



GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET

Naoko Ishii
CEO and Chairperson

December 17, 2014

Dear Council Member:

UNIDO as the Implementing Agency for the project entitled: *Tanzania: Promotion of Waste-to-Energy Applications in Agro-Industries*, has submitted the attached proposed project document for CEO endorsement prior to final approval of the project document in accordance with UNIDO procedures.

The Secretariat has reviewed the project document. It is consistent with the proposal approved by Council in November 2012 and the proposed project remains consistent with the Instrument and GEF policies and procedures. The attached explanation prepared by UNIDO satisfactorily details how Council's comments and those of the STAP have been addressed. I am, therefore, endorsing the project document.

We have today posted the proposed project document on the GEF website at www.TheGEF.org. If you do not have access to the Web, you may request the local field office of UNDP or the World Bank to download the document for you. Alternatively, you may request a copy of the document from the Secretariat. If you make such a request, please confirm for us your current mailing address.

Sincerely,

Naoko Ishii
Chief Executive Officer and Chairperson

Attachment: GEFSEC Project Review Document
Copy to: Country Operational Focal Point, GEF Agencies, STAP, Trustee



REQUEST FOR CEO ENDORSEMENT

PROJECT TYPE: Full-sized Project

TYPE OF TRUST FUND: GEF Trust Fund

For more information about GEF, visit TheGEF.org

PART I: PROJECT INFORMATION

Project Title: Promotion of waste-to-energy (WTE) applications in agro-industries of Tanzania			
Country(ies):	United Republic of Tanzania	GEF Project ID: ¹	4873
GEF Agency(ies):	UNIDO	GEF Agency Project ID:	140077
Other Executing Partner(s):	Ministry of Energy and Minerals (MEM) and Rural Energy Agency (REA)	Submission Date:	06/27/2014
		Resubmission Date:	10/06/2014
		Resubmission Date:	11/18/2014
GEF Focal Area (s):	Climate Change (CC)	Project Duration(Months)	48
Name of Parent Program (if applicable):		Project Agency Fee (\$):	527,700
	<ul style="list-style-type: none"> ➤ For SFM/REDD+ <input type="checkbox"/> ➤ For SGP <input type="checkbox"/> ➤ For PPP <input type="checkbox"/> 		

A. FOCAL AREA STRATEGY FRAMEWORK²

Focal Area Objectives	Expected FA Outcomes	Expected FA Outputs	Trust Fund	Grant Amount (\$)	Cofinancing (\$)
CCM-3 Promote investment in Renewable Energy (RE) technologies	Investments in RE technologies increased	RE capacity installed	GEF TF	5,277,000	26,750,000
Total project costs				5,277,000	26,750,000

B. PROJECT FRAMEWORK

Project Objective: To promote investments in waste-to-energy (WTE) technologies for electricity generation in agro-industries						
Project Component	Grant Type	Expected Outcomes	Expected Outputs	Trust Fund	Grant Amount (\$)	Confirmed Cofinancing (\$)
1. Capacity development and knowledge management.	TA	Improved awareness, knowledge and capacity on WTE technologies in Tanzania.	1.1. An information and learning centre (I&LC) established for WTE at the University of Dar es salaam (UDSM). 1.2. Capacity developed for at least 50 policy makers. 1.3. Technical capacities developed for relevant RE institutions, agro-	GEF TF	415,714	1,330,750

¹ Project ID number will be assigned by GEFSEC.

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

			industries and project developers (target at least 50 numbers each).			
2. Demonstration of WTE technologies.	INV	Increased use of WTE technologies in agro-industries.	2.1. Detailed plant designs prepared for demonstration projects. 2.2. WTE power plants established for 6.8 MW cumulative capacity.	GEF TF	889,000	13,950,000
	TA		2.3. WTE technologies transferred to agro-industries.		111,000	200,000
3. Creation of favorable investment environment	TA	Increased involvement of private investors in WTE projects.	3.1. Gap analysis on policy requirements conducted 3.2. Incentive and soft loan facilities designed. 3.3. Incentive scheme established under REA for investors of WTE projects. 3.4. Soft loan facility established under REA for investors of WTE projects.	GEF TF	167,564	150,000
	INV				3,382,436 ³	9,550,000 ⁴
4. Monitoring and Evaluation (M&E).	TA	Effectiveness of the outputs assessed, corrective actions taken and experience documented.	4.1. Mid-term M & E report prepared. 4.2. End of project M & E report prepared.	GEF TF	60,000	250,000
Subtotal					5,025,714	25,430,750
Project Management Cost (PMC) ⁵				GEF TF	251,286	1,319,250
Total project costs					5,277,000	26,750,000

³ USD 3,382,436 will go as incentives for demonstration projects under project component 2 through an incentive system created by the project.

⁴ Eligible WTE project will receive soft loan under this facility. Projects which receive GEF incentives are not eligible to receive loan from this facility.

⁵ PMC should be charged proportionately to focal areas based on focal area project grant amount in Table D below.

C. SOURCES OF CONFIRMED COFINANCING FOR THE PROJECT BY SOURCE AND BY NAME (\$)

Sources of Co-financing	Name of Co-financier (source)	Type of Cofinancing	Cofinancing Amount (\$)
United Republic of Tanzania	Rural Energy Agency (REA)	Grant	6,500,000
United Republic of Tanzania	Tanzania Investment Bank Limited (TIB)	Grant	3,500,000
United Republic of Tanzania	Tanzania Investment Bank Limited (TIB)	In-kind	2,550,000
United Republic of Tanzania	The National Ranching Company (NARCO)	Investment	2,600,000
Private Sector	Mohammed Enterprises Tanzania Limited (METL)	Investment	3,000,000
Private Sector	Zanzibar Sugar Factory Ltd	Investment	8,000,000
Private Sector	Masasi Food Industries Company Limited	Investment	450,000
GEF Agency	UNIDO	Grant	60,000
GEF Agency	UNIDO	In-kind	90,000 ⁶
Total Co-financing			26,750,000

Co-financing letters are provided in Annex F.

D. TRUST FUND RESOURCES REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY¹

GEF Agency	Type of Trust Fund	Focal Area	Country Name/ Global	(in \$)		
				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.

⁶ UNIDO in-kind contribution details are given in Annex K.

F. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS:

Component	Grant Amount (\$)	Cofinancing (\$)	Project Total (\$)
International Consultants	974,000	322,000	1,296,000
National / Local Consultants	192,000	540,000	732,000

G. DOES THE PROJECT INCLUDE A “NON-GRANT” INSTRUMENT? No

(If non-grant instruments are used, provide in Annex D an indicative calendar of expected reflows to your Agency and to the GEF/LDCF/SCCF/NPIF Trust Fund).

Not applicable.

PART II: PROJECT JUSTIFICATION

A. Describe any changes in alignment with the project design of the original PIF⁷

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

In the PIF the document, project component 2 establishing a financing mechanism and component 3 demonstrating WTE projects were distinct. However, during PPG stage it was clear that use of GEF resources as incentive for the demonstration projects and the respective co-financing be used as soft loans for replication projects. Therefore, an amount of USD 3.3 million has been set aside for incentives to demonstration projects and this incentive mechanism will be established with in Rural Energy Agency (REA) and the soft loan facility for replication projects will be established using co-financing amount of USD 9.6 million at Tanzania Investment Bank Limited (TIB) which may be accessed by all potential developers of WTE projects.

The proposed project is consistent with Tanzania's national development priorities. It will increase the use of renewable energy (RE) and decrease the consumption of fossil fuel for additional power generating capacity in case of grid extension or diesel generation.

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

The proposed project activities promote the use of WTE technologies, more specifically, application of biomass and biogas technologies in agro-industries. This area was selected due to their rapid scaling up and greenhouse gas (GHG) emission reduction potential. These are in line with GEF-5 climate change focal area strategic programme CCM-3: Promoting the investment in RE technologies.

