



PROJECT IDENTIFICATION FORM (PIF)

PROJECT TYPE: Medium-sized Project

TYPE OF TRUST FUND: GEF Trust Fund

For more information about GEF, visit TheGEF.org

PART I: PROJECT INFORMATION

Project Title:	Sustainable conversion of waste to clean energy for GHG emissions reduction		
Country(ies):	Republic of Kenya	GEF Project ID: ¹	5154
GEF Agency(ies):	UNIDO	GEF Agency Project ID:	120568
Other Executing Partner(s):	Ministry of Environment and Mineral Resources (MEMR), Ministry of Livestock (MoL), Ministry of Energy (MoE), Ministry of Finance (MoF) and Kenya Bureau of Standards (KEBS)	Submission Date:	09/24/2012
		Resubmission Date:	10/16/2012
		Resubmission Date:	06/27/2013
		Resubmission Date:	10/10/2013
		Resubmission Date:	11/06/2013
		Resubmission Date:	12/02/2013
GEF Focal Area (s):	Climate Change (CC)	Project Duration (Months)	48
Name of parent program (if applicable):	N/A	Project Agency Fee (\$):	190,000
<ul style="list-style-type: none"> • For SFM/REDD+ <input type="checkbox"/> • For SGP <input type="checkbox"/> • For PPP <input type="checkbox"/> 			

A. INDICATIVE FOCAL AREA STRATEGY FRAMEWORK²:

Focal Area Objectives	Trust Fund	Indicative Grant Amount (\$)	Indicative Co-financing (\$)
CCM-3 Promote investment in renewable energy (RE) technologies	GEFTF	1,999,998	9,572,000
Total Project Cost		1,999,998	9,572,000

B. INDICATIVE PROJECT DESCRIPTION SUMMARY

Project Objective: To promote investments in waste-to-energy (WTE) technologies to increase electrification and to reduce greenhouse gas (GHG) emission						
Project Component	Grant Type ³	Expected Outcomes	Expected Outputs	Trust Fund	Indicative Grant Amount (\$)	Indicative Cofinancing (\$)
1. Capacity development and knowledge management	TA	Improved awareness, knowledge sharing on best practices and capacity building on WTE in the country.	1.1. Information and best practices platform for WTE technologies. 1.2. Development of human capacities in WTE for policy makers, project developers, agro-industries, and other stakeholders. 1.3. Development and strengthening of institutional capacities in the area of WTE among technical institutions and	GEFTF	190,000	400,000

¹ Project ID number will be assigned by GEFSEC.

² Refer to the reference attached on the [Focal Area Results Framework and LDCF/SCCF Framework](#) when completing Table A.

³ TA includes capacity building, and research and development.

			financial institutions.			
2. Establishment of agro-industrial WTE plants	TA	Increased use of biogas industrial applications	2.1. Establishment of standards for medium and large scale biogas power plants	GEFTF	50,000	100,000
	TA		2.2. Detailed plant design prepared for WTE plants	GEFTF	308,180	732,820
	INV		2.3. WTE plants established for a cumulative capacity of around 1.3 MW _e and 120 kW _{th}	GEFTF	990,000	3,159,000
3. Promotion of investment into WTE plants	TA	Established incentive facility system through increased involvement of financing institutions in WTE projects	3.1. Establishment and implementation of an incentive systems for developers of WTE technologies	GEFTF	200,000	3,990,180
4. Monitoring and Evaluation (M&E) and knowledge management	TA	1. Effectiveness of the outputs assessed, corrective actions taken and experience documented 2. Acceptance of the technical and economic viability of WTE plants	4.1. Mid-term M & E report 4.2. End of project M & E report 4.3. Lessons learning and information dissemination workshops. 4.4. Publications and websites	GEFTF	80,000	190,000
Subtotal					1,818,180	8,572,000
Project Management Cost (PMC) ⁴				GEFTF	181,818	1,000,000
Total Project Cost					1,999,998	9,572,000

C. INDICATIVE CO-FINANCING FOR THE PROJECT BY SOURCE AND BY NAME IF AVAILABLE, (\$)

Sources of Cofinancing	Name of Cofinancier	Type of Cofinancing	Amount (\$)
National Government	MEMR	Cash	3,290,000
National Government	MEMR	In-kind	1,150,000
National Government	MoL	In-kind	1,500,000
National Government	MoL	Cash	1,000,000
Private Sector	Dagoretti slaughter house, Farmers choice slaughter house and Olivado EPZ Limited	Investment	2,482,000
GEF Agency	UNIDO	Grant	60,000
GEF Agency	UNIDO	In-kind	90,000
Total Cofinancing			9,572,000

⁴ To be calculated as percent of subtotal.

D. INDICATIVE TRUST FUND RESOURCES (\$) REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY¹

GEF Agency	Type of Trust Fund	Focal Area	Country Name/Global	Grant Amount (\$) (a)	Agency Fee (\$) (b) ²	Total (\$) c=a+b
(select)	(select)	(select)				0
Total Grant Resources				0	0	0

¹ In case of a single focal area, single country, single GEF Agency project, and single trust fund project, no need to provide information for this table. PMC amount from Table B should be included proportionately to the focal area amount in this table.

