area(s) the project is expected to contribute to gender equality:

☐ closing gender gaps in access to and control over natural resources;

☒ improving women's participation and decision making; and or

☒ generating socio-economic benefits or services for women.

Does the project's results framework or logical framework include gender-sensitive indicators? (yes ☒ /no ☐)

Congolese women constitute 53% of the DRC population⁶²; their visibility and contribution to food security for the survival and running of the Congolese society is undeniable and internationally recognized. The DRC has various international and domestic legislation regarding women's socio-economic rights.

The Democratic Republic of Congo ratified international legal instruments notably the Universal Declaration of Human Rights, which dedicates the principle of equality between men and women in its first two articles⁶³. The DRC established the Ministry of Advancement of Women in 1980 and ratified the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) in 1986⁶⁴. The preamble of the 2006 promulgated DRC Constitution upholds the principle of equality between men and women⁶⁵. The articles 5, 14 and 15 set up the foundations of legitimisation of any policy of equality and equity in the RDC.

Nevertheless, the DRC is ranked 150 from 157 in the Gender Inequality Index (GII)⁶⁶ and is a country, in which sexual violence was commonly used as a weapon of war⁶⁷ and maternal mortality is amongst the highest in the world⁶⁸. The current socio-economic situation of the DRC is characterized by the feminization of poverty. This is accentuated by the absence of policies and mechanisms for the promotion of gender equality and the persistent discrimination of women. Key sectors where gender disparities are particularly critical are education, health, employment and the environment.

Regardless of their 53% representation in the population, and that the right to employment is constitutionally recognized for all, women only constitute 2.8% of state waged employment against 12% of men in the DRC. Opportunities for women have generally been limited. They are underrepresented in the formal workforce, especially in higher-level positions, and generally earn less than their male counter-parts in the same jobs.

In spite of the weak female economic power due to several factors connected to poverty, the lack of access to land, lack of property, lack of access to appropriate technologies, their marginalization in the macro-economic sector, as well as insecurity in rural areas following armed conflicts, Congolese women are true agents of development. Thanks to their income generating activities, they have been significantly contributing to the survival of their families and the whole DRC nation.

In general, UNIDO recognizes that gender equality and the empowerment of women have a significant positive impact on sustained economic growth and inclusive industrial development, which are key drivers of poverty alleviation and social progress. UNIDO's commitment towards gender equality and women's empowerment is demonstrated in its policy on Gender Equality and the Empowerment of Women (2015), which provides overall guidelines for establishing a gender mainstreaming strategy. UNIDO has also developed an operational energy-gender guide to support gender mainstreaming of its sustainable energy initiatives.

UNIDO recognizes that energy interventions are expected to have an impact on people and are, therefore, not gender-neutral⁶⁹. In fact, due to diverging needs and rights regarding energy consumption and production, women and men are

⁶² MONUC 2010

⁶³ The Universal Declaration of Human Rights (UDHR) <http://www.un.org/en/documents/udhr/>

⁶⁴ CEDAW Convention on the Elimination of all forms of Discrimination against Women. <http://www.un.org/womenwatch/daw/cedaw/>

⁶⁵ Constitution de la République Démocratique du Congo. <http://www.presidentrdc.cd/constitution.html>

⁶⁶ <http://hdr.undp.org/en/indicators/68606#>

⁶⁷ <https://www.unfpa.org/news/empowering-women-and-girls-democratic-republic-congo>

⁶⁸ <http://hdr.undp.org/en/indicators/89006>

⁶⁹ ENERGIA "Turning Information into Empowerment: Strengthening Gender and Energy Networking in Africa. Leusden, 2008; Joy Clancy "Later Developers: Gender Mainstreaming in the Energy Sector", 2009

expected to be affected differently by the project (in terms of their rights, needs, roles, opportunities, etc.). The project aims to demonstrate good practices in mainstreaming gender aspects into promoting improved waste management practices and waste-to-energy technologies, wherever possible and avoid negative impacts on women or men due to their gender, ethnicity, social status or age. Consequently, it will be considered to systematically include the gender dimension during the whole project cycle.

Job opportunities, both for women and men, will be enhanced through capacity building and training activities offered for local entrepreneurs and waste collection and recycling businesses. Training of workers (women and men) on selected project sites will lead to diversification of waste recycling concepts in the country, by then preventing (hazardous) wastes from open-burning and illegal dumping and utilizing wastes for energy production. The interventions of the project will help alleviate social and economic burdens for both men and women in the sector of waste management.

In practical terms:

- Under the first component, the project will ensure that the developed regulations are gender sensitive.
- Efforts will be made to promote participation of women in training activities, both at managerial and technical levels, as participants and facilitators. Due to the particular challenges women face in DRC, in particular with regards to sexual harassment, the project will make special efforts to ensure that women's safety is protected during their participation, e.g. safe transport options.
- Gender-sensitive recruitment will be practiced at all levels where possible, especially in selection of project staff and staff for the implementation of project investments under component 2 (assumed 50% female staff rate at the newly established MRF) and component 3 (WTE pilot projects assumed to employ 30% female staff at the biogas facility, 50% female staff at RDF production and 50% female staff for bio-briquettes). In cases where the project does not have direct influence, gender-sensitive recruitment will be encouraged. Furthermore, whenever possible existing staff will be trained, and their awareness will be raised on gender issues.
- Gender responsive TORs will be used to mainstream gender in the activities of sub-contractors, consultants and experts.
- All decision-making processes will consider gender dimensions. At project management level, Project Steering Committee meetings will invite observers to ensure that gender dimensions are represented. Also, at the level of project activity implementation, effort will be made to consult with stakeholders focusing on gender equality and women's empowerment issues. This is especially relevant in policy review and formulation.
- Gender focal points of project stakeholder and stakeholders focusing on gender equality and women's empowerment issues will be included in the project whenever feasible.
- When data-collection or assessments are conducted as part of project implementation, gender dimensions will be considered. This can include sex-disaggregated data collection, performing gender analysis as part of ESIA's, etc.
- In sum, the project design will acknowledge the differences of energy access impacts considering distribution of economic activities and social roles between women and men in DRC, in line with the GEF 6 Programming Directions.
- All companies participating in the project as beneficiaries should have effective measures to eliminate sexual harassment in the workplace and provide maternal healthcare.

The project does not explicitly address women's empowerment, but gender dimensions have been considered during project formulation and will be considered systematically throughout the whole project cycle (see also gender-sensitive indicators in the project results framework - Annex A).

A.5 Risk.

Elaborate on indicated risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, the proposed measures that address these risks at the time of project implementation. (table format acceptable):

The risk assessment and mitigation actions for achieving the desired GEF project results have been discussed in detail here. The following risk categories have been identified: (1) political & institutional risks, (2) technology risks, (3) implementation risks, (4) financial and economic risks, (5) sustainability risks, (6) social and gender risks, and (7) climate change risks. All these risks have been evaluated against their risk level. The mitigation actions for these risks are presented in the table below.

<i>Risk</i>	<i>Description of Risk</i>	<i>Risk level</i>	<i>Proposed mitigation measures</i>
Political and institutional risk	Poor or insufficient political commitment which can impact project performance, especially in terms of coordination, respect of the implementation timeline, and co-financing commitments. It can also demobilize other stakeholders involved in the project.	High	The institutional arrangement is meant to prevent this risk, especially by avoiding administrative burdens by setting up a coordination mechanism with execution support by UNIDO in cooperation with MoI and FPI, involving key government institutions on the national and provincial levels concerned by the project and assuring stakeholder participation from private and public sector.
Technical risks	WTE technologies do not succeed; the technology may not perform as described mainly due a lack of skills to operate the technologies	Medium	There is limited technical risk since technologies are widely used in many other countries. Detailed assessment of suitable sites for technologies will be carried out and training of operating personal will be provided, including from technology importers, when necessary.
Implementation risk	Waste collection and sorting mechanism promoted by Project do not improve, due to missing engagement of other donors (e.g. WB, AFD) to implement parallel MSW project activities.	Medium	The Project is facing challenges across the current inappropriate and weak waste collection capacities in Kinshasa. It has been designed to utilize possible synergies in the future with projects enforced by other development partners, however, the activities will be also realizable as a stand-alone option should other projects not materialize.
	Lack of interest from private sector including local businesses and industries to take up WTE projects	Medium	Development of detailed activity plans in close cooperation with in-country project partners, stakeholders and developers. A thorough stakeholder consultation process conducted during the project preparation phase identified industries interested to take up WTE.
	Unsuccessful demonstration at selected sites and lack of capacity to operate and maintain WTE facilities	Medium	Suitable sites will be selected through careful analysis of target sectors and plants to ensure success of demonstration projects including: - Identification of proven technologies - Quality audit of equipment - Implementation guidance by experts - Training to the operating personnel in the industry
	Lack of interest from technology providers	Medium	Throughout the project, there will be regular and continued contact with manufacturers which should lead to their interest and participation. The project design also motivates and creates interest of manufacturers.
Financial risks:	General perception that WTE investments yield low returns, hence the investors are not willing to invest. No off-takers for the generated electricity.	Low	Throughout PPG phase business cases have been identified that have high chance for implementation in DRC. The demand-supply gap is very high in the DRC. The generated electricity will be either utilized by industries or exported to the national grid. The Ministry of Industry and Ministry of Energy/SNEL have expressed their commitment to support alternative forms of energy supply through wastes (apart from hydro and fossil fuels).

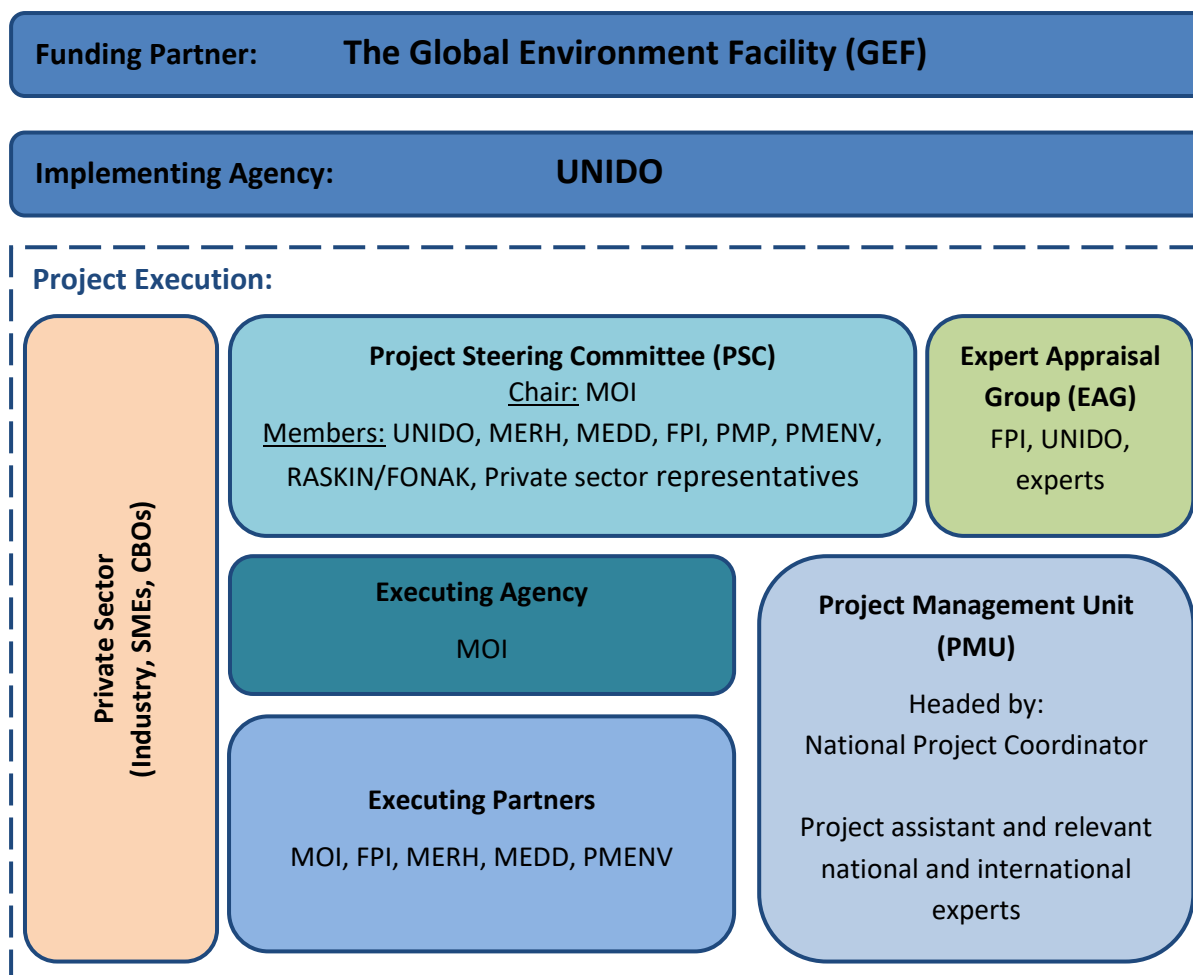
<i>Risk</i>	<i>Description of Risk</i>	<i>Risk level</i>	<i>Proposed mitigation measures</i>
	Lack of financing and financing mechanism available for WTE	Low	The Project will develop and launch a financing scheme to provide grant and soft loan support to demonstration projects and further upscale a financing facility on the national level, to support MSW and WTE projects in the future.
	Businesses' and industries' lack of resources to repay loans	Low	Stringent selection of borrowers through assessment and due diligence of each borrower's historic and future financial management capacity.
Social and gender risk:	Risk of resistance against, or lack of interest in, the project activities from stakeholders, especially with regard to the active promotion of gender equality. Low participation rates of suitable female candidates due to lack of interest, inadequate project activity or missing qualified female population within engineering sector.	Medium	This project will ensure stakeholder involvement at all levels, as well as involving CBOs and NGOs. This shall mitigate social risks and create a culture of mutual acceptance by all stakeholders including nearby communities. Awareness will be created among all stakeholders on the employment generation, business opportunities created, improved health benefits to attract participation. Environmental and Social Management Plan (ESMP) identified and proposes mitigation measures for such social risks.
Climate change risks	The WTE technology or improved waste management techniques are affected by climate change	Low	Due to the changing weather patterns which might lead to flooding of the project sites. Adequate site assessment will be done before construction of site building and offices. All the buildings and structures will be designed and built appropriately to avoid destruction by floods and extreme weather events. Clear guidelines will be prepared and staff training will be conducted on management of such emergencies. ESMP will identify and propose mitigation measures for such climate change risks.