The East Africa⁸ (a group of 19 countries including Tanzania) Ministerial Consultation meeting, 18-20th January 2011 organized by GEF secretariat, came up with WTE as one of the priority areas to be considered for East African countries. In line with that, the expected outcomes of the project include human and institutional capacity development and the increased investment for WTE technologies.

A.3 The GEF Agency's comparative advantage

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.311/5rev.1)⁹ recognizes a comparative advantage of UNIDO in this strategic programme.

A.4. The baseline project and the problem that it seeks to address

Tanzania energy scenario

According to International Energy Agency (IEA), Tanzania consumed a total of 20.8 Mtoe in 2011, of which, net imports were 1.6 Mtoe. Energy imports form about USD 1.5 billion per annum which is about 23% of the total imports and almost all of them are petroleum products.

In 2009, out of the total energy consumed in Tanzania, biomass represented 88.6% of the total energy consumption, petroleum products 9.2% and electricity 1.8%. Other energy sources, such as coal, natural gas and solar represented a negligibly small percentage¹⁰. Figure 1 depicts the energy scenario in Tanzania.

⁷ For questions A.1 –A.7 in Part II, if there are no changes since PIF and if not specifically requested in the review sheet at PIF stage, then no need to respond, please enter "NA" after the respective question

⁸ <http://millenniumindicators.un.org/unsd/methods/m49/m49regin.htm>

⁹ <http://www.thegef.org/gef/sites/thegef.org/files/documents/C.31.5%20Comparative%20advantages.pdf>

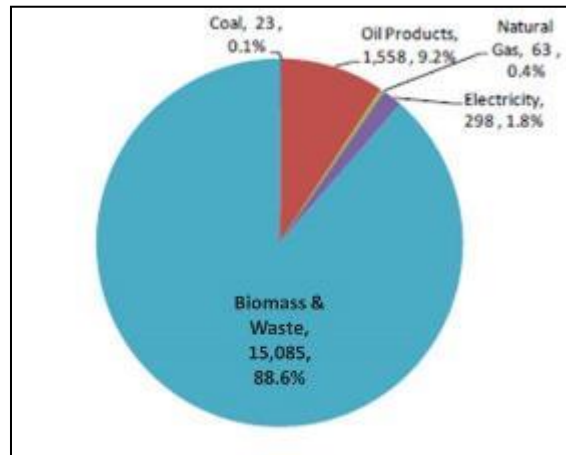


Figure 1: Energy mix in Tanzania (Mtoe), 2009

Biomass is the single biggest source of energy in the country. According to the estimates made by REA, about 15 million tons per year of agricultural, livestock and forestry residues are annually generated. These include sugar bagasse (1.5 million tons per year (mtpy)), sisal (0.2 mtpy), coffee husk (0.1 mtpy), rice husk (0.2 mtpy), municipal solid waste (4.7 mtpy), forest residue (1.1 mtpy)) with the balance from other crop wastes and livestock. Further supplies are obtained through sustainably harvested fuel wood from fast-growing trees plantations. However, only a very small percentage of these wastes are used for energy generation.

On the other hand, biomass is the main domestic energy source. More than 80% of the Tanzanians depend upon biomass as their major energy source with very less usage efficiency. As a result, in the overall country energy mix, biomass represents the major share¹¹.

Tanzania electricity scenario

Tanzania's per capita electricity consumption is around 78 kWh¹² per annum, which is very low compared to that of the world's average per capita consumption (2,000 kWh) and developing countries in Sub-Saharan Africa (552 kWh).

Tanzania's installed electricity generation capacity in March 2013 was 1,564 MW, of which around 1,438 MW was available in the main grid and the balance of 126 MW was from the small power producers (SPPs), mini-grids and imports. Out of this, 32% of the electricity comes from natural gas, 29% from oil, 35% from large hydropower and the remaining percentage from small renewable energy power and imports¹³. Electricity generation mix in Tanzania for the year 2012, with an overall production of 5,740 GWh¹⁴, is shown in figure 2. In addition, there are around 300 MW of private diesel generation systems not connected to Tanzania Electric Supply Company Limited (TANESCO) grid.

Only about 18.4% of the population has access to grid electricity. Some obtain access through stand-alone solar photovoltaic (PV) and several mini-hydro based mini-grids. These have emerged recently in response to the enabling financing and regulatory framework that the government has introduced. However, majority of the people still have no access to electricity. This is due to the lack of capacity addition in the national grid.

¹⁰ IEA Key World Energy Statistics, 2013 http://www.iea.org/publications/freepublications/publication/KeyWorld2013_FINAL_WEB.pdf
http://www.iea.org/stats/balancetable.asp?COUNTRY_CODE=TZ

¹¹ A Review of Biomass Energy Dependency in Tanzania, 9th Eco-Energy and Materials Science and Engineering Symposium, 2011

¹² The World Bank Data Bank, 2010

¹³ TANESCO, March 7, 2013

¹⁴ Current status of energy sector in Tanzania - Executive exchange on developing an Ancillary service market, USEA – Washington DC, 25th February to 2nd March 2013

<http://www.usea.org/sites/default/files/event-/Tanzania%20Power%20Sector.pdf>

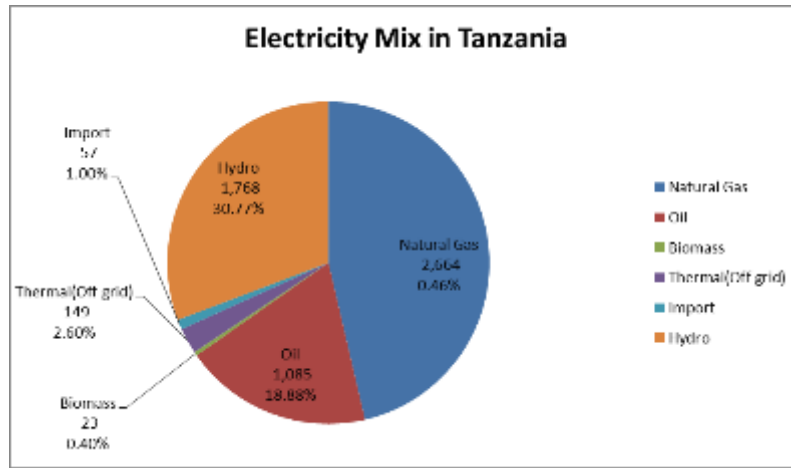


Figure 2: Electricity generation mix in Tanzania (GWh), 2012

Electricity demand in the country is increasing rapidly mainly due to the accelerated productive investments, increasing population and increasing demand for energy services. The Power System Master Plan (2010 – 2035) anticipates that Tanzania will increase its electrification status from 18.4% to at least 75% by 2035. In addition, the demand from the connected customers will also increase significantly, as Tanzania becomes a middle income country as stipulated in Tanzania Vision 2025. The peak demand is projected to rapidly increase from about 1,000 MW in 2010 to about 4,700 MW by 2025 and 7,400 MW by 2035¹⁵. The electricity peak demand and the consumption forecast is shown in figure 3.

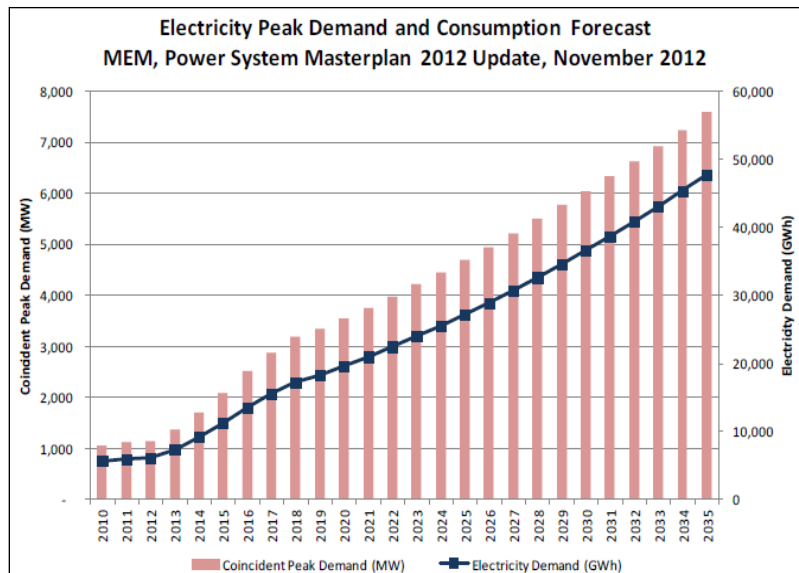


Figure 3: Electricity peak demand and consumption forecast

Zanzibar electricity scenario

Tanzania electricity situation is discussed in the above paras. But the electricity situation in Zanzibar, an island separated from the mainland Tanzania by a 22-mile channel, needs special mention. Zanzibar comprises of two islands, Unguja and Pemba.