² Indicate fees related to this project.

E. PROJECT PREPARATION GRANT (PPG)⁵

Please check on the appropriate box for PPG as needed for the project according to the GEF Project Grant:

	<u>Amount Requested (\$)</u>	<u>Agency Fee for PPG (\$)⁶</u>
• No PPG required.	-- 0--	--0--
• (upto) \$50k for projects up to & including \$1 million		
• (upto)\$100k for projects up to & including \$3 million	100,000	9,500
• (upto)\$150k for projects up to & including \$6 million		
• (upto)\$200k for projects up to & including \$10 million		
• (upto)\$300k for projects above \$10 million		

PPG AMOUNT REQUESTED BY AGENCY(IES), FOCAL AREA(S) AND COUNTRY(IES) FOR MFA AND/OR MTF PROJECT ONLY

Trust Fund	GEF Agency	Focal Area	Country Name/Global	(in \$)		
				PPG (a)	Agency Fee (b)	Total c = a + b
(select)	(select)	(select)				0
(select)	(select)	(select)				0
(select)	(select)	(select)				0
Total PPG Amount				0	0	0

MFA: Multi-focal area projects; MTF: Multi-Trust Fund projects.

⁵ On an exceptional basis, PPG amount may differ upon detailed discussion and justification with the GEFSEC.

⁶ PPG fee percentage follows the percentage of the GEF Project Grant amount requested.

PART II: PROJECT JUSTIFICATION⁷

A. Project Overview

A.1. Project Description.

1. Global Environmental Problem, root causes and barriers

Kenya is highly vulnerable to climate change since the key drivers of the economy (agriculture, livestock, tourism, forestry and fisheries) are climate-sensitive. This problem is also coupled with the country's low adaptive capacity to climate change.

Electricity demand in the country is increasing rapidly due to the accelerated productive investment and increasing population. The *Updated Least Cost Power Development Plan (ULCPDP) 2011 – 2031*, envisions that Kenya's electricity peak demand will increase from the present 1.3GW to 15 GW by the year 2030.

Poor investments in electricity sector have widened the gap between electricity demand and supply. The effective installed capacity in the year 2011 was only 1,411 MW⁸. The present electricity access is one of the lowest in the world at 15.3% of the total population and 3.8% of the rural population. The addition of generation capacity is urgently required in Kenya to meet its rapidly growing electricity demands.

The present electricity generation is dominated by hydro, geothermal and medium speed diesel (MSD) sources, together making up 99% of electricity sent to the national grid (fig. 1)⁹. However, during low hydrology, the reserve margin diminishes, which necessitates load shedding and procurement of expensive emergency power¹⁰. Therefore, the major challenge for Kenya is to meet its electricity demands through alternative cleaner sources in order to provide stable electricity throughout the year.

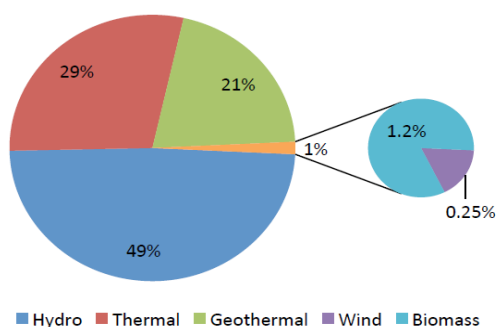


Figure 1: Electricity Generation by Source in the year 2010/2011

2. Baseline scenario and associated baseline project

In Kenya, agro industrial wastes are mostly underutilized and in most cases disposed by burning, dumping or (unplanned) land filling. Dumping and unplanned landfilling result in methane generation and release to the atmosphere. Methane is 21 times stronger greenhouse gas than carbon dioxide. Hence, the avoidance of its release to the atmosphere/utilization of it holds great environmental benefit in terms of combating global warming. It has been estimated that Industrial-scale power/cogeneration using

⁷ Part II should not be longer than 5 pages.

⁸ Kenya's Climate Change Action Plan: Mitigation, Chapter 5: Electricity Generation, August 2012

⁹ Ministry of Energy, 2011. Updated Least Cost Power Development Plan. Nairobi: Ministry of Energy.

¹⁰ World Bank, 2011. KENYA Scaling-Up Renewable Energy Program (SREP) Joint Development Partner Scoping Mission. Nairobi, February 7-11

biogas produced from agricultural residues could abate 1.6 million t CO₂e a year in 2030¹¹.

This disposal of waste incurs cost and causes logistical difficulty. However, these organic wastes represent a potential bio resource for production of energy and bio-fertilizers¹². WTE-based biogas plants holds greater promise for Kenya in its electricity supply through alternative cleaner sources. A study conducted by German International Cooperation (GIZ) during the year 2010¹³ on the biogas power generation potential from agro-wastes, concluded the following average values: Sisal waste – 20 MWe, Coffee waste – 10 MWe, sugar plant waste – 4.1 MWe, pineapple processing waste – 2.4 MWe and chicken waste – 1.9 MWe. This study was based on the available data from few selected industries. However, the actual country-wide potential is expected to exceed this limit.