Table 13. Risks and proposed mitigation measures

A.6. Institutional Arrangement and Coordination.

Describe the institutional arrangement for project implementation. Elaborate on the planned coordination with other relevant GEF-financed projects and other initiatives.

The following figure shows a diagram of the planned project implementation and execution arrangements.



Legend: MOI – Ministry of Industry, MERH – Ministry of Energy and Water Resources, MEDD – Ministry of Environment and Sustainable Development, FPI – Industrial Promotion Fund, PMENV – Provincial Ministry of Environment

Figure 10: Project steering and execution structure

- **Implementing Agency: UNIDO**

UNIDO is the only GEF Implementation Agency involved in this project and no specific arrangements with other GEF Agencies are required.

As the GEF implementing agency, UNIDO will maintain the overall oversight on the project implementation, manage the overall project budget and supervise the project execution.

Full or partial title and ownership of equipment purchased under the project may be transferred to national counterparts and/or project beneficiaries during the project implementation as deemed appropriate by the UNIDO Project Manager in consultation with project stakeholders.

- **Project Steering Committee (PSC):**

The PSC will be established for regular reviewing and monitoring project execution progress, providing strategic advice, facilitating co-ordination between project partners, providing transparency and guidance, and ensuring ownership and sustainability of the project results. The Terms of Reference and the final composition of the Steering Committee will be defined during the project start-up phase and is expected to be chaired by Ministry of Industry and include representation from UNIDO, Ministry of Environment and Sustainable Development, Ministry of Energy and Water Resources, the Provincial Government of Kinshasa and selected private sector representatives, as and when required. The PSC will be empowered to address operational modalities which can be changed during the execution of the project. Considering the identified risks, empowering the PSC would allow for another approach to be found in exceptional cases, e.g. if suddenly the financial scheme cannot happen.

The primary roles of the PSC are: (1) to provide overall guidance to the execution of the project; (2) to ensure good coordination among participating agencies and other organizations; and (3) to approve any substantial change or

addition of new project outputs in response to the emerging issues. The PSC will meet on an annual basis to review and monitor the progress of the project implementation and to approve the work plan for subsequent years.

- **Expert Appraisal Group (EAG) for call for demo-projects ⁷⁰:**

A special team under the PSC consisting of members from Ministry of Industry/FPI (2), UNIDO (1) and national (2) and international (1) experts will conduct the evaluation of applications and other reports and approval for granting further support by the project.

- **Project Management Unit (PMU):**

The PMU will be responsible for the day-to-day management and execution of project activities as in the agreed project work plan. The Project's GEF and co-financing resources foresee the recruitment of a full-time National Project Coordinator (NPC), a part-time project assistance, and part-time national and international specialists, such as a municipal waste expert, a waste-to-energy expert, technical and capacity building experts and monitoring & evaluation and public procurement specialists.

PMU members shall have the capabilities to coordinate, evaluate and monitor project-related activities as well as background on municipal solid waste management and waste-to-energy solutions, knowledge of local languages (and especially French and English), and management capacities. The specific capabilities, experience and level of knowledge of each mentioned expert will be defined through the TORs specified for each expert position.

The PMU will be further responsible for coordinating the communication and dissemination of the project results, lessons learned and success stories that are important for the replication and future development of MSW and WTE projects in other cities and parts of DRC.

- **Executing Partners**

UNIDO will oversee the implementation of the project and will be represented by the UNIDO Project Manager in the Project Steering Committee (PSC). The main executing partner is foreseen to be MOI. MEDD and PMENV will be other execution partners. All executing partners will be responsible for, amongst others, coordination and mobilization of other stakeholders to be involved in the project.

Several governmental organizations at the national and provincial (city) level will be engaged at different stages of the project implementation in order to provide execution support and coordination among governmental agencies and private sector stakeholders, including industries, small and medium sized enterprises as well as CBOs and NGOs active in the municipal solid waste management business.

Project component	Leading organization	Main tasks
Component 1	MEDD	Coordinate the legal and institutional activities concerning MSW and WTE policies, strategies, and enforcement, lead the inter-ministerial and inter-agency coordination process
Component 2	PMENV	Together with MOI/FPI and other national entities and actors from private sector, develop waste collection and sorting infrastructure, provide implementation support (provision of suitable land/locations, legalization and licensing)
Component 3	MOI	Together with FPI and MERH, oversee and support implementation of WTE demonstration projects through launching calls for proposals, and co-financing through the newly established financing mechanism
Component 4	MOI	Oversee the development of the replication strategy and set up with FPI the financing mechanism to support MSW and WTE investments with private sector engagement; implement capacity building and training activities with support of specialized institutions and experts

⁷⁰ not shown in *Legend*: MOI – Ministry of Industry, MERH – Ministry of Energy and Water Resources, MEDD – Ministry of Environment and Sustainable Development, FPI – Industrial Promotion Fund, PMENV – Provincial Ministry of Environment

Figure 10 for simplicity and oversight

Project component	Leading organization	Main tasks
Component 5	MOI/ UNIDO	M&E - monitor and evaluate project activities, progress reports, Mid-term review, terminal evaluation
Project Management and coordination	MOI	Leading the PMU, manage, coordinate, procurement support, communication and dissemination activities

Table 14: Responsibilities and tasks of executing partners in the Project

Regular consultations with stakeholders and local beneficiaries will ensure that the project's impact and appropriation can be assessed throughout project implementation. Given the multiplicity of sectoral actors involved, it is necessary to set up an inter-ministerial coordination to oversee the multiple policy levels involved (national and provincial/municipal levels) in general and the integrated and sustainable urban development and environmentally sound management of MSW and WTE project in particular.

- **Beneficiaries**

Demonstration projects will be developed and constructed under the responsibility of respective project proponents (e.g. private companies established to collect and transport waste, businesses engaged in recycling and processing of waste fractions, or industries like food, cement, agribusinesses, with significant energy demand to utilize waste fractions as energy sources). The replication projects will be identified through calls for proposals and specified through the course of the project; hence the respective companies are not known at this stage. However, private companies in the agricultural, food, cement, paper recycling or other sectors of business activity will be direct beneficiaries of the project as they will be involved in implementing demonstration projects. The direct beneficiaries will be the receivers of the project development support (technical assistance) and financing mechanism.

Apart from private sector, other beneficiaries will be governmental stakeholders from the national and provincial levels that will be receiving technical assistance through strengthened policy and regulatory support, strategic advice for establishing a sustainable waste collection and sorting infrastructure and capacitating stakeholders involved in governmental decision-making and technical operation of MSW management through the setup of trainings, study tours, expert and capacity building activities. However, trainings and capacity building activities will be also dedicated to representatives from private sector including CBOs and NGOs.

- **Other relevant projects**

Apart from UNIDO, other development agencies like the World Bank and AFD are currently planning the implementation of different urban development and waste management projects in Kinshasa which will have a synergetic relationship with this UNIDO-GEF project. As mentioned under component 2, the GEF project will built upon the establishment of waste transfer stations (to be financed by the World Bank) at selected sites in Kinshasa and establish a material recovery facility (a waste sorting station) from which waste fractions will be further distributed to produce energy or recycle, compost the remaining fractions.

The World Bank is planning to start in 2020 with the next phase of its *Urban Development Project for the DR Congo*⁷¹, with the main objective to improve access to basic services and strengthen urban and municipal management in targeted cities. The program foresees to provide funds for the rehabilitation of the existing landfill at Mpasa combined with the setup of waste collection points (*déchetteries*) and waste transfer stations.

AFD plans to start by the end of 2019 the waste management project *"TOPETOLA - Let's make it clean"* in co-operation with the World Bank. The main objective of the project is to prevent flooding due to vast illegal waste disposal at N'djili River, which is located in Eastern Kinshasa (between the centre and the airport). The original width of the riverbed will be restored and the riverbanks rehabilitated. To avoid future illegal dumping of waste in the river, a number of waste transfer stations will be established and can shall be used by the waste pickers. Waste separation and recycling is planned at the transfer stations, the remaining waste fractions finally to be transferred to Mpasa landfill. In this regard, the planned rehabilitation of Mpasa landfill by the World Bank is crucial for the project.

This project will benefit from country specific lessons-learned of waste management and waste-to-energy projects realized, and engage in common dissemination, communication and capacity building activities.

⁷¹ Refer to <http://projects.worldbank.org/P129713/drc-urban-development-project-fy13?lang=en>

A.7 Benefits.

Describe the socioeconomic benefits to be delivered by the project at the national and local levels. How do these benefits translate in supporting the achievement of global environment benefits (GEF Trust Fund) or adaptation benefits (LDCF/SCCF)?

At national level, the project will first reduce the import of fuels (hard coal, fuel oil), as these are substituted by national resources, i.e. MSW. The funds deliberated by that will be used to process MSW into a valuable energy resource, thereby creating national value chains. This substitution of imports by national resources will increase the national economic productivity and furthermore, a large number of jobs at different levels, from high to low qualification (e.g. entrepreneurs, process engineers, plant managers, waste pickers) will be created. Innovation in MSW processing will be boosted, having a large impact at national universities. Finally, the natural capital of the DRC, i.e. fresh water (through reduction of river pollution by MSW) and virgin forests (through the reduction of deforestation by substitution of charcoal with bio-briquettes) will be better utilized.

At local level, the environmental impacts caused by current waste handling practices, i.e. dumping, burning, and river disposal of waste, will be reduced. This will have a positive impact on public health and thus lead to better living conditions and higher productivity of the population in Kinshasa and other areas. Local businesses will establish themselves around the value chain created by the recovery of MSW into fuels and energy, such as waste collectors, MSW processing, management and utilization. Already established waste recycling businesses have the chance to extend their activities from solely recycling to recycling and recovery of waste as fuels or energy by making use of their local knowledge already existing.

A.8 Knowledge Management.

Elaborate on the knowledge management approach for the project, including, if any, plans for the project to learn from other relevant projects and initiatives (e.g. participate in trainings, conferences, stakeholder exchanges, virtual networks, project twinning) and plans for the project to assess and document in a user-friendly form (e.g. lessons learned briefs, engaging websites, guidebooks based on experience) and share these experiences and expertise (e.g. participate in community of practices, organize seminars, trainings and conferences) with relevant stakeholders.

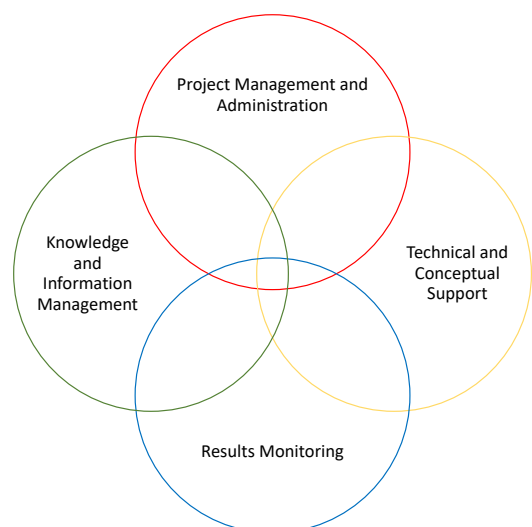
The project will work in close collaboration with various stakeholders and develop different knowledge tools (e.g. training tools, roadmap, guidebooks etc.) that will be disseminated widely. A knowledge management plan will be elaborated during the project's initialization stage to define the specific knowledge creation and dissemination activities, the target groups and the time by when the materials in a user-friendly form will be made available and delivered.

Essentially, knowledge management takes place on two levels:

- **External knowledge management:** A complete integration of existing expertise in the knowledge management of UNIDO-GEF
- **Internal knowledge management:** The flow of information between all involved experts, as well as the quality assurance of deliverables for the project. In particular, the integration of the products of internal business knowledge management into the project knowledge is significant. However, for this project, the technical and administrative knowledge gained in previous projects shall be made available.

This will be achieved through:

- Knowledge exchange between the international experts, national experts and other stakeholders



- The process and integration of the generated knowledge during the assignments into the knowledge and reporting system of UNIDO-GEF

As the contractors should have proven backstopping methods in place, they should be able to combine the backstopping method, knowledge, and information management - with a depth of experience in managing similar projects within the project region, coupled with full access to the combined knowledge-base and experience of the staff and previous projects.

UNIDO is well-placed to implement this project with its global network of experts and will be able to draw upon its experience from its wider portfolio of relevant and mainly GEF funded projects on waste-to-energy.