¹⁵ Ministry of Energy and Minerals, Power System Master plan 2012 update, November 2012

The energy sector in Zanzibar consists of unreliable electric power and usage of fossil fuels such as petroleum and petroleum products. It is also supplemented by firewood and its related products. Coal and gas are rarely used for either domestic or industrial purposes.

Unguja island depends entirely on TANESCO grid for its electricity needs, supplied through 132 kV submarine cable (established in 1979) connecting Ras Kiromoni in Tanzania Mainland and Ras Fumba in Unguja Island with a capacity of around 40 MW. Pemba Island also depends upon TANESCO grid from mainland through a submarine cable from Tanga.

Zanzibar Electricity Corporation (ZECO) is the sole power utility in Zanzibar empowered to generate, transmit, distribute and sell electricity to the customers. ZECO has emergency generators of 25 MW at Mtoni power station, which is normally used at the time of power outages in Mainland and to provide additional power to the island as and when required.

The peak electricity demand is estimated to be around 50 to 55 MW. Until 2 years ago, the electricity deficit of 10 to 15 MW was met by the diesel power plant. However, ZECO decided not to use diesel power plants, as the cost of power generation is very high. As a result, the present electricity deficit at peak hours is managed by scheduled power cuts. According to ZECO, another 100 MW cable laying works from Tanzania Mainland to Zanzibar Island under a USD 28.1 million funding from United States of America (USA) is currently being planned and is expected to provide infrastructure for electricity supply in the next few years.

In the absence of reliable and affordable alternatives, Zanzibar faces complete blackouts in case of any disruption in electricity transmission. Unguja faced two blackouts; one in 2008 for about a month (21 May-18 June) and another one in 2009-10 for about 3 months (10 December 2009 to 09 March 2010). During such times, the local population had to rely only on private generation of electricity¹⁶. Under such context, local electricity generation and feeding to ZECO grid would be a considerable contribution in improving the energy security, access and economy of Zanzibar Island.

Climate Change impacts on the energy sector

The changing weather patterns are significantly affecting the energy sector because Tanzania's electricity mix is greatly dependent upon the hydropower (presently 35%, down from over 50%) and thus highly vulnerable to weather conditions and climate changes. The climatic variability, as exemplified by droughts in the years 2000 and late 2010, 2011 and 2012 reduced the hydropower generation and led to severe energy shortages which resulted in load shedding. Blackouts and power rationing as a result of low water levels in the hydropower dams forced TANESCO to rely on oil and gas-fired emergency generators and to look increasingly at thermal projects to compensate for the reduced capacity and future capacity increases. Power rationing causes inefficiency in public services. This calls for diversifying the energy mix, tapping renewables that are less vulnerable to climate variability and change.

The current contribution of Tanzania to global climate change is small. In 2009, CO₂ emissions were 0.2 tons per capita¹⁷. With a population of 47.8 million¹⁸, country's emission is estimated to be around 9.6 million t CO₂e. The electricity and heat sector together contributed 25%, the manufacturing sector 15%, the transport sector 50% and the other sectors 10%, respectively.

According to a study by the Department for International Development (DFID), the fossil fuel based emissions are set to increase 7 times and the GHG emissions are expected to double by 2030 as compared to that of 2005 baseline.¹⁹. Thus, the continued economic growth of the country in a business-as-usual manner will increase the demand for energy and lead to increasing CO₂ emissions.

¹⁶ The Zanzibar Blackout - a case study on consequences from an electricity power crisis, KTH

¹⁷ World Bank Data Bank, <http://databank.worldbank.org/ddp/home.do?Step=1&id=4>

¹⁸ 2012 data. <http://data.worldbank.org/indicator/SP.POP.TOTL>

¹⁹ UKAID, "Economics of Climate Change in the United Republic of Tanzania", wUKith Development Partner Group

On the other hand, with regard to climate change mitigation, there is, till date, little evidence of comprehensive action to address climate change at policy or project level. Neither does any climate change policy exist nor is it particularly mainstreamed into other policy areas.

Agro-industries: Energy consumption and related GHG emission

Agriculture is the backbone of Tanzania contributing 25% of the national GDP, employing around 75% of the labour force in the country (AfDB et al, 2012). The agricultural growth rate has increased from 5% in 2002-03 to 7% by 2010²⁰. In Tanzania, processing of cashew nuts, cassava, sweet potatoes, paddy, sorghum, wheat, sunflower, groundnuts, sugarcane, tobacco, sisal and cotton is being done on a large scale. At present, most of these agro-industries depend upon grid electricity and heavy oil fired power plants or diesel generators, which are highly carbon emitting. Table 1 summarizes the energy consumption and the corresponding greenhouse gas (GHG) emissions of the selected agro-industries in Tanzania²¹.

Table 1: Energy consumption and GHG emissions from agro-industries

Crop	Energy consumption in agro-industries			GHG emissions from agro- industries ²²		
	MJ/ton ²³	Annual energy consumption (TJ)	Annual energy consumption (%) ²⁴	GHG emissions/ton (t CO ₂ e/ton)	Annual emissions (t CO ₂ e)	Annual emissions (%)
Cashew	9,391	870	0.48	0.18	16,253	0.9
Coffee	20,639	1,131	0.63	0.27	14,746	0.8
Cotton Lint	2,360	250	0.14	0.20	21,677	1.2
Edible Oils	5,006	1,652	0.92	0.32	97,594	5.3
Maize	144	514	0.28	0.02	71,380	3.9
Milk	423	42	0.02	0.05	4,655	0.3
Rice	108	145	0.08	0.02	20,128	1.1
Sisal	2,666	72	0.04	0.37	46,845	2.5
Sugar	5,875	13,924	7.72	0.80	1,890,075	10.2
Tea	44,100	1,380	0.76	0.63 ²⁵	19,777	1.1
Tobacco	164,992	8,349	4.63	1.69	85,676	4.6

²⁰ National Strategy for Growth and Reduction of Poverty (MKUKUTA)

²¹ Carbon footprint reduction opportunities for the agro-processing industries of Tanzania, “A Guidebook for use by the Agro-processing industries of Tanzania”, UNIDO, 2011

²² Energy sources’ emissions factors have not been considered.

²³ Calculated using the typical energy consumption of processing facilities and their output - excluding transportation energy consumption

²⁴ This is only a percentage of the sum of annual production of the crops analyzed in this table and not a percentage of Tanzania’s overall energy consumption or the entire Tanzanian agro-processing industry’s energy consumption.

²⁵ Due to the fact that sustainable managed biomass is used, it is assumed that these emissions are offset.

Crop	Energy consumption in agro-industries			GHG emissions from agro- industries ²²		
	MJ/ton ²³	Annual energy consumption (TJ)	Annual energy consumption (%) ²⁴	GHG emissions/ton (t CO ₂ e/ton)	Annual emissions (t CO ₂ e)	Annual emissions (%)
Wheat	288	209	0.12	0.04	28,953	1.6
Total	255,992	28,537	15.82*	1.73	2,317,759	33.5*

*The rest of the 100% are from coal

Baseline projects

In Tanzania, the usage of WTE potential has been mainly untapped. TANESCO, the national grid company, has been facing serious challenges in providing electricity mainly due to lack of developed distribution systems, high level network, sufficient hydropower output, high electricity tariffs, network voltages and adequate investments.