Limited developments have taken place in Kenya in the field of commercial biogas plants sector. The sector is faced with following barriers which need to be mitigated: a) there are currently no successful commercial scale demonstration projects to interest and convince investors and other stakeholders, b) inadequate local knowledge, technology, technical capacity and skill for sustainable implementation, operation and maintenance of WTE-based energy generation systems, c) lack of technical standards for biogas plants, d) lack of qualified feasibility studies/project designs and data for assessing the project potential in the area of WTE that would interest investors and policy makers, e) inadequate financing/private sector investment in WTE, f) improper planning in providing financial incentives and lack of funding/financing facility, g) inadequate realization and utilization of initiatives and policies of Government Ministries, h) reluctance of financial institutions to finance WTE investments and hi low public awareness on the potential of WTE.

The lessons learnt in 150 kW Sisal-cum-cattle farm biogas project in Kilifi, Kenya (Franz, 2009) emphasized the need for human and institutional capacity building and training the local staff for operation and maintenance of the plants.

On identifying the energy recovery potential from slaughter house waste, UNIDO installed a pilot plant of 10 kWe capacities using a part of wastes from one of the 4 slaughterhouse in Dagoretti abattoir cluster. This pilot plant was able to demonstrate the potential for waste management and cleaning up of the area as well as usefulness and economic potential of the waste. Few other small scale plants have been implemented in other parts of Kenya as follows:

S. No.	Project Name	Installed Capacity (kW) ¹⁴
a)	Sisal-cum-cattle farm in Kilifi, Kenya	150
b)	PSDA project, Kenya Plant in Keekonyokie	20
c)	PSDA project, Kenya Abdul Sidis farm Plant	20

Moreover, under the Kenya National Domestic Biogas Programme (KENDBIP)¹⁵, it has been planned that around 8,000 domestic biogas plants of capacities between 6m³–12m³ will be installed by December 2013, prioritizing high agricultural potential regions¹⁶.

Without GEF intervention, the mentioned barriers will continue to exist and the present scenario of poor

¹¹ http://cdkn.org/wp-content/uploads/2012/12/Kenya-Climate-Change-Action-Plan_Executive-Summary.pdf

¹² http://mahider.ilri.org/bitstream/handle/10568/10816/Project4_Biogas.pdf

¹³ Fischer, E., Schmidt, T., Hora, S., Geirsdorf, J., Stinner, W., and Scholwin, F. 2010. *Agro-Industrial Biogas in Kenya: Potentials, Estimates for Tariffs, Policy and Business Recommendations*. Berlin: German International Cooperation (GIZ), 2010.

¹⁴ <http://www.giz.de/Themen/de/dokumente/gtz2010-en-small-scale-electricity-generation-from-biomass-part-2.pdf>

¹⁵ The Kenya Biogas programme is a component of the African Biogas Partnership Programme (ABPP), funded by the Directorate General for International Cooperation (DGIS) of the Netherlands' Ministry of Foreign Affairs through two Dutch development NGO's, the Humanist Institute for Cooperation with Developing Countries (Hivos) and the Netherlands Development Organisation (SNV).

¹⁶ http://www.kenfapbiogas.org/index.php?option=com_content&view=article&id=57&Itemid=58

waste management and dependence on fossil fuels in agro-processing industries will continue with little or no significant improvement. The 10 kWe pilot plant at Dagoretti abattoir would not be expanded to a commercial biogas plant. Commercial biogas generation along with heat and/or electricity generation followed by sales of excess to the grid would not be possible as they do not have enough technical knowledge, skill and confidence for successful operation of such commercial biogas power plant.

The successful construction and operation of pilot projects built upon commercial principles will bring confidence among investors and facilitate policy changes to encourage WTE projects. Also, without some sort of financial incentives, realization of these interventions will be difficult.

GEF intervention will be timely and appropriate to achieve the goal of utilizing available WTE potential and meeting electrification targets. GEF intervention intends to remove all remaining barriers, specifically lack of human and institutional capacities (through creation of the information and best practices platform), favorable business environment and lack of demonstrable commercial biogas plants on pilot basis.

3. Proposed alternative scenario

The proposed project intends to create conducive environment for promoting private investments in WTE technologies in the Agro industries sector and will have 4 major components.

Project Component 1: Capacity development and knowledge management

Under this project component, information and best practices platform for WTE technologies will be established at a University or an institution, which would be identified during the PPG stage. This platform will also have all the database and information required for developing WTE projects.

The proposed information and best practices platform will be attached to a university or research institution for reducing infrastructure development cost and operating cost as well as to ensure its sustainability.

The capacity development activities at the proposed information and best practices platform would be sustained through the following:

- A nominal fee would be charged for the training activities. This amount would be used to manage and maintain the activities of the platform. The exact fee mechanism would be detailed at CEO endorsement stage.
- Well trained university/institution staff members of the institution would be managing the information and learning platform and hence, there would be no additional man-power cost.

Experience sharing sessions would also take place involving engineers/project managers who have prior experience in developing similar WTE projects.

The information and best practices platform staff will also be engaged during the entire cycle of the demonstration project. They would also be trained at the existing 10 kWe pilot plant at Dagoretti and at a higher capacity commercial biogas plant. These trainings would focus on a) construction of industrial biogas plants, b) operational arrangements of the industrial biogas plants, c) planned and unscheduled maintenance of the industrial biogas plants and d) troubleshooting of the industrial biogas power plants.