Feasibility studies, technical specifications, tendering procedures, business plans for the demonstration project along with at least 3 feasibility studies and business plans for replication projects will be prepared at international standards and they will serve as a reference documents for NGOs/CBOs, individual firms, students, research scholars, government agencies, investors, industries, etc. for their application in MSW sector respectively.

Under component 3, successful business cases demonstrating WTE applications will be widely disseminated choosing the most appropriate medium to reach a large number of actual and potential stakeholders. The business cases will be based on technical, operational and finance information from the pilot projects. The targets of this dissemination will be potential users of the technology, servicing and maintaining sectors, governmental stakeholders and decision-makers, as well representatives from financing institutions. After successful implementation or construction of the demonstration projects, the cases will be monitored for their performance, analyzed and evaluated as a basis for replication.

As for capacity building, the project will develop specific packages of tailored knowledge products on MSW and WTE technologies and facilitating technology transfer within waste management and energy research institutes (both academic and non-academic). 45 personnel from each target group - (i) Government officials, (ii) public and private MSW service providers and (iii) WTE operators - are going to be capacitated through trainings on waste collection, sorting and WTE production for each of the three target groups. In addition, at least 100 persons will be trained on bio-briquette production in Kinshasa and other selected towns of DRC. Up to 25% of all trainees expected to be women.

The proposed project will consult and collaborate with key stakeholders of similar UNIDO-GEF projects in the region for effective knowledge sharing. A knowledge base will be developed based on the proposed study tour under output 4.2.2 to capture the best practices learnt in municipal waste collection, segregation, handling, energy recovery, recycling and disposal from this proposed project. This will serve as a database for MSW management and WTE technologies and will link with other global initiatives, as well as relevant projects. Each and every process of MSW management will be documented in a user-friendly way, to be replicated in future projects. All the lessons learnt from the project implementation will be properly documented through periodic reviews. All these knowledge management approaches will serve as a capacity building for the replication projects in future.

General project promotion via television, radio broadcast, newspapers, magazines and social media will create awareness countrywide. One national conference on MSWM and WTE with up to 30% female participation will be organized under this project. Furthermore, WTE technologies shall be promoted at exhibitions and fairs in DRC.

All publications developed under this project will comply with GEF and UNIDO communication policies. A project website and the use of social media will propagate the materials and outputs produced under the project and act as main distribution channels for awareness creation in the country.

All knowledge management activities will be gender mainstreamed. This includes integration of gender dimensions into publications, for instance, presenting sex-disaggregated data and gender-energy nexus theory; gender sensitive language in publications, photos showing both women and men and avoid presenting stereotypes; as well as assuring that women, men and the youth have access to and benefit from the knowledge created.

To enhance the use of knowledge and experiences from elsewhere, partnerships with organizations and platforms in the field of solid waste management are established. The project can make use of networks such as the Global Plastics Action Partnership⁷², the African Clean Cities Platform⁷³, or the International Solid Waste Association (ISWA)⁷⁴. The latter, for

⁷² <https://www.acceleratecirculareconomy.org/global-plastics-action-partnership-index>

⁷³ https://africancleancities.org/member_CityP_Kinshasa.html

⁷⁴ https://africancleancities.org/member_CityP_Kinshasa.html

instances, frequently organizes study tours and two-week courses (summer school, winter school) on topics such as recycling and biowaste treatment⁷⁵, landfilling⁷⁶, and utilization of waste for energy production and as a fuel⁷⁷.

All knowledge management activities (such as ...) will be gender mainstreamed. This includes integration of gender dimensions into publications, for instance presenting sex-disaggregated data, gender-energy nexus theory, gender sensitive language in publications, photos showing both women and men, and avoid presenting stereotypes, as well as assuring that women, men and the youth have access to and benefit from the knowledge created.

B. DESCRIPTION OF THE CONSISTENCY OF THE PROJECT WITH:

B.1 Consistency with National Priorities.

Describe the consistency of the project with national strategies and plans or reports and assessments under relevant conventions such as NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, etc.:

Reference is made to descriptions provided already in the PIF.

The proposed project will support the following government policies and strategies for the successful implementation of solid waste management techniques and energy generation for a sustainable usage in the country:

- *National Adaptation Programmes of Actions (NAPAs) (2006)*: The NAPA report identifies the following priority sectors of the DRC: 1) Water resources, 2) Coastal areas, 3) Health, 4) Agriculture and 5) Land degradation. NAPA also proposed following potential activities to be addressed including, a) Electrification of urban and rural areas, b) Development of water resources, c) Protection coastal areas, d) Management of forest resources, etc.
- *Third National Communication to United Nations Framework Convention on Climate Change (UNFCCC) (2015)*: This report identified energy, agriculture and industrial sectors as the main sources of human induced GHG emissions in DRC. The energy sector will prioritize and take initiatives on the following for the reducing GHG emissions in DRC,
 - development of renewable energy sources,
 - use of clean technologies in electricity production,
 - utilization of waste for biogas and biofuel production.
- *Second Poverty Reduction and growth Strategy Paper (PRSP) (2011-2015)*: The strategy places a particular emphasis on growth, employment creation and the impact of climate change. The document also focuses on the strengthening of good governance, the achievement of the MDGs by 2020 and the elimination of gender-based inequalities. The strategy rests on four pillars: (i) The strengthening of governance and the consolidation of peace; (ii) The diversification of the economy to accelerate growth and create employment; (iii) The Improvement of access to basic social services as well as the improvement of human capital; and (iv) The protection of the environment and actions to reduce the impact of climate change.
- *Intended Nationally Determined Contributions (INDC)*: It is stated that the country estimates to reduce around 17% of its emission level against the baseline year of 2000. The priority sectors are agriculture, forestry and energy. The proposed project involves reduction of emission levels avoiding the use of fossil fuels in energy sector by generating power from landfill gases. Thus, it is in alignment with the INDC goals.

The proposed GEF project is therefore in line with the all above national strategies and plans.

C. DESCRIBE THE BUDGETED M & E PLAN:

⁷⁵ <http://www.iswa-events.org/de-AT/microsite/iswa-study-tour-biowaste-2018>; <https://www.iswa.org/iswa-study-tour-on-collection-sorting-recycling-2016/>

⁷⁶ <http://www.iswa-events.org/de-AT/microsite/iswa-swis-winter-school-2019>; <http://www.iswa-events.org/de/microsite/iswa-um-summer-school-2017>

⁷⁷ https://www.iswa.org/nc/events-courses/calendar/eventdetail/show_detail/iswa-tu-summer-school-on-energy-and-fuels-from-solid-waste/

Project monitoring and evaluation (M&E) will be conducted in accordance with established UNIDO and GEF procedures. The overall objective of the monitoring and evaluation process is to ensure successful and quality implementation of the project by:

- i) tracking and reviewing project activities execution and actual accomplishments;
- ii) providing visibility into progress as the project proceeds so that the implementation team can take early corrective action if performance deviates significantly from original plans;
- iii) adjusting and updating project strategy and implementation plan to reflect possible changes on the ground, results achieved, and corrective actions taken.
- iv) ensuring linkages and harmonization of project activities with that of other related projects at national, regional and global levels.

According to the Monitoring and Evaluation policy of the GEF and UNIDO, follow-up studies like Country Portfolio Evaluations and Thematic Evaluations can be initiated and conducted. All project partners and contractors are obliged to (i) make available studies, reports and other documentation related to the project and (ii) facilitate interviews with staff involved in the project activities.

At the same time, M&E will comply with the rules and regulations governing the M&E of UNIDO technical cooperation projects, in particular the UNIDO Evaluation Policy and the Guidelines for Technical Cooperation, both in their respective current versions.

A detailed monitoring plan for tracking and reporting on project time-bound milestones and accomplishments will be prepared by UNIDO in collaboration with the PMU and project partners at the beginning of project implementation and then periodically updated. By making reference to the impact and performance indicators defined in the Project Results Framework, the monitoring plan will track, report on and review project activities and accomplishments in relation to:

- a. Waste-to-energy induced heat/power delivered and GHGs emission reductions directly generated by the UNIDO/GEF project. These will include the type and the number of projects developed and implemented.
- b. Waste-to-energy induced heat/power generation delivered and GHGs emission reductions indirectly generated by the UNIDO/GEF project. These will include type and the number of projects developed and implemented due to the increased capacity and conducive environment for the renewable energy projects.
- c. Waste-to-energy investment generated by the UNIDO/GEF project, directly and indirectly
- d. Development and amendments of policy, legislative and regulatory frameworks aimed to promote and support the MSW and WTE market
- e. Level of awareness and technical capacity for the use of MSW for energy purposes within relevant institutions, in the market and within enterprises.
- f. Overall and specific socio-economic impacts of the project, including the increase in productive capacities, access to modern energy services, job creation for women and men, and gender related aspects (such as gender balance of beneficiaries, budget spent on activities actively promoting GEEW).

The PMU will be responsible for day-to-day and local management of project activities execution, performance and the tracking of progress towards the achievement of milestones. However, monitoring and evaluation of the demonstration projects with respect to energy generation, technical performance, commercial viability and GHGs emission reduction will be integral part of the evaluation component of Project Component 5.

UNIDO will be responsible for oversight and tracking overall project milestones and progress towards the attainment of the set project outputs. UNIDO will be responsible for narrative reporting to the GEF. The UNIDO National Project Coordinator will be responsible for the preparation of Annual Project Implementation Reviews (PIR).

Mid-term (MT) and terminal evaluation (TE) will be prepared by an independent evaluator as established in the M&E Plan.

One mid-term review will be carried out and a final external terminal evaluation at least one month before the completion of the project. UNIDO will make arrangements for the independent terminal evaluation of the project. The UNIDO project manager will inform UNIDO Evaluation Group at least 6 months before project completion about the expected timing for the Terminal Evaluation (TE). The UNIDO Evaluation Group will then manage the terminal evaluation in close consultation with the project manager.

All monitoring and evaluation documents, such as progress reports, final evaluation report, and thematic evaluations (e.g. capacity needs assessment), as well as publications reporting on the project, will include gender dimensions wherever adequate. Table 15 provides the tentative budget for monitoring and the two evaluations, which has been included in Output 5.1.1 of Project Component 5.

UNIDO as the Implementing Agency will involve the GEF Operational Focal Point and project stakeholders in order to ensure the use of the evaluation results for further planning and implementation. According to the Monitoring and Evaluation policy of the GEF and UNIDO, follow-up studies like Country portfolio evaluations and thematic evaluations can be initiated and conducted. All project partners and contractors are obliged to (i) make available studies, provide reports or other documentation related to the project and (ii) facilitate interviews with staff involved in the project activities.

Type of M&E Activity	Responsible Partner	Budget (USD)	Co-financing (USD)	Timeframe
M&E design and tools to collect and record data (performance indicators) including a survey to confirm baseline values for industry, manufacturers, policy makers, gender, etc.	UNIDO PM, PMU and M&E specialists as required	25,000	45,000	Continuous
Regular monitoring and analysis of performance indicators (technical, social, policy, environmental, gender) and GEF core indicators	PMU			Continuous
Monitoring of Environmental & Sustainability Management Plan	PMU			Continuous
Periodic Progress Reports	PMU			Continuous
Mid-term evaluation including survey to measure progress against baseline for investments, trainings and policy makers	PMU, UNIDO PM and project developers	25,000	20,000	Mid of project
Project Terminal Evaluation	PMU, UNIDO PM and project developers	30,000	33,000	Evaluation at least three months before the end of the project
TOTAL indicative cost		80,000	98,000	

Table 15: Project's Indicative Monitoring and Evaluation Work Plan

D. LEGAL CONTEXT:

The UNIDO activities will be governed by the provisions of the Standard Basic Cooperation Agreement concluded between the Government of the recipient country concerned and UNIDO or – in the absence of such agreement – by one of the following: (i) the Standard Basic Assistance Agreement concluded between the recipient country and UNDP, (ii) the Technical Assistance Agreements concluded between the recipient country and the United Nations and specialized agencies, or (iii) the Basic Terms and Conditions Governing UNIDO Projects.

PART III: CERTIFICATION BY GEF PARTNER AGENCY(IES)

A. GEF Agency(ies) certification

This request has been prepared in accordance with GEF policies⁷⁸ and procedures and meets the GEF criteria for CEO endorsement under GEF-6.

Agency Coordinator, Agency Name	Signature	Date (MM/dd/yyyy)	Project Contact Person	Telephone	Email Address
Mr. Philippe R. Scholtès, Managing Director, Programme Development and		05/24/2019	Mr Robert Novak, UNIDO Industrial Development	+43 1 26026- 4805	R.Novak@unido.org

⁷⁸ GEF policies encompass all managed trust funds, namely: GEFTF, LDCF, and SCCF

Technical Cooperation, UNIDO-GEF Focal Point			Officer		
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ANNEX I: BACKGROUND DOCUMENT – MUNICIPAL SOLID WASTE IN DRC (see separate file)

ANNEX J: CALCULATIONS OF GHG EMISSION REDUCTIONS (see separate file)

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ANNEX A: PROJECT RESULTS FRAMEWORK (either copy and paste here the framework from the Agency document, or provide reference to the page in the project document where the framework could be found).