On the other hand, since 2002, the cost of electricity generation has continuously increased; primarily as the reliance on fossil fuel based generation has increased. In addition, contribution of large hydropower has continuously decreasing from 98% of total capacity in 2002 to 40% in 2006 and to 35% now, of the available capacity, due to extended droughts.

As a result of the aforementioned issues, there have been constant revenue shortfalls to meet the operating costs. Most recently, TANESCO is facing increased losses, as it depends greatly upon thermal power. Even, under such context, TANESCO has so far not given a thrust on utilizing the available WTE potential.

During the 2011, UNIDO undertook a study “*Carbon foot print reduction in agro industrial sector of Tanzania*”, which focused on four agro-industries, sisal, dairy, tobacco and edible oil. The study aimed at identifying opportunities for reducing their carbon footprints. From the study, it was clear that most of the industries were found using carbon intensive technologies, contributing substantially to GHG emissions. The primary carbon reduction opportunities in these industries were found to be the use of RE for electricity generation. Captive power generation will increase the reliability of electricity supply and excess electricity, when exported, will also reduce unreliability in power supply in the country.

In addition to the above study, UNIDO also conducted another study in July 2011 using its own funds, namely the “*Due-Diligence report: Potential sites to generate energy from waste in the selected agro-processing centres*”. This was followed by the conduct of the feasibility studies in December 2013 to estimate the installed capacity in each of the demonstration sites using financing from investors

As part of the baseline, UNIDO had piloted with its own funds, three community-level waste-to-energy systems in Zanzibar, Lindi and Kigoma, each of them producing about 10 kW electricity. The feedstock for these plants includes slaughter house waste, animal manure and market wastes as well as fish wastes. Also, an industrial scale biogas project at Katani Limited, Hale, Tanga with an installed capacity of 300 kWe (2x150 kWe) utilizing sisal wastes was technically supported by UNIDO. Presently, this power plant is utilizing all the power for its own operation. The project total investment cost was USD 1.5 million. Out of this, USD 800,000 was donated by Combined Federal Campaign (CFC) and Food and Agricultural Organization (FAO), whereas UNIDO provided technical support in this project. From this, it is very clear that grant support is extremely important in the development of WTE projects in Tanzania, for the current scenario.

The Government of Tanzania is in the process of instituting interventions, including budget support to TANESCO to place the power sector on a more sustainable path. There are four complementary sets of actions being considered:

1. Shifting the energy mix from the expensive emergency oil based power supply to a more efficient and low cost generation with a view to reduce the cost of electricity supply and to mitigate the risks of major shocks to the power system, such as droughts or oil price increases.

The focus is presently on gas, coal and RE in the near future, with coal and large hydro-power in the long term.

2. Restructuring institutions and strengthening investment planning, procurement and contracts management.

This would include leveraging private investment through IPPs, procurement through solicited and competitive bidding processes and increasing the market competition in power generation.

3. Addressing TANESCO's financial gap through financing arrangements and through revenue-enhancing measures.
4. Reducing distribution and transmission losses from 17.8% in 2012 to 15.1% in 2015.

Recently under the small power purchase agreement (SPPA) program, two biomass power projects are supplying power to TANESCO with a capacity of 9 MW²⁶ and 1.5 MW²⁷. Another 1 MW Ngombeni project was commissioned in June 2013 to supply power to TANESCO's isolated grid on Mafia Island. TANESCO has signed SPPA for another three additional biomass projects with a cumulative capacity of 9.6 MW. It is thus clear that, only limited developments have taken place so far.

The proposed project will supplement the SPPA program with a cumulative capacity of 6.8 MW.

Compared to the available potential of around 650 MW, the present installed and planned WTE power plant capacities (biogas and biomass) are far lower. It is thus clear that, WTE technologies are at a very rudimentary level of penetration in Tanzania. Though there is good potential to establish several WTE projects, barriers exist, which need to be removed. The proposed project will build on the above mentioned baseline projects/activities in Tanzania and will extend the baseline and focus on overcoming the barriers in Tanzania. Some of the identified barriers for WTE projects include, but not limited to, the following:

- Lack of information on potential resources and existing projects;
- Inadequate public awareness and participation;
- Inadequate Knowledge, technology and skills to overcome barriers;
- Lack of business skills for development and implementation of WTE projects;
- Lack of strong institutional support;
- Inadequate private sector participation;
- Non-availability of dedicated financing schemes to support private sector investments; and
- Inadequate local technical capacity for sustainable O&M.

Without GEF intervention, these barriers may continue to exist, where the present scenario of poor waste management in agro-processing industries, without appropriate usage, will continue, with little or no significant improvement. Fossil fuel based energy consumption and GHG emission will continue to increase. By mitigating some of the identified barriers, the proposed WTE project will provide more opportunities for the private sector investment.

The proposed project will facilitate the wide uptake of clean energy in the agro-industrial sector as part of large countrywide efforts in mitigating the anticipated climate change impacts. The project will also supplement National Adaptation Programme of Action (NAPA) assisted by UNEP in collaboration with the Vice President's Office (VPO), Division of Environment, aimed at developing a country-wide programme of immediate and urgent project based adaptation activities that address the current and anticipated adverse effects of CC, including extreme events.

²⁶ TPC Limited- major sugar producer

²⁷ TANWATT- tannin producer

Also the proposed project will have a significant impact on the electricity supply of the country. The demonstration (6.8 MW) and potential replication projects (15 MW considered over a period of 10 years after the end of the proposed project) together (21.8 MW) will supply around 0.5% of the estimated power demand in the year 2025 (4,700 MW) using RE resources.

A 5. Incremental /Additional cost reasoning: Describe the incremental (GEF Trust Fund/NPIF) or additional (LDCF/SCCF) activities requested for GEF/LDCF/SCCF/NPIF financing and the associated global environmental benefits (GEF Trust Fund) or associated adaptation benefits (LDCF/SCCF) to be delivered by the project:

WTE potential

Various study reports have concluded that Tanzania has more than 200 MW cogeneration potential from sugarcane residues (bagasse), mainly at the five sugar factories of Zanzibar Sugar, Kilombero Sugar Company Limited (KSCL), Mtibwa Sugar Estates Limited (MSEL), Kagera Sugar Limited (KSL) and Tanganyika Planting Company (TPC)²⁸. Zanzibar being an island, experiences severe power shortage and energy insecurity due to lack of sustainable energy generation and supply. It depends on diesel based generation which is imported from the mainland to meet its electricity needs. There is tremendous support from the local Government and also, the Zanzibar Sugar Company is willing to actively participate and finance the cogeneration project. Implementation of this project in Zanzibar Island will not only achieve GEF goals but also contribute positively towards the energy security and thus, the economy of the island.

Rice is the second largest food grain produced in Tanzania with the annual production of 1,341,846 tons. The volume of rice husk available is around 335,461 tons per year²⁹ from which a cumulative capacity of 45 MW power can be generated³⁰.

Timber processing is another significant industry in Tanzania, with 22,026,415 tons being processed annually and widely distributed across the country. Wood processing produces an average of about 25% bio-waste in the forms of bark, sap and sawdust³¹ from which a cumulative capacity of 360 MW³² power can be generated.

It has been reported that there is a potential for implementing biogas plants of 1 MW capacity in each of the 42 sisal estates³³. Other potentials include biogas plants in dairy and abattoirs and biomass power plants in tobacco industries. Table 2 provides an insight into the energy generation potential from major agro-wastes.

Significant potential exists with NARCO’s 10 ranches covering an area of approximately 230,384 hectares holding a total of 35,000 cattle, 2,933 sheep and goats. In addition, another 289,069 hectares have been subdivided into 124 small ranches and leased to Tanzanian investors. Initial study in these areas reveals the power generation potential of up to 20 MW of electricity from animal wastes through biogas route³⁴.