All these trainings would ensure that the platform staffs understand the various intricacies involved in the WTE project development. The platform will conduct periodical trainings even after the completion of the GEF project and would ensure that the capacity development activities are sustained.

A team of international and national consultants who initially trained the platform staff will continue their association with the platform. When the need and/or if any major/critical issues arises, these consultants would assist the project development activities.

Necessary training material for different recipients will be prepared. Available guidebooks on biogas power plant development will be customized to suit the local conditions. Any information regarding WTE projects can be obtained from this platform. The above arrangement will ensure the sustainability of the proposed activities in capacity development.

Through trainings, awareness on potential usage of WTE technologies in agro-industries will be created. The policy makers and interested project developers will be educated and efforts will be taken to help them gain confidence in the technology and be equipped with necessary technical capacity for supporting, developing and implementing such projects. Personnel from banks and financing institutions will be trained in assessing the WTE projects. Local engineering and O&M companies will be trained to facilitate sustainable operation and maintenance of demonstration and replication projects. In addition, the learning platform would conduct frequent trainings on O&M of biogas plants.

Whenever a new policy maker assumes charge, he/she will be informed of the latest developments & requirements regarding WTE technologies. The policy makers and their representatives also participate in the nearest date of training sessions organized at the platform.

All demonstration projects are on investment basis and investors need to source their investment through co-financing from banks and financial institutions. Therefore, efforts to create awareness and interest among banks and financial institutions in co-financing WTE demonstration project will be a priority. The details of such efforts will be described in detail in the CEO document.

Project Component 2: Establishment of pilot WTE power plants in Agro-industries

At present, Kenya Bureau of Standards (KEBS) in collaboration with Energy Regulatory Commission (ERC) is working to develop biogas system standards. ERC will enact regulations that will require all domestic biogas plants to adhere to these standards.

This project would work with KEBS and ERC to amend the domestic standards to bring industrial biogas plants under the regulations and in the enforcement of these standards at industrial biogas plants. Such standards would be prepared as a priority before the actual construction of the demonstration project starts with necessary technical inputs from Ministry of Energy.

List of proposed biogas-based WTE pilot sites identified during the pre-PIF phase, with their estimated capacities, are given in the following table:

S. No.	Name of the industry	Waste	Tentative capacity (kW)
1.	Dagoretti Abattoirs	Slaughter house waste	540
2.	Farmers Choice slaughterhouse	Slaughter house waste	530
3.	Olivado avocado oil processing plant ¹⁷	Avocado waste	240
	Total		1,310
4.	Kenya meat commission	Slaughter house waste	120 kW _{th}

Baseline of the above projects identified through pre-feasibility reports are as follows:

¹⁷ Also involve heat generation. Conservatively not considered for calculations.

S. No.	Name of the industry	Baseline			Project		
		Waste	Electricity	Heat	Waste	Electricity	Heat
1.	Dagoretti Abattoirs (slaughterhouse)	Unused	Grid	Not applicable	Utilized for biogas generation	Biogas engine. Generated electricity for own (domestic) use and the surrounding village communities. Excess power export to grid (if any)	Not applicable
2.	Farmers Choice Slaughterhouse (slaughterhouse)	Unused	Grid	Not applicable	Utilized for biogas generation	Biogas engine. Generated electricity for own (domestic) use. Export of excess power to grid (if any).	Not applicable
3.	Olivado Oil Processing Plant (avocado processing)	Unused	Grid	Not applicable	Utilized for biogas generation	Biogas engine. Generated electricity and heat for own (domestic) use.	Not applicable
4.	Kenya Meat Commission	Unused	Not applicable	Furnace oil	Utilized for biogas generation	Not applicable	Furnace oil replaced by biogas

Existing regulatory and contractual frameworks governing grid electricity export

Some of the key conditions set for grid export of produced electricity by the existing policy and contractual framework includes the following¹⁸:

- Energy generating, transmitting or distributing projects with a capacity above 3 MW must obtain an Electricity Generation License from the Energy Regulatory Commission (ERC).
- Projects with a capacity under 1 MW do not need an ERC clearance and those between 1 MW and 3 MW must obtain an Electricity Permit from ERC, which is a streamlined license.
- For grid electricity export with FiT benefits, the cost of interconnection, including the costs of construction, upgrading of transmission/distribution lines, substations and associated equipment are to be borne by the developer.
- Minimum power plant capacity, to be eligible for FiT for biogas power plants is 0.2 MW
- Power purchase agreement with “The Kenya Power And Lighting Company Limited” should be signed.

Based on detailed feasibility studies for a number of potential sites conducted during PPG stage, technical plant designs will be prepared for the proposed demonstration projects. Through detailed feasibility studies, long term economic viability of the plants will be studied. Only the plants which are viable will be considered for demonstration.

Other project development assistance will be facilitated through GEF grant. A part of GEF grant will also be used to provide incentives towards equipment purchase within the limits set by the principles of incremental cost. A limit or cap would be set on the incentives for each WTE plant similar to the described mechanism in PC 3.