Results	Indicators	Baseline	Targets	Means of Verification	Assumptions and Risks
Objective					
To promote waste-to-energy (WTE) technologies for sustainable waste management in the Democratic Republic of the Congo	Indicator 1: CO ₂ emission reduced (tons of CO _{2eq}) due to new WTE projects [direct and indirect]	0 CO ₂ emission reductions due to absence of WTE projects	1,495,924 t CO _{2eq} direct emission reductions achieved by EOP and indirect 1,340,139 t CO _{2eq} after 20 years Total 2,893,572 t CO _{2eq}	GEF project tracking tool	The Government remains committed to the development of WTE
	Indicator 2: Energy generated from WTE projects supported or promoted by project (in MWh)	0 MWh of energy generated from WTE	190,000 MWh energy production per year (EOP)	Project documents	Implementation of project activities will foster investment in WTE technologies
	Indicator 3: No. of WTE projects	0 WTE projects realized	4 projects realized by EOP (1 in component 2 and 3 in component 3)		Adequate resources mobilized
Component 1: Policy and regulation development					
Outcome 1.1: Strengthened policy and regulatory environment under considerations of gender equality and equity	Policy and regulatory framework for MSWM and WTE is developed / accepted among governmental stakeholders and private sector able to implement projects under that framework	The legislative and regulatory regime for the waste management sector in the DRC is not conducive for effective waste management. The country has a policy framework and instruments with some significant gaps (e.g. law enforcement)	Policy amendments and regulatory framework (incl. policies, instruments, supporting waste collection and sorting and waste utilization incl. energy use, financial mechanism) are elaborated under considerations of gender equality and equity	Policy and regulatory guidelines document	Government of DRC remains committed to improve the MSW management and energy use in the country.
Output 1.1.1: Municipal solid waste (MSW) assessment report - gap analysis concerning the instruments and policies already in place	Municipal MSW strategy report for Kinshasa including gap analysis and policy recommendations developed (including gender dimensions)	National MSW strategy and municipal strategy available, but with major gaps Existence of few policies on MSWM and energy production.	One municipal solid waste strategy report developed within first year of the GEF Project start under considerations of gender equality and equity	Strategy Report available	Sustained support of Provincial Government of Kinshasa Involvement of relevant stakeholders

Results	Indicators	Baseline	Targets	Means of Verification	Assumptions and Risks
Output 1.1.2: Policies to enhance MSW and energy utilization drafted for the consideration and approval of the Government of DRC	Gender-responsive policy amendments developed in cooperation with governmental stakeholders	Available MSW policy framework is not sufficient	Recommendations for policy amendments to be introduced in the national /provincial legislation to: <ul style="list-style-type: none"> j) establish a long-term financing of the waste management operations in DRC (waste fee/taxation strategy and policy) – by year 2 k) allow private entities to establish and operate waste collection/waste transfer stations (including questions of taxation) – by year 2 l) support the utilisation of waste components for recycling and energy use (waste hierarchy) – by year 2 m) gender- dimensions considered and addressed 	Draft policy documents available by year 2 Policy approval by Government by year 3	Government of DRC remains committed to improve the MSW management and energy use in the country.
Component 2: Establishment of a sustainable waste collection and sorting system					
Outcome 2.1: Development of an efficient waste collection infrastructure and building a supply chain for sorted wastes to become useful resources for energy production	Improved MSW management including trained public and private actors in the process of waste collection and operationalization of a sorting facility	Public solid waste management by RASKIN is only conducted in 9 of 24 communes of Kinshasa. In the last 2 years more than 40 of initial 61 transfer stations were closed. Mpasa landfill is currently not operated	Successful implementation of a sustainable waste collection and sorting system in Kinshasa	Project commissioning reports Monitoring reports	Public waste management company of Kinshasa will remain on low capacity without project support Private companies require capacity development to improve the overall capacity of MSW

Results	Indicators	Baseline	Targets	Means of Verification	Assumptions and Risks
Output 2.1.1: Market review updated and roadmap developed	Updated market review on MSW practices in Kinshasa Stakeholder consultations with private and public sector representatives established	Weak capacities of public MSW operator and only few private waste collection actors on the market	n) Updated market review concerning resources available (equipment, trucks, workforce, etc.) for waste collection, sorting, handling and transfer to disposal facilities in Kinshasa o) One Roadmap developed towards sustainable waste management (collection and sorting) practices by public and private stakeholders	Updated market review on waste collection processes Roadmap on sustainable MSWM in Kinshasa	Minimal or no development of MSWM until project start. Also other waste management initiatives (e.g. AFD/WB) will not start before beginning of 2020 Informal MSW sector and involvement of CBOs/NGOs will remain since the project will not cover all communes of Kinshasa Province Increased willingness for cooperation among public and private stakeholders
Output 2.1.2: Improved design for a waste collection and sorting infrastructure deployed in Kinshasa	Concept of a sorting facility at selected transfer stations developed - technical design - commercial (business plan)	Collection of wastes is currently established through approx. 11 municipally controlled waste collection centres (transfer stations to landfill). Sorting of wastes is not considered in the existing municipal MSW concept.	Design concept for an integrated waste transfer station including collection and sorting of wastes elaborated - by end of year 1 Business plan for the operation of a waste sorting facility developed – by end of year 1	Design concept developed	Parallel MSW projects initiated by the World Bank and AFD in the N'djili river catchment (located in Kinshasa, eastern and southern parts of the province) will consider installation of waste collection centers and transfer stations across Kinshasa. Assumption is that this Project will develop and co-finance the sorting infrastructure, even without realization of WB/AFD projects.

Results	Indicators	Baseline	Targets	Means of Verification	Assumptions and Risks
Output 2.1.3: Pilot material recovery facility (MRF) processing 250,000 t of wastes - investment initiated at selected waste transfer stations for waste collection and waste sorting	<p>Implementation of a material recovery facility (MRF) at one selected transfer station</p> <p>Investor and operator for the MRF awarded (under considerations of gender dimensions)</p> <p>Financing mechanism developed in cooperation with FPI</p> <p>Service contracts for private operators drafted</p>	Current MSW framework does not foresee the separate collection and sorting of municipal wastes at dedicated facilities	<p>Installation and operation of MRF launched – beginning of year 2</p> <p>Selected companies to receive investment support – by year 2</p> <p>MRF (max. capacity of approx. 250,000 t/a) implemented and operations launched – by year 2</p> <p>50% female staff at the operator</p>	<p>Tender documents</p> <p>Responses counted to call for tender</p> <p>No. of offers submitted</p> <p>Updated operation reports of demonstration sorting facility</p> <p>Report on financing mechanisms (FPI)</p> <p>Draft service contract for private operators</p>	Complementary activity, will be established in addition to WB/AFD project but can be possibly realised even without WB/AFD project
Output 2.1.4: Local businesses capacitated in establishing collection and sorting infrastructure as a paid service	<p>Capacity support for businesses establishing waste collection</p> <p>Operationalization support for established waste transfer station</p> <p>No. of personnel of public/private operator trained (gender-specific monitoring)</p> <p>Manuals and operational procedures developed for waste collection and waste sorting</p>	No capacity building support established in Kinshasa currently	<p>p) At least 15 local waste collection and recycling companies received trainings and business development support (30% women participation)</p> <p>q) Training of operator staff organized during start-up and test-run of waste sorting facility (30% women)</p> <p>r) Contractual agreements facilitated between waste collectors, recyclers and industries (RDF supply) for long-term supply of materials.</p>	<p>Training reports</p> <p>Participant lists</p> <p>No. of contractual agreements issued.</p> <p>Manuals and operational procedures</p>	Interest from private sector to establish waste collection and sorting businesses increases

Component 3: Demonstration of municipal waste to energy technologies

Results	Indicators	Baseline	Targets	Means of Verification	Assumptions and Risks
Outcome 3.1: Pilot Waste-to-energy (WTE) technologies in industries implemented	Increase the number of installed WTE applications with focus on power and heat production and increase the number of private sector players taking part in such project.	Low interest from private investors to engage in WTE plants development	State-of-the-art technology and best practices in the country in the form of highly replicable innovative WTE applications using waste residues implemented	Project commissioning reports Monitoring reports (at least 1 year of continuous project monitoring ensured by COP)	No. of projects succeeding into the phase of project approval and implementation is sufficient. Commitment of project sponsors and investors maintained throughout project approval and implementation stage
Output 3.1.1: Feasibilities and business models developed for local industries to utilize municipal waste and waste from industries as energy sources	No. of project developers engaging in demonstration projects No. of business plans/feasibility studies submitted based on call for projects issued No. of demonstration projects supported by the Project	Waste-to-energy projects have not been developed so far	1. Launch a call for project proposals for WTE demonstration (min. 5 applications) 2. Selection of at least 3 project proposals for further project development support (under consideration of gender dimensions) 3. Prepare business plan and feasibility study for at least 2 pilot projects 4. Develop and confirm at least 2 demonstration projects for an approx. amount of cumulative 60,000 tons of MSW processed per year	Responses counted to call for projects Project concepts submitted Detailed plant design reports of each demonstration plant	Timely approval of finances/funds and permissions available Difficulty to confirm interest of private sector partners (beverage or cement industries)
Output 3.1.2: 1.35 MWeI biomethanisation WTE plant co-fermenting municipal and industrial wastes in industry	MWh/a of energy (power, thermal) supplied through cogeneration plant using MSW Amount of municipal wastes utilized (in t/a)	No commercial WTE plants in DRC Industries depend on fossil fuels for process energy needs	At least 1 biogas plant installed at an industrial facility utilizing bio-wastes (min. 18,000 t/a) in a cogeneration process (approx. 5,200 MWh/a electricity and 5,400 MWh/a heat produced) 30% female staff at the biogas plant	Monitoring reports (at least 1 year of continuous project monitoring ensured by EOP)	Interest and commitment of industries with high energy demand Operational and financial capacity of industries Risk of continuous supply of wastes and feasibility of pilot project
Output 3.1.3: Pilot investment 2: utilization of 70,000 t of refuse derived fuels (RDF) processed at industrial facilities	MWh/a of energy supplied through RDF in industries Amount of municipal wastes utilized as RDF (in t/a)	RDF is not been commercially used in DRC Industries depend on fossil fuels for process energy needs	At least 40,000 t/a of RDF are collected/sorted from the municipal solid waste in Kinshasa and used in industrial production; corresponding amount of energy approx. 176,000 MWh/a At least 50% female staff for RDF production min. 500 waste pickers involved (thereof At least 30% women)	Monitoring reports (at least 1 year of continuous project monitoring ensured by EOP)	Interest and commitment of industries interesting in using RDF for energy supply Technical feasibility and continuous supply of RDF

Results	Indicators	Baseline	Targets	Means of Verification	Assumptions and Risks
Output 3.1.4: Pilot investment 3: utilization 2,300 t of market wastes for production of bio-briquettes	Capacity of bio-briquettes (t/a) produced MWh/a of energy supplied through bio briquettes Amount of municipal wastes utilized (in t/a)	Small scale production of bio-briquettes (< 12 t per year) only so far in Kinshasa About 490,000 t/a of charcoal used in Kinshasa leading to large-scale deforestation	2,300 t of bio wastes utilized for approx. 360 t/a bio-briquette production ~2,000 MWh/a of energy produced out of bio-briquettes 50% female staff for bio-briquette production min. 200 waste pickers involved (thereof to 30% women)	Monitoring reports (at least 1 year of continuous project monitoring ensured by EOP)	Long-term agreements to be established with individual suppliers of bio wastes Increased awareness among target groups will raise interest in bio-briquettes in the long-term
Component 4: Replication and scale up					
Outcome 4.1: Potential for replication assessed	Increased involvement of private investors in waste collection and WTE projects across the DRC	Low interest from private investors to engage in waste collection and WTE plants development	Develop a replication strategy that covers other DRC cities and focuses on improved waste collection, waste sorting and WTE applications	Replication strategy Financial incentive mechanism	Interest from private sector and municipal operators across other DRC cities increases based on the successful implementation of pilot activities in Kinshasa
Output 4.1.1: Waste collection/sorting, WTE potential and business opportunities for replication projects assessed	Number of project developers established waste collection/sorting or WTE businesses and benefitted through the financing mechanism Replication strategy developed	Inadequate financing facilities to attract investments in waste collection infrastructure and WTE projects	Developing of a replication strategy (by EOP) (under consideration of gender dimensions)	Replication strategy document published	Financing the operation on the long terms by the public institutions (FONAK, Government) MSW is requiring improved collection and sorting mechanisms in all parts of the country WTE is a beneficial solution considering the weak energy supply in parts of the cities or other parts of the country
Output 4.1.2: Financing mechanism for scale-up of waste collection/sorting and WTE applications established	Incentive program and financing scheme for waste collection/sorting and WTE promotion established	No financing mechanism or incentive schemes for waste management or WTE applications available in the country	Financial mechanism (incl. social and gender sensitive grant support, financial guarantee or ESCO) to replicate waste collection and WTE projects in the future explored and developed (by EOP)	Financing scheme and incentive program documents, guidelines, implementation plans established Exit strategy for the financing scheme (future ownership) developed	Finance sector gets interested in financing waste infrastructure projects, and financing support mechanisms continuously developed further.