Table 2: Major agro-waste energy generation potential

Waste resource	Technology	Energy Potential (MW)
Sugarcane	Cogeneration	200

²⁸ An assessment of future emissions growth and low carbon reduction potential, December 2010 for UK Department of International Development

²⁹ Carbon footprint reduction opportunities for the agro-processing industries of Tanzania, “A Guidebook for use by the Agro-processing industries of Tanzania”, UNIDO, 2011

³⁰ Assuming a calorific value of 14 MJ/kg and power plant operating hours 7,500 hours

³¹ Carbon footprint reduction opportunities for the agro-processing industries of Tanzania, “A Guidebook for use by the Agro-processing industries of Tanzania”, UNIDO, 2011

³² Assuming a calorific value of 7 MJ/kg and power plant operating hours 7,500 hours

³³ <http://www.katanitz.com/Sisal%20Energy.html>

³⁴ Technical Feasibility Assessment Report, Power Generation from Animal Wastes, NARCO – UNIDO, 2013

Waste resource	Technology	Energy Potential (MW)
Sisal	Biogas power plant	42
Rice husk	Biomass power plant	45
Wood waste	Biomass power plant	360
Animal waste	Biogas power plant	20
Total		667

As mentioned in the previous section, electricity demand in 2035 is expected to be around 7,400 MW. If the available WTE potential is materialized, it would meet 8.7% of the total electricity requirements. Considering grid electricity displacement, these potential WTE plants would reduce approximately 1.85 million t CO₂e every year³⁵. With a conservative lifetime assumption of 15 years, these WTE plants would reduce approximately 27.8 million t CO₂e.

Proposed intervention

The proposed GEF project aims to establish the following:

- a) Improved human and institutional capacity for continuous development of WTE projects.
- b) WTE demonstration projects on a private-public partnership (PPP) basis for a cumulative 6.8 MWe capacity leading to up scaling of the WTE technology. This would lead to around 328,877 t CO₂e of overall emission reduction.
- c) Favorable investment environment through creation of incentive scheme/soft loan facility, leading to replication of at least 15 MW. This would lead to an overall emission reduction of around 725,464 t CO₂e.

GEF context

Under the business-as-usual scenario, most of the investments in the energy sector will have to come from the government. Given the budgetary constraints and other pressures, public sector investments are unlikely to substantially fund the increasing energy gap in the country, particularly using RE resources. The role of private sector which is very crucial in achieving substantial investments needed in energy sector in Tanzania would be minimal.

Without GEF intervention, the utilization rate of WTE potential would be less and the initiatives taken in the sector would be inadequate. No holistic, country wide efforts to improve the sector would take place. Moreover, the Tanzanian government's policy initiatives will not result in any tangible output within a short term.

In addition, funding of this project could be difficult considering the barriers present in the country in developing WTE. GEF funding will place the Government in a better position to mobilize co-financing for the project. The business-as-usual situation would limit Tanzania's ability to contribute to the achievement of Millennium Development Goals (MDGs), especially, the environmental sustainability and poverty reduction. Therefore, GEF support will be instrumental for the deployment of WTE based energy systems in Tanzania, supporting government initiatives for the betterment of energy situation in the country.

In conclusion, the baseline projects and baseline scenario would not be able to bring about significant mitigation of most of the barriers that hamper the implementation of WTE projects in Tanzania within a short-term. The underlying critical problems of the lack of adequate institutional capacity, supporting financial environment and good technical expertise and skills on the market would remain unsolved.

The GEF project will result in the removal of key barriers that currently limit the use of abundant agricultural waste to generate power for use in agro-industries, thereby, resulting in substantial reduction in GHG emissions.

³⁵ Grid emission factor of 0.5290 t CO₂/MWh is considered <http://www.iges.or.jp/en/cdm/report.html> (IGES)

The project

The proposed project will have the following 4 project components (PCs):

PC 1: Capacity development and knowledge management

Awareness will be created on potential of WTE technologies in the agro-industries through trainings and information dissemination mechanisms. Information dissemination will be a major activity in this component.

Under this component, the project aims at delivering the following outputs:

- a) An Information and Learning Centre (I&LC) for WTE projects will be established at University of Dar es Salaam (UDSM). This centre will create a database, which includes all information required for developing WTE projects. It will also provide necessary trainings to various stakeholders such as the agro-industries, project developers, financial institutions, technology developers, suppliers, end users, etc., accordingly, as per their requirements. The centre will be integrated in the UDSM structure using the human resources, already available in the University. UDSM, through its institution, College of Engineering and Technology (CoET) has established a National Energy Centre for Excellence (NECE), in which, this proposed I&LC will be embedded.

The capacity development activities at the proposed I&LC 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 centre sustainably.
- Well trained university/institution staff members of UDSM would be managing I&LC and hence, there would be no additional man-power cost.

Prior to taking responsibility of the centre, the staff will be trained in operation and management of the I&LC. Through the centre, WTE information will be disseminated through various dissemination tools such as leaflets or different websites. Necessary and appropriate training material for different groups of trainees will be prepared. Available guidebooks and strategies on WTE plants (biomass and biogas) development will be customised for adaption to the local conditions. This will benefit the potential investors. Any information regarding WTE projects including technology and regulatory issues can be obtained from this centre. The above arrangement will ensure the sustainability of capacity development even after the GEF project ends. Additional details on sustainability of the center are given in Annex E.

- b) Capacity will be developed among policy makers: Without appropriate supporting policy and regulatory environment, no technology promotion can be achieved. Therefore it is essential to engage policy makers by providing tailored training to at least 50 personnel over the project duration. Prior to the delivery of the training, the project will closely engage with the policy makers in understanding their present knowledge status, training needs, etc.
- c) Specific trainings aimed at agro-industries will be conducted, targeting at least 50 persons from the agro-industries.

The key decision makers from different RE/technical institutions and interested project developers (at least 50 numbers each) will be trained and equipped with necessary technical capacity for supporting, developing and implementing such projects.

All the demonstration projects are on investment basis and the investors need to source their investment (co-financing) from banks and financial institutions. Therefore, efforts to create awareness and interest among banks and financial institutions for lending WTE demonstration project will be a priority. Around 20 personnel from banks, financial institutions and funding agencies will be trained in assessing, evaluating and conducting due diligence on WTE projects.

In addition, trainings for various target groups such as local engineering and O&M companies will be provided (at least 50 personnel) to facilitate sustainable operation of the demonstration and replication projects. All capacity building activities will be carried out at UDSM I&LC.

Efforts will be taken to ensure that at least 20% of the training participants in each training programme are women.

Impact of the intervention

From the outcome of this project component, it is expected that the following barriers are removed:

Barriers / Challenges	How it is addressed
Insufficient public awareness and participation	<ul style="list-style-type: none"> • Creation of I&LC centre and functioning of the centre. • Training activities and information dissemination through various tools
Inadequate knowledge, technology and skill available for implementing WTE plants	Training to: <ul style="list-style-type: none"> • Key policy makers • Agro-industries • Interested project developers • Government officials • Banks/financial institutions • RE/technical institutions • Local engineering companies
Inadequate local technical capacity for sustainable operation and maintenance	Training to: <ul style="list-style-type: none"> • Local engineering companies • Local O&M companies

PC 2: Demonstration of WTE technologies

This component aims to demonstrate the viability of commercial WTE plants in Tanzania.

- a) Under this component, detailed technical plant design reports will be prepared for the proposed demonstration projects for which detailed feasibility studies have been undertaken during the PPG stage.
- b) Demonstration projects for a cumulative capacity of around 6.8 MWe based on biomass and biogas technologies will be established in agro-industries.

The demonstration sites were selected based on the following criteria, (a) representation by sub sector (sugar, sisal, livestock etc.), and (b) initiative of the investors for financing. Below are the selected sites in which the intervention will take place under this proposed project. Feasibility studies for these demonstration projects have been completed during the PPG stage (refer Annex E).