¹⁸ Regulatory and contractual frameworks for renewable energy power plants and grid electricity export exist in Kenya and are found to be sufficient. These include the following: a) The Energy Act, No 12 Of 2006, b) The Energy (Electricity Licensing) Regulations, 2010, c) Standardised Power Purchase Agreement for Renewable Energy Generators of less than and including 10 MW, d) Connection Guidelines for Small-Scale Renewable Generating Plant, e) Feed in Tariff Policy 2012 (FiT Policy).

More details on the existing frameworks can be obtained from RE portal of Energy Regulatory Commission Website (ERC) <http://renewableenergy.go.ke/index.php/content/19>

The co-financing contribution from private investors will be used for establishing the demonstration projects. All efforts would be taken to operationalize the proposed financial support (under PC 3) and make use of the supports for the demonstration projects. This is based on the fact that for the first few plants, the investment cost is expected to be on the higher side and hence, additional incentive would ease the cost related barriers.

Before the actual power plant operation, biogas plant operators would be trained at the information and learning platform. Also these plant operators would also undergo on the job training at an existing biogas plant.

During the plant operation, the digested residue shall be processed into organic fertilizer for sale to local farmers. It can be said that the digested sludge will be devoid of heavy metal content, plastic waste content, etc. and is suitable for the land application. Aerobic post-treatment of anaerobically digested material will greatly reduce its phyto-toxicity and enhance the physical and chemical properties of the material¹⁹. Hence, it will be ensured that only the aerobically post-treated sludge will be used for fertilizer application. Further chemical analysis of post-treated bio-digested sludge would be undertaken during the feasibility studies prepared during the PPG stage and would be made available during the CEO endorsement stage.

The project will work with National Environment Management Authority (NEMA) Regulatory Agency under Ministry of Environment and Mineral Resources (MEMR) for quarterly chemical analysis of the post-treated bio-digested sludge waste produced by WTE plants, during its operation, for its nutrient quality and certifying its suitability for farming use.

Chemical analysis of the bio-digested slurry will be done at KEBS, University of Nairobi (School of Agriculture), etc., through NEMA. NEMA will issue a certificate, certifying the bio-digested sludge's suitability for farm application.

Costs related to such tests will be borne by the demonstration plant owners. The demonstration plant owners, when selling the bio-digested sludge will affix NEMA's certificate on suitability as fertilizer, date of certification, etc.

MEMR or any other government agency will audit the demonstration plants (will be decided during the PPG stage) and will check selling/distribution of certified bio-digested sludge. The exact agency responsible for this monitoring will be identified during PPG stage. Any distribution of uncertified bio-digested sludge will be noted. Suitable penalty will be laid on the demonstration plant owner, including banning the distribution of sludge in that plant. Such monitoring system would be elaborated during the PPG stage and will be presented in the CEO document. In addition, awareness would be created among potential bio-digested sludge users on the certification from NEMA.

Demonstration projects under the proposed GEF project do not involve CDM and corresponding CER benefits, since the market value for CER is low and the transaction costs for CDM project is high. These projects will only look upto GEF grant for their implementation.

Details on the demonstration projects and its potential impact on the sector will be articulated in detail in the CEO endorsement document. The expected outputs and outcomes of this component will mitigate the following barriers/challenges:

¹⁹Review paper "Anaerobic digestion of organic solid poultry slaughterhouse waste – a review"

E. Salminen I, J. Rintala, Bioresource Technology 83 (2002) 13–26

<http://josiah.berkeley.edu/2007Fall/ER200N/PolicyMemo/AnaerobicDigestionPoultrySlaughterhouse.pdf>

Project Component 3: Creation of financing incentive arrangement

As of now, the level of investments in WTE projects in Kenya is very low. One major reason for this is the lack of conducive environment for investments. Hence to mitigate this barrier, a specific financial incentive scheme for promoting investments in WTE technologies will be created.

Under the project, incentives would be provided based on installed capacity for WTE energy projects as follows:

For smaller plants, up to 200 kW_e or 600 kW_{th}: USD 75,000 grant

For medium to large plants, greater than 200 kW_e or 600 kW_{th}: USD 50,000 grant

As the capacity increases, the viability of the plants increases due to economy of scale. Hence, the capital subsidy is reduced accordingly. Initial target is to provide incentives to small plants for a cumulative 3 MW_e and 1 MW_{th} and medium to large plants for a cumulative 4 MW_e and 2 MW_{th}.

Cost-effectiveness

To ensure cost-effectiveness, declining incentive amounts in line with targeted capacity levels, which will reflect the increased economies of scale corresponding to the market maturity, will be followed. Details of the proposed declining incentive scheme will be elaborated in the CEO endorsement document, once the funds are made available.

Sustainability of the scheme

Kenya government is expected to allocate funding for enhancing renewable energy capacity in Kenya. In addition to this, various donors are expected to support Kenya government in the coming years. A part of this money will be channelled to this purpose, to ensure the financial sustainability of the incentive scheme.

Partner involved

Co-operative bank of Kenya who has previously worked with renewable energy specific projects in collaboration with Agence Française de Développement (AFD)²⁰ will be the partner under PC 3. Co-operative bank has entered into agreement with AFD towards financing the Renewable Energy and Energy Efficiency projects in the country²¹.