Results	Indicators	Baseline	Targets	Means of Verification	Assumptions and Risks
Outcome 4.2: Capacity of key players in municipal administration, target businesses/industries enhanced	Key stakeholders (government, private sector decision-makers, technical/operation staff) are capacitated & made aware of the vast potential waste residues have for energy production.	Insufficient awareness, capacity and knowledge among key stakeholders	Capacities of main stakeholders strengthened, and awareness raised	Training materials Promotional materials	Interest from the government, municipalities, industries & private sector in developing waste collection/sorting and WTE
Output 4.2.1: Training and capacity programs on waste collection, sorting and utilization of residues organized: - municipal operator (RASKIN, etc.) - waste collection/sorting/recycling businesses and potential operators	Number of public and private sector stakeholders participating in trainings Number of trainings organized	Insufficient local capacity to develop, support, operate & maintain waste sorting & WTE facilities	1. Conduct at least 3 trainings on waste collection, sorting and WTE production for each of the three target groups (i) Government officials, (ii) public and private MSW service providers and (iii) WTE operators. s) At least 45 personnel from each target group trained 2. Conduct at least 5 trainings for bio-briquette production in Kinshasa and other cities of DRC. At least 100 persons trained. 3. 25% women participation	Training reports (in total min. 14 trainings)	Support of the participating ministries, Provincial government of Kinshasa, private sector stakeholders Representatives from Kinshasa and other DRC cities will be invited to the trainings, trainings will take place in different cities
Output 4.2.2: Sharing of the best practices from other countries on MSW management, energy recovery and recycling	Number of study tour participants from different public institutions Case study publications about WTE applications in other cities and countries Promotion event in the regional context of Sub-Saharan African countries and cities organized (e.g. in cooperation with UNIDO and SACREEE)	Knowledge and awareness about best practices and successful MSW and WTE projects not available and not disseminated among DRC stakeholders	General project promotion (television, radio broadcast, newspapers, magazines) 1 intl. study tour for public stakeholders organized (approx. 10-15 participants, 50% women participation) Publication of case studies of successful implemented projects Organizing one national conference on MSW and WTE (with 30% female participants) Participation at exhibitions and fairs to promote WTE solutions	Promotional materials and broadcasts Study tour program and report Case study summary Event report, exhibition materials Confirmation of participation	Public and private sector representatives and other stakeholders are interested in participation of events, conference and study tour. DRC Government remains committed for development of MSW capacities/know-how through private sector participation.

Component 5: Monitoring & Evaluation

Results	Indicators	Baseline	Targets	Means of Verification	Assumptions and Risks
Outcome 5.1: Effectiveness of the outputs assessed, corrective actions taken and reported	Timely implementation of the project and project targets and indicators properly monitored throughout the project duration	N/A	Project progress and an overall project impact assessment periodically monitored and evaluated	Evaluation Reports Monitoring Reports Lessons learnt report	Capability and experience of project management unit Government and private sector build upon successful project results
Output 5.1.1: Terminal evaluation conducted	List of all progress reports prepared Mid-term and terminal evaluation conducted	N/A	Mid-term evaluation completed by project mid-term Terminal evaluation completed by end of project closing time Project terminal report completed by end of project	Mid-term evaluation Report Terminal evaluation Report Project terminal report	Appropriate capability of the Project Manager and Project Director exist for proper management and monitoring of the project. Project gets commissioned successfully and the expected outputs achieved sustainably
Output 5.1.2: Project's progress monitored, documented and recommended actions formulated	Monitoring reports of successfully implemented projects No. of project steering committee meetings Report on lessons learnt	N/A	M&E Plan available within 3 months of project start At least one PSC per year 3 monitoring reports documenting successful project implementation of demonstrations Lessons learnt from the project drafted by year 4	Monitoring reports PSC meeting minutes Lessons learnt report	Appropriate capability of PM exists for proper project management and monitoring of project Government and private sector accept the fact and figures produced from the projects' experiences.

ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF).

GEF SECRETARIAT comments at PIF stage relevant for CEO Endorsement Request stage:

<p>1. Comments by Germany on GEF TF Work Program November 2017:</p> <p><u>Suggestions for improvements to be made during the drafting of the final project proposal:</u></p> <p>Regarding activity 3.1.3 under outcome 3.1 on the biomethanisation of organic wastes, the PIF states that an estimated 10% of the municipal solid waste being landfilled is organic waste that could be used for methane-capture, if separated. Table 2 lists garden and park waste as making up 40% of the total municipal solid waste — this in addition to 9% from food wastes. That would result in almost 50% of the municipal solid waste being comprised of organic waste that could potentially be used for biomethanisation. It would be helpful if during the Project Preparation Grant phase it could be clarified why the yard waste is not considered as an input for the biomethanisation process but rather will be used for combustion.</p>	<p><u>Response:</u></p> <p>As regards organic wastes considered for waste-to-energy utilization, generally no restrictions are being made regarding types of wastes, so yard wastes are in principle eligible and able to be included in energy generation. However, in the case of biomethanisation, the specific composition of wastes has to be considered, since they influence the methanisation process and gas production.</p> <p>The business case elaborate during the PPG now foresees the combined fermentation of industrial organic wastes (e.g. brewery or other food industry process residues) and municipal organic wastes coming mainly from markets and households (since these wastes usually have less woody/lignin components).</p>
<p>2. Comments by United States</p> <p><i>Comment 1:</i> We are concerned there may be significant barriers to large populations adopting new waste management protocols, though this may not be an insurmountable challenge given the thought and effort put into stakeholder outreach.</p> <p><i>Comment 2:</i> Related initiatives are not well articulated in the PIF; rather, the project builds off existing landfill and MSW collection and other infrastructure. We encourage the project team to expand their scope of potential related initiatives to include other activities.</p>	<p><u>Response:</u></p> <p>The Project primarily focuses on improving the waste collection situation in Kinshasa, by adding a new dimension to MSW management, which is improved collection and sorting of wastes (including the installation of a specific waste sorting facility). Major parts of the population shall be benefitting from improved waste collection quality and, in addition, from new business opportunities by providing sources of income through waste collection, waste sorting, recycling and energy production opportunities.</p> <p>Although initial focus of producing energy at the (meanwhile not properly functional) landfill has been set aside, and the focus is given towards producing energy at – and together with – industrial facilities. Related initiatives of other donors and programs have been elaborated in the CEO Endorsement Document, incl. possible linkages that this UNIDO-GEF Project may establish with planned initiatives of the World Bank, AFD and others.</p>

GEF STAP Comments received:

<p>3. Municipal solid waste (MSW) management can be improved in urban areas of the DRC by policies that are to be drafted for consideration by the Government. Much of the solid waste is currently burned or dumped, both resulting in high pollution. Demonstrations of collection and sorting techniques will be established in the largest city of Kinshasa with USD 5.4M of co-financing (mainly from the private sector Fond de Promotion de l'Industrie and government) to develop infrastructure. A further USD 9.1M will be used to install an improved landfill gas collection and electricity generation system at the Mpsa landfill site**. This will also help meet the deficit of electricity generation capacity in the country. An RDF processor is also planned, as well as an aerobic digester for the food waste component of the MSW.</p>	<p><u>Response:</u></p> <p>PPG activities confirmed that the major challenge for the municipal solid waste management (MSWM) is the inappropriate and insufficient collection capacity in Kinshasa. The city is though not able to meet the pressing needs of growing demand for waste collection and disposal services; it lacks capacity to enforce the waste management regulations and there is also lack of cooperation among public institutions and between public and private sectors.</p> <p>The Project design has been changed compared to the initial PIF; the Project proposes to include a focus on private-sector players engaging in waste management activities and increase their capacity to collect, sort and valorize the use of wastes, specifically by promoting waste-to-energy applications but also recycling and upcycling practices. The sorting of wastes will allow to increase the opportunities for those businesses that are already engaged in the city and partly acting as licensed partners of the public waste management authority (RASKIN) – but are partly of small size or generally acting on low capacity; it will also allow new businesses to evolve around specific waste streams – e.g. composting, briquetting and energy production from biodegradable wastes, or businesses engaging in the collection, recycling/upcycling of plastic, paper and wood wastes, and selling parts of unusable material as residue-derived fuels (RDF) for energy use into local industries.</p>
<p>4. An overall national waste strategy is one aim of the GEF project to assess the replication potential. A national assessment of waste generation will be made, and replication projects will be encouraged through knowledge sharing, workshops, and training.</p>	<p><u>Response:</u></p> <p>Elements of a national and municipal MSW strategy are partly available, but with major gaps, furthermore, there are few policies existing on MSWM and energy production but not effectively implemented and executed. The project will develop a municipal strategy with a focus to reduce the existing organizational, financial and policy gaps. Dialogue will be established in close collaboration with various stakeholders and develop different knowledge tools (e.g. training tools, roadmap, guidebooks etc.) that will be disseminated widely. A knowledge management plan will be elaborated during the project's initialization stage to define the specific knowledge creation and dissemination activities, the target groups and the time by when the materials in a user-friendly form will be made available and delivered.</p>
<p>5. The existing European Commission-funded project was instigated in 2011 to collect waste in many communes of Kinshasa and deliver to a managed landfill site. However, since management of the project moved to the Board of Sanitation and Public Works in 2015, the gas collection system has failed (possibly due to increased gas pressure), and the methane is no longer collected and flared or utilized, but released to the atmosphere.</p>	<p><u>Response:</u></p> <p>Landfill gas utilization is not part of the piloting activities under the Project. Refer to comment #3.</p>
<p>6. The GEF project involves the successful contractor collecting and</p>	<p><u>Response:</u></p>

<p>using this methane to run a 2MW power generation plant, although if the current landfill is anticipated to "exhaust in 2018, and new sections must be developed for landfill of future wastes", then it is not clear how this will be achieved successfully in such a short time frame. Landfill gas volumes reach a peak soon after a cell is sealed and is then only produced for a limited time as volumes decline. The period of gas production varies with the type of organic waste, ambient temperature, collection systems, etc. but the decline in gas production is well understood and has to be anticipated at the project design stage and when calculating revenue from sales of gas or electricity. Has this been accounted for in the feasibility study where it states, "The proposed output will capture an average of 5.5 million cubic meters of CH4 per annum"? It is not clear who conducted the study or what the decline rate is.</p>	<p>In the PIF the idea was to focus on achieving the successful implementation of WTE options at the Mpsa landfill site. However, since the landfill is not fully functional and is expected to be rehabilitated under a larger urban development program with support from the World Bank, demonstrating WTE applications directly at the landfill does not make much sense.</p> <p>Energy from waste will be produced closer to the source of waste and nearby the facilities requiring energy, e.g. industries requiring power and thermal energy for their processes, or otherwise fed into the grid in the form of electricity or being available to replace traditional fuel sources at household level (e.g. briquettes made from bio-wastes replacing charcoal).</p> <p>3 business cases are considered for pilot investments:</p> <ul style="list-style-type: none"> • Case 1: Biogas production with bio-degradable wastes from MSW collection and industrial processes (co-fermentation), such as spent grains, waste waters, etc. • Case 2: RDF Production from Plastic, paper and wood wastes from waste sorting facility or direct collection sources • Case 3: Bio-briquettes production from market, household and other biodegradable wastes (e.g. restaurants)
<p>7. Furthermore, the project will seek to segregate organic waste for biomethanisation. This means that the total organic volume that will be landfilled will be significantly reduced, which is a good thing. However, was this reduction in organic content, and consequently reduction in the volume of landfill gas to be generated from the landfill, considered when estimating the amount of methane expected from the landfill, as well as the amount of power to be generated and the expected revenue resulting?</p>	<p><u>Response:</u></p> <p>All pilot activities foreseen under this Project are mainly addressing the need to reduce waste streams going to the landfill. Project component 2 will focus on improving the coverage, effectiveness and reliability of the waste collection system in the city as well as the introduction of a waste sorting system at the transfer stations.</p> <p>The produced wastes from residential and commercial areas as well as market wastes shall be pre-collected by private enterprises (awarded through a tender process Output 2.1.3). These wastes will be then sent to a material recovery facility (MRF) established under this project to sort out recyclable and recoverable MSW (organic, plastic, wood, paper, etc.). Ideally, this MRF will be situated in the city (to reduce transport costs) at the MSW collection facilities, such as large-scale transfer stations. Only the remaining wastes neither recycled, nor recovered and used as energy source, shall then be transferred to the municipal landfill.</p>
<p>8. A detailed analysis of the expected volume of landfill gas, the anticipated MWh of electricity generated, and consequently the anticipated revenue need to be carried out for both the short and long terms, as the project is planned further. It is good that international best practices and knowledge will be sought from the successful tenderer since it is a specialist area. This analysis must be rigorously done to attract the private sector as desired</p>	<p><u>Response:</u></p> <p>See response #5. Landfill gas recovery is not part of the project anymore.</p>

and ensure project success.	
9. It is planned to produce biogas from the food waste component in the future. Has a cost/benefit analysis been undertaken to compare this option with putting this food waste into the landfill and hence generating more landfill gas and avoiding the investment, operation and maintenance costs of the anaerobic digester and 1 MW generation plant? STAP recommends reviewing whether similar combinations of producing both landfill gas and biogas at the same site have been successfully conducted elsewhere to give the optimum return on investment.	<p><u>Response:</u></p> <p>The biogas demonstration will consider, as described under response #6, a co-fermentation of industrial food processing wastes and municipal organic wastes, preferably from markets, restaurants and households.</p> <p>Cost-benefit analysis has been conducted for this and all other business cases and recommendations provided concerning the level of financing required to make the cases economically feasible.</p>
10. It is not clear who will purchase the RDF or for what applications it will be used for. 300 t/day is a considerable amount, so ideally it will require long-term purchase contracts to be put in place.	<p><u>Response:</u></p> <p>During the PPG phase, the business case for RDF production has been developed in detail. With respect to industrial energy demand, large amounts of fossil fuels are imported. The main importer of hard coal is the cement industry, the major application is therefore foreseen there.</p> <p>By producing RDF consisting of unrecyclable plastics and paper and cardboard from MSW, a value chain for these hitherto unrecyclable and therefore valueless materials is created. This reduces the amount of MSW to be collected and the negative impacts on human health and the environment (i.e. GHG emissions, plastic marine litter, and pressure on natural resources) caused by dumping, burning, and river disposal of MSW. Furthermore, the production costs for cement in the DRC as well as the dependency of this industry on expensive fossil fuel imports, will be reduced.</p>
11. Around 2.5 Mt CO ₂ -eq of direct emission reductions are projected as a result of project implementation with an additional 3.3 Mt CO ₂ -eq of indirect emissions. This equates to around USD 3.5 /t CO ₂ -eq but this figure excludes possible revenue from the RDF and electricity sales and any monetary value for the additional co-benefits such as improved health and clean rivers.	<p><u>Response:</u></p> <p>The updated calculation of GHG results in 1.49 Mt CO₂eq emission reductions achieved by EOP (thereof direct GHG emissions reductions 0.12 Mt CO₂eq and indirect 1.37 Mt CO₂eq). This equates to around US\$ 2.41/t CO₂.</p> <p>Possible revenues are considered in the cost-benefit analyses (refer to business cases described in Annex K).</p>
12. Overall, the project will focus on managing the generated wastes and ultimately converting them to useful resources. However, it is also pertinent to create upstream solutions that prevent waste generation and promote resource-use efficiency. It is recommended that this should be built into the project.	<p><u>Response:</u></p> <p>Waste minimization and preventing wastes being generated requires long-term awareness and dissemination activities which are partly built into specific capacity building and dissemination tasks under the project (mainly in component 2 and component 4). However, the project is not able to solve all awareness and capacity issues regarding MSW, nevertheless synergies with other donor-supported projects have been identified and incorporated into project design.</p>