Zanzibar Sugar Factory and Ethanol Factory

Zanzibar Sugar Factory located in Mahonda village in Zanzibar Island is one of the oldest sugar factories in the country established in the year 1974. The ownership of the factory has passed through several hands and at present the sugar factory is being run by a private sector with a minimum participation from Zanzibar Government. The company has strengthened its financial and managerial capacity by partnering with other investors. They have recently refurbished the factory machinery and expanded the farm size. The factory also plans an expansion in sugar cane crushing and ethanol production. For all these activities, the factory needs consistent and quality steam supply. Due to lack of reliable steam supply, the company is incurring heavy losses annually.

With this background, the Ministry of Industry and Trade requested UNIDO to study the situation in June 2011. The factory has a small cogeneration unit (2 x 1 MW)³⁶, which has been designed and implemented to provide steam and electricity requirements of the sugar factory. However, the power generating equipment was not operational due to some technical issues. It was found to be designed at low efficiency for the maximum bagasse utilization in the boiler. After the study, it was strongly recommended to implement a modern bagasse based cogeneration plant for 4 MW capacity to ensure financial benefits to the entire sugar business of the Zanzibar Sugar factory. The study concluded that factory also has a potential to establish a 400 kW biogas plant from sugar and ethanol processing waste water.

In the absence of GEF intervention, the Zanzibar Sugar Factory and Ethanol Factory will not dare to invest in high efficiency cogeneration plant and biogas plant, as it does not have enough technical competency and confidence in the success of the project. Moreover, as mentioned earlier, this project would have a significant impact on the electricity requirements of the Zanzibar Island, which currently depends heavily on the Tanzanian mainland for its electricity requirements. The excess power from the factory will be exported to the grid for utilization by the local communities in the island.

National Ranching Company (NARCO)

National Ranching Company (NARCO) was one among the sites covered under UNIDO due-diligence study on selected agro-industries during July 2011. NARCO has eight ranches comprising an area of 230,384 ha. Kongwa ranch is one among them located at Dodoma. It covers an area of 38,000 ha which can hold about 14,000 cattle. However, currently the ranch is holding only 8,500 cattle, along with additional 1,150 goats and sheep.

The ranch also operates a small slaughter facility with a slaughtering rate of around 10 heads/day during the parliament session. During normal seasons it slaughters 20-30 heads/month. However, slaughtering is not its primary business. This ranch generates around 217,600 kg of cow dung/day. Feasibility study conducted during December 2013 by UNIDO identified a power plant potential of around 884 kW.

NARCO also aims to install another biogas based electricity generating project in its abattoir located at Ruvu which is now under construction. The abattoir will slaughter at least 150 animals per day generating a waste of around 5 tons/day.

³⁶ Even though the installed capacity was 2,000 kW, one 1,000 kW turbine was kept as a standby



Figure 4: Wastes piles in abattoirs and ranches in NARCO facilities

Based on the feasibility study conducted during December 2013 by UNIDO, the power plant capacity was estimated to be around 170 kW. Thus, the cumulative power generation capacity under NARCO (ranch & abattoir) will be around 1,054 kW.

Kongwa and Ruvu ranches are connected to the national grid. However, due to the grid unreliability, there are standby generators which supply power to the facilities including staff houses. Recent communication reveals that the ranch uses diesel generator for around 30% of its energy requirements. Such a data was not available for Ruvu abattoir.

Without the GEF intervention, NARCO will continue its ranch and abattoir activities without any significant difference. The available wastes would not be put to appropriate use like generation of electricity. Electricity generation from biogas for its own use, exporting the excess to the grid and nearby communities would be an intangible task for NARCO, as it does not have enough technical knowledge, skill and confidence in the success of the technology.

Mohammed Enterprises Tanzania Limited (METL) Sisal Estates

UNIDO due-diligence study also included the Mohammed Enterprises Tanzania Limited (METL) Sisal Estates. In general, Sisal processing discards about 96% of the biomass as waste materials (figure 5). These wastes are mostly disposed of by burning or dumping on site, posing environmental hazards and contributing to GHG emissions. The sisal leaf decortication wastes can be used for methane production and subsequent electricity generation. It was found that, although the biogas production is limited by fibrous nature of waste and high C:N ratio, the biogas yield from decortication waste can be improved by waste pre-treatment by fungi.



Figure 5: Wastes generated from sisal fibre processing in METL

The Feasibility study conducted in December 2013, found that with the biogas generated from sisal wastes, around 1,238 kW of electricity can be generated as presented in table 3.

Table 3: METL WTE power generation potential

Estate name	Waste generation (t/year)	Biogas production (m³/year)	Power generation (kWh/year)	Power plant capacity (kW)
Mazinde	43,200	2,332,800	4,339,008	495
Mjesani	20,160	1,088,640	2,024,870	231
Hassani	23,040	1,244,160	2,314,138	264
Husseni	21,600	1,166,400	2,169,504	248
TOTAL	108,000	5,832,000	10,847,520	1,238

The factories are mainly located in the grid connected areas and only one village is not grid connected. However, all the four factories have backup generators to run the factory when the grid electricity is not available. The electricity load includes factory operations, social services, health facility, schools, staff houses and water pumping near the estates, which are at present powered by unreliable grid. Studies in these factories show that diesel electricity supplements the grid electricity at 20 to 60% each month, depending upon the grid electricity availability.

With the available wastes, it is possible to generate the power in each factory which will be useful for running the plants along with the possibility of supplying power to the surrounding communities, including staff houses. In the absence of the project, the sisal wastes dumping would be continued or burnt on-site without any economical usage, thus posing significant environmental hazards.

Masasi Food Industries

Masasi food industries is a food processing plant located in Kibaha, Coast Region processing fruits and vegetables for export and producing products like jams, pickles, ketchup, etc. At the moment, the factory generates around 1,000 kg of wet waste (bio degradable) per day. They are currently disposing the waste in a nearby pond which causes environmental pollution, odour, and related health hazards. Additional fruit and vegetable leftovers at the nearby town markets located at Picha ya Ndege and Kibaha town area, or cow manure from Kibaha Education Centre are also available.

Average electricity consumption in the factory is estimated to be around 4,000 kWh per day. Discussions with the owners of the factory suggest that they experience frequent interruption in grid electricity supply and are thus compelled to run their diesel generators. Owing to this, diesel generators power the factory for 20% of its operational time.

Feasibility study conducted by UNIDO during December 2013, estimated the potential capacity of the proposed biogas power plant as 150 kW. The estimated potential is based on the current factory production levels and possible additions from the nearby feedstock sources. This power generation would cover a part of the factory electricity requirements. Once the factory operates under its full capacity, the production levels will be high and the electricity potential from biogas may be increased.

The list of proposed demonstration sites, their estimated capacity and the technology to be used are summarised in the table 4.

Table 4: List of demonstration projects

S. No.	Name of the industry	Technology	No of plants	Total Capacity (kW)	End-user of electricity
1.	NARCO	Biogas	2	1,054	Own power requirements. Excess power export to grid
2.	METL ³⁷	Biogas	4	1,238	Own power requirements. Excess power export to grid
3.	Zanzibar Sugar Factory	Cogeneration	1	4,000	Own power requirements. Excess power export to grid
4.	Zanzibar Ethanol Factory	Biogas	1	400	Own power requirements. Excess power export to grid
5.	Masasi Food Industries	Biogas	1	150	Own power requirements. Excess power export to grid
		Total	9	6,842	

Efficient biogas and gas engine technology are not available in Tanzania. Hence, they have to be imported. Similarly for the sugar factory, efficient cogeneration system is not locally available and has to be imported. Therefore, as a result of the demonstration projects, there will be technology transfer to Tanzania. The GEF project will provide technical assistance in sourcing and preparing specifications etc., of technologies through UNIDO procurement services. However, the equipment purchase will be done by adhering to UNIDO's procurement services and rules.