Ministry of Finance, Kenya would be involved in the design and implementation of the incentive system to be sponsored by Ministry of Livestock (MoL) and MEMR (around USD 4 million), along with necessary inputs from Ministry of Energy. During PPG stage, efforts would be taken to identify more co-financing contribution for the incentive system. The exact modalities and specific involvement of financial institutions will be established during the PPG stage.

Around USD 200,000 of the GEF grant will be used to facilitate and create modalities of the above mentioned incentive scheme. This would maximize the benefit of CO₂ reduction per USD spent by GEF for this project. No part of the GEF grant would be used for the incentive scheme. Only co-financing will be used for this purpose.

²⁰ AFD is a financial institution and the main implementing agency of France's official development assistance to the developing countries and overseas territories.

²¹ The EUR 30 Million (USD 39 Million) credit agreement signed in 2011 enabled the Bank on-lend to its customers undertaking projects targeting diversification of energy resources and transition towards renewable energy solutions

In addition to the above incentive system, MoF will also play a key role in enhancing the financial environment by offering other financial incentives like tax incentives for commercial biogas plants, recommended under the project. As of now, MoF is providing import duty exemption for domestic biogas plants construction materials. The duty waiver on domestic biogas digester construction materials has been waived from 25% to 0%.

In the absence of incentive system, there will be lack of encouragement among potential investors in WTE projects. Only such incentive systems will help them overcome the barrier of high investment costs.

Detailed financial analysis (with and without incentives) will be done during the PPG stage to show the effectiveness of the incentive systems. It has to be noted, that commercial biogas plants are new to Kenya and hence there should be some mechanisms to encourage project developers to invest in these technologies. With the presence of incentive facility system along with other GEF/UNIDO's support and involvement system, they would come forward to invest in the technology.

During the PPG stage, the expected amount of investment and energy production as a result of the proposed incentive system would also be studied. At the end of monitoring and evaluation, the amount of investment and energy production as a result of the proposed incentive system would be studied in detail.

As a result of this component, it is expected that the following barriers will be addressed:

Project Component 4: Monitoring and Evaluation

The project will be subjected to mid-term and final evaluations. A mid-term M&E will be conducted and corrective actions will be taken. An independent final evaluation will be conducted three months prior to the terminal review meeting. The final evaluation will look at the impact and sustainability of results, including the contribution to capacity development, effectiveness of incentive systems and the achievement of global environmental benefit goals. The final evaluation will also provide recommendations for follow-up activities.

Full scale project demonstration site visit and seminars will be organized and the project experiences will be disseminated to various interested stake holders in order to increase the replication potential of the project. Various information dissemination tools such as publications, leaflets, website, etc., will be used for this purpose. 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.

4. Incremental reasoning

As of now, electricity demands of the industries are met through grid; and thermal energy demand is met through furnace oil. Therefore, the incremental base is replacement of grid electricity and furnace oil. The incremental cost of demonstration projects is shown in the table below. GEF funding will be used to meet this incremental cost in replacing the systems with equivalent biogas based systems.

Plant name	Type	Capacity	Existing Baseline	Baseline investment (USD)	Project investment (USD) ²²	Incremental cost (USD)
Dagoretti Abattoirs	Biogas power plant	540 kW	Grid	0	1,850,000	1,850,000

²²Approximate values. To be confirmed during feasibility studies in PPG stage.

Farmers Choice Slaughter house	Biogas power plant	530 kW	Grid	0	1,832,000	1,832,000
Olivado Avocado Oil Processing Plant	Biogas power plant	240 kW	Grid	0	1,058,000	1,058,000
Kenya Meat Commission	Furnace oil replacement using biogas	120 kW _{th}	Furnace oil	0 ²³	450,000	450,000
	Total	1.3 MW & 120 kW _{th}		0	5,190,000	5,190,000

As stated above in the incremental cost, GEF bears cost of USD 1,298,180 only, which is about 25% of the total estimated incremental cost.

5. Global environmental benefits

The established WTE plants will result in avoidance of approximately 87,560 tCO₂e emissions directly throughout their lifetime of 20 years. It is expected that the induction of market transformation in which many others would also initiate and develop WTE projects of at least 5 MW_e and around 1 MW_{th} plants within a time span of maximum 10 years after the project. Already few industries, including All Fruit Limited, a fruit processing industry have expressed their interest to develop WTE projects. This will lead to avoidance of 368,967 t CO₂e emissions indirectly. These initial estimates will be refined during the project preparation grant (PPG) phase. Conservatively, avoidance of methane emission from the dumped agro-industry waste (baseline practice) is not considered in the PIF stage. In the CEO document, these emissions will also be calculated.

The total GEF resources of around 2 million will be used to mitigate CO₂ emission at rate of USD 22.8/t CO₂ directly and around USD 5.4/t CO₂ indirectly. These initial estimates will be refined during the PPG phase.

6. Innovation, sustainability and scaling up

An Information and best practices platform for WTE technologies is created to provide continuous technical support on design and development of commercial WTE plants. They will sustain the promotional and development activities within the sector.

Also, financial incentive system will be setup for attracting investments in WTE technology. Technical standards for medium and large scale biogas technology will be established which would increase the quality and life of the WTE plant construction.