ANNEX C: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS⁷⁹

A. Provide detailed funding amount of the PPG activities financing status in the table below:

PPG Grant Approved at PIF: US\$ 150,000			
<i>Project Preparation Activities Implemented</i>	<i>GEF/LDCF/SCCF Amount (\$)</i>		
	<i>Budgeted Amount</i>	<i>Amount Spent To date</i>	<i>Amount Committed</i>
Development of CEO Endorsement document – engagement of specialised contractor	112,668	112,668	
International Waste-to-Energy Expert	9,909	9,909	
National Consultant	5,680	5,680	
Validation Workshop	1,543	1,543	
CEO Endorsement Package – Review and adaptation	20,200		20,200
Total	150,000	129,800	20,200

⁷⁹ If at CEO Endorsement, the PPG activities have not been completed and there is a balance of unspent fund, Agencies can continue to undertake the activities up to one year of project start. No later than one year from start of project implementation, Agencies should report this table to the GEF Secretariat on the completion of PPG activities and the amount spent for the activities. Agencies should also report closing of PPG to Trustee in its Quarterly Report.

ANNEX D: CALENDAR OF EXPECTED REFLOWS (if non-grant instrument is used)

Provide a calendar of expected reflows to the GEF/LDCF/SCCF Trust Funds or to your Agency (and/or revolving fund that will be set up)

No reflows are expected.

ANNEX E: GEF 7 CORE INDICATOR WORKSHEET

Use this Worksheet to compute those indicator values as required in Part I, Table E to the extent applicable to your proposed project. Progress in programming against these targets for the program will be aggregated and reported at any time during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

The relevant project core indicator is the amount of **Greenhouse Gas Emissions Mitigated** (metric tons of CO₂e).

For details refer to Table E in Part I of this CEO Endorsement Request Document and ANNEX J providing details on the calculations for GHG emission reductions (separate Excel file).

Core Indicator 1	Terrestrial protected areas created or under improved management for conservation and sustainable use					(Hectares)
		Hectares (1.1+1.2)				
		Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
Indicator 1.1	Terrestrial protected areas newly created					
Name of Protected Area	WDPA ID	IUCN category	Hectares			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
		(select)				
		(select)				
		Sum				
Indicator 1.2	Terrestrial protected areas under improved management effectiveness					
Name of Protected Area	WDPA ID	IUCN category	Hectares	METT Score		
				Baseline		Achieved
					Endorsement	MTR
						TE
		(select)				
		(select)				
		Sum				
Core Indicator 2	Marine protected areas created or under improved management for conservation and sustainable use					(Hectares)
		Hectares (2.1+2.2)				
		Expected		Achieved		
		PIF stage	Endorsement	MTR	TE	
Indicator 2.1	Marine protected areas newly created					
Name of Protected Area	WDPA ID	IUCN category	Hectares			
			Expected		Achieved	

			PIF stage	Endorsement	MTR	TE
		(select)				
		(select)				
		Sum				
Indicator 2.2	Marine protected areas under improved management effectiveness					
Name of Protected Area	WDPA ID	IUCN category	Hectares	METT Score		
				Baseline		Achieved
				PIF stage	Endorsement	MTR
						TE
		(select)				
		(select)				
		Sum				
Core Indicator 3	Area of land restored					(Hectares)
			Hectares (3.1+3.2+3.3+3.4)			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 3.1	Area of degraded agricultural land restored					
			Hectares			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 3.2	Area of forest and forest land restored					
			Hectares			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 3.3	Area of natural grass and shrublands restored					
			Hectares			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 3.4	Area of wetlands (including estuaries, mangroves) restored					
			Hectares			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE

Core Indicator 4	Area of landscapes under improved practices (hectares; excluding protected areas)					(Hectares)
		Hectares (4.1+4.2+4.3+4.4)				
		Expected		Expected		
		PIF stage	Endorsement	MTR	TE	
Indicator 4.1	Area of landscapes under improved management to benefit biodiversity					
			Hectares			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 4.2	Area of landscapes that meet national or international third-party certification that incorporates biodiversity considerations					
Third party certification(s):			Hectares			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 4.3	Area of landscapes under sustainable land management in production systems					
			Hectares			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 4.4	Area of High Conservation Value Forest (HCVF) loss avoided					
Include documentation that justifies HCVF			Hectares			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Core Indicator 5	Area of marine habitat under improved practices to benefit biodiversity					(Hectares)
Indicator 5.1	Number of fisheries that meet national or international third-party certification that incorporates biodiversity considerations					
Third party certification(s):			Number			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE

Indicator 5.2	Number of large marine ecosystems (LMEs) with reduced pollution and hypoxial					
			Number			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 5.3	Amount of Marine Litter Avoided					
			Metric Tons			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Core Indicator 6	Greenhouse gas emission mitigated					(Metric tons of CO ₂ e)
			Expected metric tons of CO ₂ e (6.1+6.2)			
			PIF stage	Endorsement	MTR	TE
	Expected CO ₂ e (direct)	2,484,107	1,495,924			
	Expected CO ₂ e (indirect)	3,312,143	1,340,139			
Indicator 6.1	Carbon sequestered or emissions avoided in the AFOLU sector					
			Expected metric tons of CO ₂ e			
			PIF stage	Endorsement	MTR	TE
	Expected CO ₂ e (direct)					
	Expected CO ₂ e (indirect)					
	Anticipated start year of accounting					
	Duration of accounting					
Indicator 6.2	Emissions avoided Outside AFOLU					
			Expected metric tons of CO ₂ e			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
	Expected CO ₂ e (direct)	2,484,107	1,495,924			
	Expected CO ₂ e (indirect)	3,312,143	1,340,139			
	Anticipated start year of accounting	2020	2020			
	Duration of accounting	20	20			
Indicator 6.3	Energy saved					
			MJ			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE

Indicator 6.4	Increase in installed renewable energy capacity per technology					
		Technology	Capacity (MW)			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
		(select)				
		(select)				
Core Indicator 7	Number of shared water ecosystems (fresh or marine) under new or improved cooperative management					(Number)
Indicator 7.1	Level of Transboundary Diagnostic Analysis and Strategic Action Program (TDA/SAP) formulation and implementation					
		Shared water ecosystem	Rating (scale 1-4)			
			PIF stage	Endorsement	MTR	TE
Indicator 7.2	Level of Regional Legal Agreements and Regional Management Institutions to support its implementation					
		Shared water ecosystem	Rating (scale 1-4)			
			PIF stage	Endorsement	MTR	TE
Indicator 7.3	Level of National/Local reforms and active participation of Inter-Ministerial Committees					
		Shared water ecosystem	Rating (scale 1-4)			
			PIF stage	Endorsement	MTR	TE
Indicator 7.4	Level of engagement in IWLEARN through participation and delivery of key products					
		Shared water ecosystem	Rating (scale 1-4)			
			Rating		Rating	
			PIF stage	Endorsement	MTR	TE
Core Indicator 8	Globally over-exploited fisheries Moved to more sustainable levels					(Metric Tons)
Fishery Details			Metric Tons			
			PIF stage	Endorsement	MTR	TE
Core Indicator 9	Reduction, disposal/destruction, phase out, elimination and avoidance of chemicals of global concern and their waste in the environment and in processes, materials and products					(Metric Tons)

			Metric Tons (9.1+9.2+9.3)			
			Expected		Achieved	
			PIF stage	PIF stage	MTR	TE
Indicator 9.1	Solid and liquid Persistent Organic Pollutants (POPs) removed or disposed (POPs type)					
POPs type			Metric Tons			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
(select)	(select)	(select)				
(select)	(select)	(select)				
(select)	(select)	(select)				
Indicator 9.2	Quantity of mercury reduced					
			Metric Tons			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 9.3	Hydrochlorofluorocarbons (HCFC) Reduced/Phased out					
			Metric Tons			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 9.4	Number of countries with legislation and policy implemented to control chemicals and waste					
			Number of Countries			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 9.5	Number of low-chemical/non-chemical systems implemented particularly in food production, manufacturing and cities					
		Technology	Number			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 9.6	Quantity of POPs/Mercury containing materials and products directly avoided					
			Metric Tons			
			Expected		Achieved	
			PIF stage	Endorsement	PIF stage	Endorsement

Core Indicator 10	Reduction, avoidance of emissions of POPs to air from point and non-point sources					<i>(grams of toxic equivalent gTEQ)</i>
Indicator 10.1	Number of countries with legislation and policy implemented to control emissions of POPs to air					
			Number of Countries			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 10.2	Number of emission control technologies/practices implemented					
			Number			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Core Indicator 11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment					<i>(Number)</i>
			Number			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
		Female		450,000		
		Male		450,000		
		Total		900,000		

ANNEX F: GEF PROJECT TAXONOMY WORKSHEET

Use this Worksheet to list down the taxonomic information required under Part I, item F by ticking the most relevant keywords/ topics/themes that best describe this project.

Level 1	Level 2	Level 3	Level 4
<input checked="" type="checkbox"/> Influencing models			
	<input checked="" type="checkbox"/> Transform policy and regulatory environments		
	<input checked="" type="checkbox"/> Strengthen institutional capacity and decision-making		
	<input type="checkbox"/> Convene multi-stakeholder alliances		
	<input checked="" type="checkbox"/> Demonstrate innovative approaches		
	<input checked="" type="checkbox"/> Deploy innovative financial instruments		
<input checked="" type="checkbox"/> Stakeholders			
	<input type="checkbox"/> Indigenous Peoples		
	<input checked="" type="checkbox"/> Private Sector		
		<input checked="" type="checkbox"/> Capital providers	
		<input type="checkbox"/> Financial intermediaries and market facilitators	
		<input checked="" type="checkbox"/> Large corporations	
		<input checked="" type="checkbox"/> SMEs	
		<input checked="" type="checkbox"/> Individuals/Entrepreneurs	
		<input type="checkbox"/> Non-Grant Pilot	
		<input type="checkbox"/> Project Reflow	
	<input checked="" type="checkbox"/> Beneficiaries		
	<input checked="" type="checkbox"/> Local Communities		
	<input checked="" type="checkbox"/> Civil Society		
		<input checked="" type="checkbox"/> Community Based Organization	
		<input checked="" type="checkbox"/> Non-Governmental Organization	
		<input checked="" type="checkbox"/> Academia	
		<input type="checkbox"/> Trade Unions and Workers Unions	
	<input checked="" type="checkbox"/> Type of Engagement		
		<input checked="" type="checkbox"/> Information Dissemination	
		<input checked="" type="checkbox"/> Partnership	
		<input checked="" type="checkbox"/> Consultation	
		<input checked="" type="checkbox"/> Participation	
	<input checked="" type="checkbox"/> Communications		
		<input checked="" type="checkbox"/> Awareness Raising	
		<input checked="" type="checkbox"/> Education	
		<input checked="" type="checkbox"/> Public Campaigns	
		<input checked="" type="checkbox"/> Behavior Change	
<input checked="" type="checkbox"/> Capacity, Knowledge and Research			
	<input checked="" type="checkbox"/> Enabling Activities		
	<input checked="" type="checkbox"/> Capacity Development		
	<input checked="" type="checkbox"/> Knowledge Generation and Exchange		
	<input type="checkbox"/> Targeted Research		
	<input type="checkbox"/> Learning		
		<input type="checkbox"/> Theory of Change	
		<input type="checkbox"/> Adaptive Management	
		<input type="checkbox"/> Indicators to Measure Change	
	<input checked="" type="checkbox"/> Innovation		
	<input checked="" type="checkbox"/> Knowledge and Learning		
		<input type="checkbox"/> Knowledge Management	
		<input checked="" type="checkbox"/> Innovation	
		<input checked="" type="checkbox"/> Capacity Development	
		<input checked="" type="checkbox"/> Learning	
	<input type="checkbox"/> Stakeholder Engagement Plan		
<input checked="" type="checkbox"/> Gender Equality			
	<input checked="" type="checkbox"/> Gender Mainstreaming		
		<input checked="" type="checkbox"/> Beneficiaries	
		<input checked="" type="checkbox"/> Women groups	
		<input checked="" type="checkbox"/> Sex-disaggregated indicators	
		<input checked="" type="checkbox"/> Gender-sensitive indicators	