These demonstration plants will meet the electricity needs of the agro-industries apart from supplying excess electricity to the grid. A number of technology know-how workshops and plant visits will also be conducted under this component. Socio-economic baseline analysis for the community level will be conducted for the demonstration projects. An impact assessment study at the end will also be carried. These studies will be conducted using GEF grant. The demonstration project owners will provide necessary support and cooperating for the conduct of these studies.

Baseline of the demonstration projects

Baseline of the demonstration projects are summarized in table 5. It has to be noted that these demonstration projects will follow international competitive bidding practice and other standards in selecting and contracting of the equipment supplier. This would also include agreement on supply of spare parts for the O&M of WTE plants for at least 2 years. The equipment supplier would either supply or suggest ways of procuring the spare parts.

Table 5: Baseline of demonstration projects

S. No.	Name of the industry	Baseline	
		Waste	Electricity ³⁸
1.	NARCO (cow dung + abattoir waste)	Unused	Grid / Diesel

³⁷ Combined capacity for group of biogas plants at 4 sisal factories of METL group

³⁸ Grid electricity is highly unreliable and often supplemented by diesel generators.

S. No.	Name of the industry	Baseline	
		Waste	Electricity ³⁸
2.	METL (sisal waste)	Unused	Grid / Diesel
3.	Zanzibar Sugar factory (bagasse)	Used in the existing plant inefficiently	From old cogeneration plant
4.	Zanzibar Sugar and ethanol plant factory (waste water)	Effluent not managed properly	From old cogeneration plant
5.	Masasi Food Industries (food waste and other nearby wastes)	Unused	Grid / Diesel

Impact of the intervention

The expected output and outcome of this component will mitigate the following barriers:

Barriers/Challenges	How it is addressed
Inadequate financing/private sector investment in WTE	Increased investments from private sector
Lack of information sharing on existing projects	Biogas and biomass demonstration projects implemented and operating. Information sharing through site visits and workshops.
Inadequate local technical capacity for sustainable operation and maintenance	Training to: <ul style="list-style-type: none"> • Local engineering companies • Local O&M companies/institutions
High costs of installing the systems	Successful demonstration will lead to: <ul style="list-style-type: none"> • Replication of the technology which will induce competition in the market. • Transfer of technology which will reduce the project cost.

PC 3: Creation of favorable investment environment

During the PPG stage, minor modifications have been made in PC 3 to reflect the project context. Throughout the PIF stage, it was envisaged that a revolving fund mechanism will be established to facilitate demonstration and replication projects emanating from this GEF intervention. However, during the PPG stage, it was found that a mechanism combining an incentive system for the demonstration sites committed in the CEO Endorsement using GEF grant and a soft loan facility for replication projects using co-financing will be the more effective and sustainable option taking into consideration the comparative advantages of UNIDO as an implementing agency.

Accordingly, the proposed incentive scheme and soft loan facility will be established and managed under the Rural Energy Agency (REA), which is mandated to manage energy related funds in Tanzania. All participating industries included in the project document will be eligible for incentives based on the incrementality principle of the GEF. All

other industries planning to adopt WTE technologies will be eligible for soft loan facility and the modalities will be developed together with REA during the implementation period.

In addition, a separate output on gap-analysis on policy requirements to ensure long-term update of the WTE technology, is added under PC 3. Also this component was considered as PC 2 in PIF. The revised and earlier outputs under this component are given in table 6:

Table 6: Changes in project outputs under project component 3

Project component	Outputs mentioned in PIF	Outputs mentioned in CEO
Component 3: Creation of favorable investment environment	2.1. Revolving fund mechanism established for WTE technologies under REA	3.1. Gap analysis on policy requirements conducted
		3.2. Incentive and soft loan facilities designed
	2.2. Revolving fund established and operated	3.3. Incentive scheme established under REA for investors of WTE projects
		3.4. Soft loan facility established under REA for investors of WTE projects

Under this component, the project aims to create the following:

- a) Without appropriate supporting policy and regulatory environment, no technology promotion can be achieved and the long-term uptake of this technology cannot be guaranteed.

To ensure that proper policies are available to support WTE on the long term, a separate output on gap analysis on existing policies will be included under PC 3 (Creation of favourable investment environment). Based on the gap analysis, required policies necessary for long term uptake of the technology shall be taken. Linkages would be created between policy advocacy groups and the government. This shall identify the problems that may potentially make their way onto the public policy.

Recommendations would be given regarding the policies to be brought in to bridge the gap for WTE technology penetration.

- b) GEF allocation of USD 3,382,436 will be reserved as an incentive scheme using the principles of incremental cost for supporting private investments in WTE projects directly participating in the project. Installed capacity based incentives would be given to the demonstration projects based on the level of investment needed. Such incentives would be disbursed on a pro-rata basis on the development in project implementation. Incentive to be allocated for each project is shown in table 7:

Table 7: Incentive allocation for each demonstration project

S. No.	Name of the industry	Capacity of demonstration plant (kW)	Project investment (USD)	Committed co-financing (USD)	GEF contribution towards technical assistance under PC 2 (USD)	GEF Incentive under PC 3 (USD)
1.	NARCO	1,054	3,162,000	2,600,000	185,000	377,000
2.	METL	1,238	3,714,904	3,000,000	284,000	430,904

S. No.	Name of the industry	Capacity of demonstration plant (kW)	Project investment (USD)	Committed co-financing (USD)	GEF contribution towards technical assistance under PC 2 (USD)	GEF Incentive under PC 3 (USD)
3.	Zanzibar Sugar Mill	4,000	8,912,000	8,000,000	370,000	1,982,000
4.	Zanzibar Ethanol Factory	400	1,440,000			
5.	Masasi Foods	150	450,000	350,000	50,000	50,000
	Total	6,842	17,678,904	13,950,000	889,000	2,839,904

The remaining, USD 542,532, will be used as grant support to developers of replication projects, depending upon their proposed installed capacities.

- c) Using respective co-financing from REA and TIB, who have prior experience in operating soft loan facilities (of World Bank³⁹), an appropriate soft loan facility at lower interest rates (compared to commercial interest rate) for around USD 9.6 million will be proposed for the benefit of developers of replication projects.

Upon CEO approval, guidelines for implementation of this soft loan facility will be developed together with REA and TIB. Around USD 120,000 of the GEF grant will be used to create the modalities and facilities of the proposed incentive/soft loan system.

In addition to the co-financing that REA and TIB are bringing in for the soft loan facility within the framework of the project, they are expected to replenish the fund on a regular basis. This will ensure sustainability of the fund flow into the facility will continue even after the project's completion, allowing for future investments in WTE technology.

The incentive scheme will be used for providing incentives to the demonstration projects to cover incremental cost. The soft loan will facilitate replication projects (please refer to foot note numbers 3 and 4). Hence, the co-financing will help achieving additional emission reduction through the replication projects. This would provide the maximum benefit of CO₂ reduction per USD spent by GEF for this project.

Since the WTE technology has not seen much market penetration in Tanzania, it is essential that the financial support is provided upfront to drive the private investments for the initial projects (that is what is done through the demonstration projects in the proposed GEF project). It is not possible to have demonstration projects without any financial support. Also, the technology and the market is not ready for WTE investments in Tanzania and hence, technology popularization cannot be done directly without demonstration projects⁴⁰.

Impact of the intervention

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

Barriers/Challenges	How it is addressed
Inadequate financing/private sector investment in WTE	<ul style="list-style-type: none"> • Creation and operation of incentives and

³⁹<http://wbcarbonfinance.org/Router.cfm?Page=Projport&ProjID=65756>

⁴⁰ Response to Canada GEF council member. Refer Annex L for the comment and the response given

Barriers/Challenges	How it is addressed
Lack of dedicated financing schemes to support WTE investments	soft loan facilities <ul style="list-style-type: none"> • Private sector benefitted from incentives and soft loan facilities

PC 4: Monitoring and Evaluation (M&E)

The project will be subjected to mid-term and final evaluations. The project will be monitored from the beginning and a mid-term evaluation will be carried out at the end of the 2nd year of the GEF project and follow up corrective actions will be taken. This evaluation will focus on various activities of the project such as the construction of the demonstration plant, assessment of the effectiveness of the trainings, establishment of I&LC, establishment of incentives and soft loan facilities, etc., carried out until the 2nd year of the project.