These would remove the barriers faced by the sector currently. Since there is good replication potential, it is expected that, as a result of the project, more WTE projects would be established in other potential places.

A.2. Stakeholders.

The project will involve MEMR (GEF focal point), MoL, MoF, MoE, other institutions like Energy Regulatory Commission (ERC), Kenya Industrial Research and Development Institute (KIRDI), KEBS, banks/financial institutions, private investors, etc. MEMR, along with MoF, MoE and a Co-operative Bank of Kenya will be responsible for the financial incentive. Also, MoF is the deciding authority in clearing projects, which are donor funded. During the PPG stage, the project will report to MoF to get clearance.

²³ Existing setup and hence baseline investment is considered as zero.

The demonstration projects will utilize the recently revised FiTs and PPA templates, results of the WTE projects will be fed in to future revisions and improvements of both FiTs and PPAs by MoE. Also the demonstration projects will also closely work with MoE utilities, like Kenya Power, for grid electricity export²⁴. KEBS along with MoE will be responsible for the design and enforcement of technical standards for medium and large scale biogas technology.

Private sector will mobilize investments for the establishment of WTE plants. The existing barriers of stakeholders' disintegration will be reduced by applying private PPP concept in the development of WTE projects.

Local community people (including women, young girls and other vulnerable section of the communities) will benefit from access to clean electricity and cleaner environment, as well as from employment opportunities during construction and operation of the plants.

Eligible women candidates will be involved as trainers and technical consultants. TORs will be prepared in such a way, so as to encourage participation of women experts and to mainstream gender in the activities of consultants and experts. Moreover, women will also be encouraged to participate as trainees in the capacity building sessions.

A.3 Risk.

Risk	Proposed mitigation measures	Risk level
Technical risks: Lack of human and institutional capacity is an impediment to large scale penetration of WTE technology	Training will be given to experts, operators, government agencies, etc. Capacity building and transfer of technology will mitigate the technical risk. As Kenya already has the technology for domestic biogas units, further development on commercial biogas units can be achieved with lesser difficulty. Detailed techno-economic feasibility studies will be carried out.	Low
Financial risks: General perception that WTE investments yield low returns, hence the investors are not willing to invest.	Detailed techno-economic feasibility studies will be carried out to establish the financial viability of the demonstration projects. Moreover, financial incentives will be designed to attract investments in WTE.	Low
Market risks: No off-takers for the generated electricity.	The demand-supply gap is very high in Kenya and hence, there is no market risk. Off-takers for each plant will be decided during the feasibility study.	Low
Implementation risks: Risk of failure in implementing the project due to lack of co-financing and political risks	Letter of co-financing to be obtained. The new constitution is envisaged to provide more political stability in the foreseeable future – providing less implementation risk. Moreover, these risks will be studied in depth during the PPG stage.	Moderate
Sustainable operational risk: Application of WTE technology might be in halt by	The installations will be done only after conducting a proper resource assessment study in order to ensure the supply of wastes from industries.	Low

²⁴ Kenya Power is the sole agency responsible in Kenya for electric distribution and any arrangement for electric supply to the grid is the responsibility of Kenya Power.

shortage of inputs and inadequate availability of trained plant operators.	Before the actual plant operation, these O&M staff would be trained at the information and best practices platform and would undergo on the job training in an existing biogas plant. Also, the demonstration projects' O&M staff will be trained by the respective suppliers. In addition, local engineering and O&M companies will be trained in O&M of WTE plants.	
Climate change risk: Floods	WTE plant building and site office will be located on an elevated area to prevent flooding. All buildings and structures will be designed and built appropriately to avoid flooding.	Low

A.4. Coordination.

The project will build on experiences and achievements of the following projects to ensure that they are complimentary to each other.

1) *Removal of Barriers to Energy Conservation and Energy Efficiency in Small and Medium Scale Enterprises*: This is a completed GEF-UNDP project for reduction of GHG emission in industrial sector. It aimed at removing barriers on capacity building and financing by training and introduction to new financial mechanisms in the energy efficiency sector respectively. The proposed project is complementary to this project, as it aims at using available wastes for energy generation by implementing WTE plants with cumulative 1.3 MW_e and 120 kW_{th} capacity.

2) *Cogen for Africa (regional project)*: This is an on-going GEF-UNEP project. It aims at a) increasing awareness among key policy makers to promote cogeneration, b) formulating policies related to grid and rural electrification and c) supporting the establishment of dedicated regional and national institutions to provide information and services for the new and highly efficient cogenerations. The proposed project aims at creating an information platform which would educate policy makers and help them gain confidence in WTE technology, as well as equip them with necessary technical capacity for supporting, developing and implementing such projects. This would lead to creation and implementation of more policies/action plans in improving electrification in Kenya.

3) *Solar and Wind Energy Resource Assessment (global project)*: This is a completed GEF-UNEP project. The overall goal of the project was to promote the integration of wind and solar alternatives in national and regional energy planning and sector restructuring as well as in related policy making. Also, it aimed at enabling informed decision making and enhancing the ability of participating governments to attract investors' interest in RE. The proposed project complements the above project by designing and introducing financial incentives which would attract investors into WTE (renewable energy).