	<input checked="" type="checkbox"/> Gender results areas		
		<input type="checkbox"/> Access and control over natural resources	
		<input checked="" type="checkbox"/> Participation and leadership	
		<input checked="" type="checkbox"/> Access to benefits and services	
		<input checked="" type="checkbox"/> Capacity development	
		<input checked="" type="checkbox"/> Awareness raising	
		<input checked="" type="checkbox"/> Knowledge generation	
<input checked="" type="checkbox"/> Focal Areas/Theme			
	<input checked="" type="checkbox"/> Integrated Programs		
		<input type="checkbox"/> Commodity Supply Chains (⁸⁰ Good Growth Partnership)	
			<input type="checkbox"/> Sustainable Commodities Production
			<input type="checkbox"/> Deforestation-free Sourcing
			<input type="checkbox"/> Financial Screening Tools
			<input type="checkbox"/> High Conservation Value Forests
			<input type="checkbox"/> High Carbon Stocks Forests
			<input type="checkbox"/> Soybean Supply Chain
			<input type="checkbox"/> Oil Palm Supply Chain
			<input type="checkbox"/> Beef Supply Chain
			<input type="checkbox"/> Smallholder Farmers
			<input type="checkbox"/> Adaptive Management
		<input type="checkbox"/> Food Security in Sub-Saharan Africa	
			<input type="checkbox"/> Resilience (climate and shocks)
			<input type="checkbox"/> Sustainable Production Systems
			<input type="checkbox"/> Agroecosystems
			<input type="checkbox"/> Land and Soil Health
			<input type="checkbox"/> Diversified Farming
			<input type="checkbox"/> Integrated Land and Water Management
			<input type="checkbox"/> Smallholder Farming
			<input type="checkbox"/> Small and Medium Enterprises
			<input type="checkbox"/> Crop Genetic Diversity
			<input type="checkbox"/> Food Value Chains
			<input type="checkbox"/> Gender Dimensions
			<input type="checkbox"/> Multi-stakeholder Platforms
		<input type="checkbox"/> Food Systems, Land Use and Restoration	
			<input type="checkbox"/> Sustainable Food Systems
			<input type="checkbox"/> Landscape Restoration
			<input type="checkbox"/> Sustainable Commodity Production
			<input type="checkbox"/> Comprehensive Land Use Planning
			<input type="checkbox"/> Integrated Landscapes
			<input type="checkbox"/> Food Value Chains
			<input type="checkbox"/> Deforestation-free Sourcing
			<input type="checkbox"/> Smallholder Farmers
		<input checked="" type="checkbox"/> Sustainable Cities	
			<input checked="" type="checkbox"/> Integrated urban planning
			<input type="checkbox"/> Urban sustainability framework
			<input type="checkbox"/> Transport and Mobility
			<input type="checkbox"/> Buildings
			<input checked="" type="checkbox"/> Municipal waste management
			<input type="checkbox"/> Green space
			<input type="checkbox"/> Urban Biodiversity
			<input type="checkbox"/> Urban Food Systems
			<input checked="" type="checkbox"/> Energy efficiency
			<input type="checkbox"/> Municipal Financing
			<input type="checkbox"/> Global Platform for Sustainable Cities
			<input checked="" type="checkbox"/> Urban Resilience
	<input type="checkbox"/> Biodiversity		
		<input type="checkbox"/> Protected Areas and Landscapes	
			<input type="checkbox"/> Terrestrial Protected Areas
			<input type="checkbox"/> Coastal and Marine Protected Areas
			<input type="checkbox"/> Productive Landscapes
			<input type="checkbox"/> Productive Seascapes
			<input type="checkbox"/> Community Based Natural Resource Management
		<input type="checkbox"/> Mainstreaming	

			<input type="checkbox"/> Extractive Industries (oil, gas, mining)
			<input type="checkbox"/> Forestry (Including HCVF and REDD+)
			<input type="checkbox"/> Tourism
			<input type="checkbox"/> Agriculture & agrobiodiversity
			<input type="checkbox"/> Fisheries
			<input type="checkbox"/> Infrastructure
			<input type="checkbox"/> Certification (National Standards)
			<input type="checkbox"/> Certification (International Standards)
		<input type="checkbox"/> Species	
			<input type="checkbox"/> Illegal Wildlife Trade
			<input type="checkbox"/> Threatened Species
			<input type="checkbox"/> Wildlife for Sustainable Development
			<input type="checkbox"/> Crop Wild Relatives
			<input type="checkbox"/> Plant Genetic Resources
			<input type="checkbox"/> Animal Genetic Resources
			<input type="checkbox"/> Livestock Wild Relatives
			<input type="checkbox"/> Invasive Alien Species (IAS)
		<input type="checkbox"/> Biomes	
			<input type="checkbox"/> Mangroves
			<input type="checkbox"/> Coral Reefs
			<input type="checkbox"/> Sea Grasses
			<input type="checkbox"/> Wetlands
			<input type="checkbox"/> Rivers
			<input type="checkbox"/> Lakes
			<input type="checkbox"/> Tropical Rain Forests
			<input type="checkbox"/> Tropical Dry Forests
			<input type="checkbox"/> Temperate Forests
			<input type="checkbox"/> Grasslands
			<input type="checkbox"/> Paramo
			<input type="checkbox"/> Desert
		<input type="checkbox"/> Financial and Accounting	
			<input type="checkbox"/> Payment for Ecosystem Services
			<input type="checkbox"/> Natural Capital Assessment and Accounting
			<input type="checkbox"/> Conservation Trust Funds
			<input type="checkbox"/> Conservation Finance
		<input type="checkbox"/> Supplementary Protocol to the CBD	
			<input type="checkbox"/> Biosafety
			<input type="checkbox"/> Access to Genetic Resources Benefit Sharing
	<input type="checkbox"/> Forests		
		<input type="checkbox"/> Forest and Landscape Restoration	
			<input type="checkbox"/> REDD/REDD+
		<input type="checkbox"/> Forest	
			<input type="checkbox"/> Amazon
			<input type="checkbox"/> Congo
			<input type="checkbox"/> Drylands
	<input type="checkbox"/> Land Degradation		
		<input type="checkbox"/> Sustainable Land Management	
			<input type="checkbox"/> Restoration and Rehabilitation of Degraded Lands
			<input type="checkbox"/> Ecosystem Approach
			<input type="checkbox"/> Integrated and Cross-sectoral approach
			<input type="checkbox"/> Community-Based NRM
			<input type="checkbox"/> Sustainable Livelihoods
			<input type="checkbox"/> Income Generating Activities
			<input type="checkbox"/> Sustainable Agriculture
			<input type="checkbox"/> Sustainable Pasture Management
			<input type="checkbox"/> Sustainable Forest/Woodland Management
			<input type="checkbox"/> Improved Soil and Water Management Techniques
			<input type="checkbox"/> Sustainable Fire Management
			<input type="checkbox"/> Drought Mitigation/Early Warning
		<input type="checkbox"/> Land Degradation Neutrality	
			<input type="checkbox"/> Land Productivity
			<input type="checkbox"/> Land Cover and Land cover change
			<input type="checkbox"/> Carbon stocks above or below ground

		<input type="checkbox"/> Food Security	
	<input checked="" type="checkbox"/> International Waters		
		<input type="checkbox"/> Ship	
		<input type="checkbox"/> Coastal	
		<input type="checkbox"/> Freshwater	
			<input type="checkbox"/> Aquifer
			<input type="checkbox"/> River Basin
			<input type="checkbox"/> Lake Basin
		<input type="checkbox"/> Learning	
		<input type="checkbox"/> Fisheries	
		<input type="checkbox"/> Persistent toxic substances	
		<input type="checkbox"/> SIDS : Small Island Dev States	
		<input type="checkbox"/> Targeted Research	
		<input type="checkbox"/> Pollution	
			<input type="checkbox"/> Persistent toxic substances
			<input checked="" type="checkbox"/> Plastics
			<input type="checkbox"/> Nutrient pollution from all sectors except wastewater
			<input type="checkbox"/> Nutrient pollution from Wastewater
		<input type="checkbox"/> Transboundary Diagnostic Analysis and Strategic Action Plan preparation	
		<input type="checkbox"/> Strategic Action Plan Implementation	
		<input type="checkbox"/> Areas Beyond National Jurisdiction	
		<input type="checkbox"/> Large Marine Ecosystems	
		<input type="checkbox"/> Private Sector	
		<input type="checkbox"/> Aquaculture	
		<input type="checkbox"/> Marine Protected Area	
		<input type="checkbox"/> Biomes	
			<input type="checkbox"/> Mangrove
			<input type="checkbox"/> Coral Reefs
			<input type="checkbox"/> Seagrasses
			<input type="checkbox"/> Polar Ecosystems
			<input type="checkbox"/> Constructed Wetlands
	<input type="checkbox"/> Chemicals and Waste		
		<input type="checkbox"/> Mercury	
		<input type="checkbox"/> Artisanal and Scale Gold Mining	
		<input type="checkbox"/> Coal Fired Power Plants	
		<input type="checkbox"/> Coal Fired Industrial Boilers	
		<input type="checkbox"/> Cement	
		<input type="checkbox"/> Non-Ferrous Metals Production	
		<input type="checkbox"/> Ozone	
		<input type="checkbox"/> Persistent Organic Pollutants	
		<input type="checkbox"/> Unintentional Persistent Organic Pollutants	
		<input type="checkbox"/> Sound Management of chemicals and Waste	
		<input type="checkbox"/> Waste Management	
			<input type="checkbox"/> Hazardous Waste Management
			<input type="checkbox"/> Industrial Waste
			<input type="checkbox"/> e-Waste
		<input type="checkbox"/> Emissions	
		<input type="checkbox"/> Disposal	
		<input type="checkbox"/> New Persistent Organic Pollutants	
		<input type="checkbox"/> Polychlorinated Biphenyls	
		<input type="checkbox"/> Plastics	
		<input type="checkbox"/> Eco-Efficiency	
		<input type="checkbox"/> Pesticides	
		<input type="checkbox"/> DDT - Vector Management	
		<input type="checkbox"/> DDT - Other	
		<input type="checkbox"/> Industrial Emissions	
		<input type="checkbox"/> Open Burning	
		<input type="checkbox"/> Best Available Technology / Best Environmental Practices	
		<input type="checkbox"/> Green Chemistry	
	<input checked="" type="checkbox"/> Climate Change		
		<input type="checkbox"/> Climate Change Adaptation	
			<input type="checkbox"/> Climate Finance
			<input type="checkbox"/> Least Developed Countries
			<input type="checkbox"/> Small Island Developing States
			<input type="checkbox"/> Disaster Risk Management
			<input type="checkbox"/> Sea-level rise

			<input type="checkbox"/> Climate Resilience
			<input type="checkbox"/> Climate information
			<input type="checkbox"/> Ecosystem-based Adaptation
			<input type="checkbox"/> Adaptation Tech Transfer
			<input type="checkbox"/> National Adaptation Programme of Action
			<input type="checkbox"/> National Adaptation Plan
			<input type="checkbox"/> Mainstreaming Adaptation
			<input type="checkbox"/> Private Sector
			<input type="checkbox"/> Innovation
			<input type="checkbox"/> Complementarity
			<input type="checkbox"/> Community-based Adaptation
			<input type="checkbox"/> Livelihoods
		<input checked="" type="checkbox"/> Climate Change Mitigation	
			<input type="checkbox"/> Agriculture, Forestry, and other Land Use
			<input checked="" type="checkbox"/> Energy Efficiency
			<input checked="" type="checkbox"/> Sustainable Urban Systems and Transport
			<input checked="" type="checkbox"/> Technology Transfer
			<input checked="" type="checkbox"/> Renewable Energy
			<input checked="" type="checkbox"/> Financing
			<input checked="" type="checkbox"/> Enabling Activities
		<input type="checkbox"/> Technology Transfer	
			<input type="checkbox"/> Poznan Strategic Programme on Technology Transfer
			<input type="checkbox"/> Climate Technology Centre & Network (CTCN)
			<input type="checkbox"/> Endogenous technology
			<input type="checkbox"/> Technology Needs Assessment
			<input type="checkbox"/> Adaptation Tech Transfer
		<input checked="" type="checkbox"/> United Nations Framework on Climate Change	
			<input checked="" type="checkbox"/> Nationally Determined Contribution
		<input checked="" type="checkbox"/> Climate Finance (Rio Markers)	<input checked="" type="checkbox"/> Paris Agreement
			<input checked="" type="checkbox"/> Sustainable Development Goals
			<input type="checkbox"/> Climate Change Mitigation 1
			<input checked="" type="checkbox"/> Climate Change Mitigation 2
			<input type="checkbox"/> Climate Change Adaptation 1
			<input type="checkbox"/> Climate Change Adaptation 2