4) *Kenya National Domestic Biogas Programme (an initiative under the Africa Biogas Partnership Programme), 2009-2013*: This programme aims at disseminating domestic biogas plants as local and sustainable energy source through development of commercially viable and market-oriented biogas sector. As household biogas digesters are very common in Kenya, the technology can be extended and modified appropriately into commercial plants. An additional know-how of the present situation would also be created under the proposed GEF project.

Poverty reduction through productive activities is a priority of UNIDO and therefore UNIDO's substantive branches such as Agro Business Development Branch, Business, Investment and Technology Services Branch, etc., will be actively involved in developing economic activities in beneficiary communities.

B. Description of the consistency of the project with:

B.1 National strategies and plans or reports and assessments under relevant conventions, if applicable, i.e. NAPAs, NAPs, NBSAPs, national communications, TNAs, NCSAs, NIPs, PRSPs, NPFE, Biennial Update Reports, etc.:

The proposed project will support the following government policies and strategies targeted to increase the percentage of RE in overall energy mix and electrification rate in the country.

The Electric Power Act, 1997: This act facilitated the private sector participation in the generation and distribution of electricity and encouraged rural electrification using RE technologies.

First National Communication of Kenya to UNFCCC, 2002²⁵: This policy identified the need for economic incentives, intensified R&D activities, access to appropriate technologies, capacity building and policy formulation in waste management sector, as well as establishment of energy centres, setting up of demonstration facilities and establishment of district-wise information resource centre in energy sector.

Technology Needs Assessment (TNA), 2005²⁶: This assessment suggested carrying out of inventory on GHG reduction potential, capacity and awareness building on GHG emission reduction as well as promotion of technology transfer of less GHG emitting technology.

Energy Act, 2006 and Vision 2030 (announced in 2008): This act aimed at promotion of development and use of RE technologies, local fabrication, strengthening of O&M capacity, reduction of country reliance on imported fossil fuels, increase of electrification access, provision of affordable and reliable energy and mobilization of private sector capital for generation of electricity from RE.

National Portfolio Formulation Document (NPF), March 2011: This document identified the issues of promotion of RE, energy conservation and efficiency, capacity building/policy making for promotion of conservation as well as enhancement of carbon savings through sustainable management of land use and forestry REDD+, as the key areas for climate change mitigation. It is consistent with UNIDO's proposed interventions which includes conversion of WTE from organic waste (MSW, water hyacinth, slaughterhouse wastes, agro-farm wastes, etc.) to produce biogas, assessment of organic waste potential for bio-energy technologies from organic wastes, capacity building in the area of RE, etc.

B.2. GEF focal area and/or fund(s) strategies, eligibility criteria and priorities:

The proposed project activities promote the use of waste to energy (WTE) technologies. This area was selected due to their potential in rapid scaling up and in reducing GHG emissions. This is in line with *GEF-5 climate change focal area strategic programme CCM-3: Promoting the investment in RE technologies.*

B.3 The GEF Agency's comparative advantage for implementing this project:

The project is a technical assistance/capacity development intervention that fits within the Climate Change focal area strategic objective 3. The GEF Council paper "Comparative Advantages of the GEF Agencies" (GEF/C.31/5rev.1) recognizes a comparative advantage of UNIDO in this strategic programme.

UNIDO is well placed to implement this project owing to its experience and expertise in projects related to agro-industries linking access, waste management and productive use activities in other countries. Specific to Kenya, UNIDO's previous intervention in WTE sector is mentioned in section A.1, Part II.

UNIDO has a full-fledged country office in Nairobi, headed by a UNIDO Representative and a number of technical officers who focus on the implementation of the ongoing Kenya country programmes and various other projects funded by multilateral funding mechanisms such as the Montréal protocol and

²⁵<http://unfccc.int/resource/docs/natc/kenncl.pdf>

²⁶http://unfccc.int/tclear/pdf/TNA/Kenya/TNA%20%20REPORT%20Kenya%20final%20_nov05.pdf

Persistent Organic Pollutants (POPs). In this context, UNIDO is well placed to implement such a programme in Kenya.


This project will also benefit from some of the administrative structures established for the UNIDO-GEF and other UNIDO projects.

PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)

- A. **RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S):** (Please attach the [Operational Focal Point endorsement letter\(s\)](#) with this template. For SGP, use this [OFP endorsement letter](#)).

NAME	POSITION	MINISTRY	DATE (MM/dd/yyyy)
Mr. Ali Mohamed	Permanent Secretary	Ministry Of Environment And Mineral Resources	11/23/2012

B. **GEF AGENCY(IES) CERTIFICATION**

This request has been prepared in accordance with GEF/LDCF/SCCF/NPIF policies and procedures and meets the GEF/LDCF/SCCF/NPIF criteria for project identification and preparation.					
Agency Coordinator, Agency name	Signature	DATE (MM/dd/yyyy)	Project Contact Person	Telephone	Email
Mr. Philippe Scholtès, Officer-in-Charge, Programme Development and Technical Cooperation Division - PTC, UNIDO GEF Focal Point		12/02/2013	Jossy Thomas Industrial Dev. Officer Energy & Climate Change Branch, PTC UNIDO	+43 - 1 – 26026- 3727	j.thomas@unido.org 