ANNEX G: WORKPLAN

	Year 1												Year 2												Year 3												Year 4													
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12		
1. Policy and regulation development																																																		
1.1.1 Municipal Solid Waste (MSW) Assessment Report	1	1	1	2	2	2	3	3	3	3	3	3	3	3	3	3	2	2	2	1	1	1	1	1																										
1.1.2 Policies to enhance MSW and energy utilisation drafted	1	1	1	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	1	1	1	1	1	1																					
2. Establishment of a sustainable waste collection and sorting system																																																		
2.1.1 Market review updated and roadmap developed	1	1	2	2	3	3	3	3	3	2	2	2	2	2	3	3	3	3	3	3	2	2	1	1	1	1	1	1	1	1																				
2.1.2 Improved design for a waste collection and sorting infrastructure deployed in Kinshasa																																																		
			1	1	1	2	2	2	2	2	3	3	3	3	3	3	3	3	3	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1															
2.1.3 Pilot investments initiated at selected waste transfer stations for waste collection and waste sorting																																																		
			1	1	1	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
2.1.4 Local businesses capacitated in establishing collection and sorting infrastructure as a paid service																																																		
3. Demonstration of municipal waste to energy technologies																																																		
3.1.1 Feasibilities and business models developed for local industries to utilise waste as energy sources																																																		
3.1.2 Pilot investment 1: biomethanisation WTE plant using municipal wastes in industry																																																		
3.1.3 Pilot investment 2: utilisation of refuse derived fuels (RDF) processed at industrial facilities																																																		
3.1.4 Pilot investment 3: utilisation of market wastes for production of bio-briquettes																																																		
4. Replication and scale up																																																		
4.1.1 Waste collection/sorting, WTE potential and business opportunities for replication projects assessed																																																		
4.1.2 Financing mechanism for scale-up of waste collection/sorting and WTE applications established																																																		
4.2.1 Training and capacity programmes on waste collection, sorting and utilisation of residues organised																																																		
4.2.2 Sharing of the best practices from other countries on MSW management, energy recovery and recycling																																																		
5. Monitoring and evaluation																																																		

Yellow, 1: background or preparatory activities

Light green, 2: phasing in and out, or just lower activity

Dark green, 3: main activity

ANNEX H: BUDGET SHEET

Output Based Budget for the GEF Grant											
			GEF Grant Budget Component 1								
Component 1 - Policy and regulation development	Type of Expense	Yr 1		Yr 2		Yr 3		Yr 4		Output Total	
1.1.1 Municipal Solid Waste (MSW) Assessment Report		w/w	\$	w/w	\$	w/w	\$	w/w	\$	w/w	\$
	International Expertise	3	15,000	7	35,000					10	50,000
	Local Travel		1,000		1,000					0	2,000
	National Expertise	1	4,275	1	4,275					2	8,550
	Training/Workshops									0	0
	Equipment									0	0
	Miscellaneous		1,000		2,000					0	3,000
	Output sub-total	4	21,275	8	42,275	0	0	0	0	12	63,550
1.1.2 Policies to enhance MSW and energy utilization drafted for the consideration and approval of the Government of DRC		w/w	\$	w/w	\$	w/w	\$	w/w	\$	w/w	\$
	International Expertise	4	20,000	4	20,000					8	40,000
	Local Travel		2,000		2,000					0	4,000
	National Expertise	1	7,200	1	7,200					3	14,400
	Training/Workshops									0	0
	Equipment									0	0
	Miscellaneous		1,500		1,550					0	3,050
	Output sub-total	5	30,700	5	30,750	0	0	0	0	11	61,450
TOTAL Component 1		9	51,975	13	73,025	0	0	0	0	23	125,000

		GEF Grant Budget Component 2									
Component 2 - Establishment of a sustainable waste collection	Type of Expense	Yr 1		Yr 2		Yr 3		Yr 4		Output Total	
		w/w	\$	w/w	\$	w/w	\$	w/w	\$	w/w	\$
2.1.1 Market review updated and roadmap developed	International Expertise	2	12,000	4	18,000					6	30,000
	Local Travel		1,500							0	1,500
	National Expertise	1	2,700	1	4,050					1	6,750
	Training/Workshops									0	0
	Equipment									0	0
	Miscellaneous									0	0
	Output sub-total	3	16,200	4	22,050	0	0	0	0	7	38,250
2.1.2 Improved design for a waste collection and sorting infrastructure deployed in Kinshasa		w/w	\$	w/w	\$	w/w	\$	w/w	\$	w/w	\$
	International Expertise	2	8,000	5	27,000					7	35,000
	Local Travel			0	1,500					0	1,500
	National Expertise	0	2,160	1	5,940					2	8,100
	Training/Workshops									0	0
	Equipment									0	0
	Miscellaneous									0	0
	Output sub-total	2	10,160	7	34,440	0	0	0	0	9	44,600
2.1.3 Pilot material recovery facility (MRF) processing 250,000 t of wastes - investment initiated at selected waste transfer stations for waste collection and waste sorting		w/w	\$	w/w	\$	w/w	\$	w/w	\$	w/w	\$
	International Expertise	0		2	10,000	2	10,000			4	20,000
	Local Travel					0	1,500			0	1,500
	National Expertise			1	4,500		3,600			1	8,100
	Training/Workshops										0
	Equipment			84	418,750	84	418,750			168	837,500
	Miscellaneous	0		0	1,000					0	1,000
	Output sub-total	0	0	87	434,250	86	433,850	0	0	173	868,100
2.1.4 Local businesses capacitated in establishing collection and sorting infrastructure as a paid service		w/w	\$	w/w	\$	w/w	\$	w/w	\$	w/w	\$
	International Expertise			1	7,200	3	16,800			5	24,000
	Local Travel									0	0
	National Expertise			0	1,890		4,410			0	6,300
	Training/Workshops					2	8,750			2	8,750
	Equipment									0	0
	Miscellaneous									0	0
	Output sub-total	0	0	2	9,090	5	29,960	0	0	7	39,050
TOTAL Component 2		5	26,360	100	499,830	91	463,810	0	0	196	990,000

			GEF Grant Budget Component 3								
Component 3 - Demonstrations of municipal waste to energy technologies	Type of Expense	Yr 1		Yr 2		Yr 3		Yr 4		Output Total	
3.1.1 Feasibilities and business models developed for local industries to utilize municipal waste and waste in industries as energy sources		w/w	\$	w/w	\$	w/w	\$	w/w	\$	w/w	\$
	International Expertise			3	15,900	7	37,100			11	53,000
	Local Travel					0	1,500			0	1,500
	National Expertise			1	2,511	1	5,859			2	8,370
	Training/Workshops									0	0
	Equipment									0	0
	Miscellaneous	0		0		0				0	0
	Output sub-total	0	0	4	18,411	9	44,459	0	0	13	62,870
3.1.2 Pilot investment 1: 1.35 MWeI biomethanisation WTE plant co-fermenting municipal and industrial wastes in industry		w/w	\$	w/w	\$	w/w	\$	w/w	\$	w/w	\$
	International Expertise									0	0
	Local Travel									0	0
	National Expertise									0	0
	Training/Workshops									0	0
	Equipment			40	200,000	160	800,000			200	1,000,000
	Miscellaneous					4	20,000			4	20,000
	Output sub-total	0	0	40	200,000	164	820,000	0	0	204	1,020,000
3.1.3 Pilot investment 2: utilization of 40,000 t of refuse derived fuels (RDF) processed at industrial facilities		w/w	\$	w/w	\$	w/w	\$	w/w	\$	w/w	\$
	International Expertise									0	0
	Local Travel									0	0
	National Expertise									0	0
	Training/Workshops									0	0
	Equipment			22	111,000	33	166,500			56	277,500
	Miscellaneous			9	45,000	4	20,000			13	65,000
	Output sub-total	0	0	31	156,000	37	186,500	0	0	69	342,500
3.1.4 Pilot investment 3: utilization 2,300 t of market wastes for production of bio-briquettes		w/w	\$	w/w	\$	w/w	\$	w/w	\$	w/w	\$
	International Expertise			1	6,000	2	9,000			3	15,000
	Local Travel									0	0
	National Expertise									0	0
	Training/Workshops									0	0
	Equipment			6	30,000	9	45,000			15	75,000
	Miscellaneous			0		0				0	0
	Output sub-total	0	0	7	36,000	11	54,000	0	0	18	90,000
TOTAL Component 3		0	0	82	410,411	221	1,104,959	0	0	303	1,515,370

			GEF Grant Budget Component 4									
Component 4 - Replication and scale up	Type of Expense	Yr 1		Yr 2		Yr 3		Yr 4		Output Total		
4.1.1 Waste collection/sorting, WTE potential and business opportunities for replication projects assessed		w/w	\$	w/w	\$	w/w	\$	w/w	\$	w/w	\$	
	International Expertise					1	6,000	5	24,000		30,000	
	Local Travel										0	
	National Expertise					0	1,080	1	4,320		5,400	
	Training/Workshops										0	
	Equipment										0	
	Miscellaneous										0	
	Output sub-total	0	0	0	0	1	7,080	6	28,320	7	35,400	
4.1.2 Financing mechanism for scale-up of waste collection/sorting and WTE applications established		w/w	\$	w/w	\$	w/w	\$	w/w	\$	w/w	\$	
	International Expertise			1	5,250	3	14,000	3	15,750	7	35,000	
	Local Travel									0	0	
	National Expertise			0	810	0	2,160	0	2,430	1	5,400	
	Training/Workshops									0	0	
	Equipment							142	710,000	142	710,000	
	Miscellaneous									0	0	
	Output sub-total	0	0	1	6,060	3	16,160		728,180	4	750,400	
4.2.1 Training and capacity programmes on waste collection, sorting and utilisation of residues organised		w/w	\$	w/w	\$	w/w	\$	w/w	\$	w/w	\$	
	International Expertise					7	32,500	7	32,500	13	65,000	
	Local Travel									0	0	
	National Expertise					0	900	0	900	0	1,800	
	Training/Workshops					7	34,634	7	34,634	14	69,268	
	Equipment									0	0	
	Miscellaneous									0	0	
	Output sub-total	0	0	0	0	14	68,034	14	68,034	27	136,068	
4.2.2 Sharing of the best practices from other countries on MSW management, energy recovery and recycling		w/w	\$	w/w	\$	w/w	\$	w/w	\$	w/w	\$	
	International Expertise			2	12,000	1	3,000	3	17,000	6	32,000	
	Local Travel			12	62,000					12	62,000	
	National Expertise			1	3,780	0	1,620	1	5,400	2	10,800	
	Training/Workshops						1,000		15,000	0	16,000	
	Equipment									0	0	
	Miscellaneous			1	4,500	1	5,400	2	8,100	4	18,000	
	Output sub-total	0	0	16	82,280	2	11,020	6	45,500	25	138,800	
TOTAL Component 4		0	0	18	88,340	20	102,294	25	870,034	63	1,060,668	

			GEF Grant Budget Component 5									
Component 5 - Monitoring and evaluation	Type of Expense	Yr 1		Yr 2		Yr 3		Yr 4		Output Total		
5.1.1 Terminal Evaluation conducted		w/w	\$	w/w	\$	w/w	\$	w/w	\$	w/w	\$	
	International Expertise	2	10,500			3	12,600	4	18,900	8	42,000	
	Local Travel	0	2,000			1	2,500	1	4,000	2	8,500	
	National Expertise	0	1,125			0	1,350	0	2,025	1	4,500	
	Training/Workshops									0	0	
	Equipment									0	0	
	Miscellaneous									0	0	
	Output sub-total	3	13,625	0	0	3	16,450	5	24,925	11	55,000	
5.2.1 Project's progress monitored, documented and recommended actions formulated		w/w	\$	w/w	\$	w/w	\$	w/w	\$	w/w	\$	
	International Expertise					1	5,000	2	10,000	3	15,000	
	Local Travel			0.3	1,500	0.3	1,500	0.3	1,600	1	4,600	
	National Expertise			0.4	1,900	0.3	1,500	0.4	2,000	1	5,400	
	Training/Workshops									0	0	
	Equipment									0	0	
	Miscellaneous									0	0	
	Output sub-total	0	0	1	3,400	2	8,000	3	13,600	5	25,000	
TOTAL Component 5		3	13,625	1	3,400	5	24,450	8	38,525	16	80,000	
Project Management Costs (PMC)		w/w	\$	w/w	\$	w/w	\$	w/w	\$	w/w	\$	
	International Expertise	5	26,046	5	26,046	5	26,046	5	26,046	21	104,184	
	Local Travel		3,000		1,400		2,000		1,511		7,911	
	National Expertise	39	17,364	39	17,364	39	17,364	39	17,364	154	69,456	
	Training/Workshops		1,000		2,000		2,000		2,000		7,000	
	Equipment										0	
	Miscellaneous										0	
	Output sub-total	44	47,410	44	46,810	44	47,410	44	46,921	175	188,551	
Total		44	47,410	44	46,810	44	47,410	44	46,921	175	188,551	
TOTAL		61	139,370	257	1,121,816	381	1,742,923	77	955,480	776	3,959,589	

ANNEX I: BACKGROUND DOCUMENT – MUNICIPAL SOLID WASTE IN DRC

ANNEX J: CALCULATIONS OF GHG EMISSION REDUCTIONS

ANNEX K: WASTE-TO-ENERGY BUSINESS CASES

ANNEX L: ENVIRONMENTAL SOCIAL IMPACT ASSESSMENTS (ESIA)

ANNEX M: CO-FINANCING LETTERS