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 and the achievement of global environmental benefit goals. The final evaluation will also provide recommendations for follow-up activities. After completion of the demonstration project and successful operation, the project performance monitoring will be conducted to study the technical, financial, environmental and socio-economic performances of the projects. 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 dissemination tools such as leaflets, website, etc., will be used for effective dissemination.

Methodologies / tools will be developed to use the collated information for better planning and decision making. Case studies will be prepared and presented to raise more investment in WTE projects, using the trained capacity and various financing schemes that are 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 the key stakeholders and agencies. Annual reports will be submitted to GEF secretariat in the form of Project Implementation Reviews (PIRs).

Project implementation schedule is given in Annex H.

Local and national environmental benefits

In the absence of the WTE based electricity generation, the industries will continue to pollute the surroundings with the wastes generated in the process and continue to use grid electricity and diesel generators which are highly GHG intensive and emits hazardous smoke impairing the human health of the local population.

At the national level, the equivalent amount of GHG is mitigated.

Global environmental benefits

Direct benefits derive from the implementation of demonstration projects for approximately 6.8 MW cumulative capacity. Indirect benefits are obtained from the contribution of the project towards the market transformation, capacity building, institutional strengthening, technology adaptation and creating enabling environment for the investments in WTE sector.

As explained earlier in table 2, the available WTE potential in Tanzania is 667 MW. Other potentials include biogas plants in dairy, abattoirs and biomass power plants in tobacco industries.

Considering the a) human and institutional capacity development, including the establishment of information and learning centre, b) establishment of incentive and soft loan facility for WTE projects and c) establishment of demonstration projects for 6.8 MW (biomass and biogas technologies), it is conservatively assumed that at least 15 MW of WTE based plants will be replicated in agro-industries all over the country within a period of 10 years after the closure of the project. This will reduce the CO₂ emissions considerably and improve the energy supply situation in Tanzania.

Baseline for all the demonstration projects:

- Grid electricity⁴¹ is taken as the baseline (emission factor of 0.5290 t CO₂/MWh is considered)⁴²
- Although the cogeneration plant has a lifetime of more than 20 years, conservatively, it is taken as 15 years for the sake of consistency with the other demonstration projects.

Overall emission reduction from the demonstration projects are estimated based on “Manual for Calculating GHG Benefits of GEF Projects: Energy Efficiency and Renewable Energy Projects”⁴³. The overall emission reduction potential from the demonstration projects is presented in table 8.

Table 8: Emission reduction potential in demonstration projects

S. No.	Name of the industry	Type of plant	Demonstration Capacity (kWe)	Annual electricity generation (MWh/year)	Annual CO ₂ e reduction
1.	NARCO	Biogas generator	1,054	7,180	3,798
2.	METL	Biogas generator	1,238	9,174	4,853
3.	Zanzibar Sugar Factory ⁴⁴	Cogeneration plant	4,000	21,315	11,276
4.	Zanzibar Ethanol Factory	Biogas generator	400	2,666	1,410
5.	Masasi Foods Industries	Biogas generator	150	1,112	588
		Total	6,842	41,446	21,925

Note: Capacity and annual electricity generation figures are taken from the respective feasibility study reports.

WTE based electricity system (6.8 MW) will reduce a cumulative of 328,877 tCO₂e directly and 725,464 t CO₂e indirectly (15 MW replication projects) throughout the project lifetime of 15 years.

The emission reduction benefits from the proposed project are summarized in table 9.

Table 9: Emission reduction benefits of proposed project

S. No.	Type of benefit	Emission Reduction (t CO ₂ e)
1.	Direct reduction	328,877

⁴¹ Even though, diesel generators are considered for incremental cost calculations, conservatively, only grid emission factor is considered for estimating the avoided GHG emissions as the demonstration plants are connected to grid. It has to be noted that the grid electricity availability is unreliable and it is a must that the industries have sufficient diesel generators to meet their electricity demand.

⁴² <http://www.iges.or.jp/en/cdm/report.html> (IGES)

⁴³ https://www.thegef.org/gef/sites/thegef.org/files/documents/C.33.Inf_18%20Climate%20Manual.pdf

⁴⁴ Considering milling (240 days) and off-season (90 days) and deducting 1.2 MW generated by existing cogeneration system

2.	Indirect reduction	725,464
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The increment of the project:

Under PC 1, the GEF funding would be used for establishing I&LC to strengthen the existing human and institutional capacity in technologies involving WTE. Under PC 2, a part of the incremental cost of demonstrating the benefits of WTE instead of carbon intensive technologies is funded from GEF resources. Under PC 3, the GEF funding will be used mainly for the incremental element in creating the soft loan and capacity based incentive scheme. As such, this will build confidence among investors and attract more investments. Under PC 4, the GEF resources will be used for funding the incremental cost of monitoring and independently evaluating the demonstration projects as well as other project components to ensure that the global environmental benefit objectives of the project are met.

Incremental cost for the demonstration plants has been revised. It is arrived based on the following findings:

- There is a wide gap existing in the country between the electricity demand and supply
- Electricity supply to industries is often unreliable and industries resort to the diesel generator as backup power source
- Industries (including the industries where demonstration plants are coming up) operate at lower capacity and lower operating hours due to lack of grid electricity availability
- Increased electricity demands will have to be met out by diesel generator electricity
- The demonstrating industries have the required biomass/biowastes necessary to develop and operate WTE plants. Very few biogas/biomass plants exist in Tanzania. Only with the involvement of GEF/UNIDO, the demonstration plant owners have come forward to invest in a technology which is new to them. If this 6.8 MW electricity is not developed by these proposed demonstration plants, then an equivalent amount would be generated using diesel in some other industries in Tanzania. Thus it is clear that the demonstration plants will displace equivalent amount of electricity that would be generated from diesel generators in some other industries of Tanzania.
- Investment on diesel generators is considered as the baseline cost

The table 10 shows the incremental cost for each demonstration plant⁴⁵.

Table 10: Incremental cost of demonstration plants

S. No.	Name of the industry	Capacity of demonstration plant (kW)	Baseline investment (USD) ⁴⁶	Project investment (USD)	Incremental cost (USD)
1.	NARCO	1,054	330,000	3,162,000	2,832,000
2.	METL	1,238	390,000	3,714,904	3,324,904
3.	Zanzibar Sugar Mill	4,000	950,000	8,912,000	7,962,000
4.	Zanzibar ethanol factory	400	120,000	1,440,000	1,320,000
5.	Masasi Foods	150	65,000	450,000	385,000

⁴⁵ For project activity technology and capacity, please refer the earlier table

⁴⁶ Diesel generator costs are derived based on existing installations in industries of Zanzibar and Mainland Tanzania. Data on existing diesel generators were collected by UNIDO national staff, Tanzania through communication with the industries.

S. No.	Name of the industry	Capacity of demonstration plant (kW)	Baseline investment (USD) ⁴⁶	Project investment (USD)	Incremental cost (USD)
	Total	6,842	1,855,000	17,678,904	15,823,904

In the absence of the GEF intervention, the industries will continue to follow the existing practice. NARCO, MASASI, and METL will continue to use the grid electricity or diesel generators for their electricity requirement. Zanzibar sugar factory will not invest in modern cogeneration plant and hence, will not export excess electricity to the grid. Therefore, Zanzibar Island will continue to depend upon the electricity from Tanzanian mainland.

In general, if this 6.8 MW electricity is not developed by these proposed demonstration plants, then, an equivalent amount would be generated using diesel in some other industries in Tanzania. This is the baseline. None of the industries has the capacity to develop WTE power plants on its own without the technical and financial support the proposed project provides.

Only with the involvement of GEF grant and UNIDO support, these industries have now shown interest in developing the WTE plants.

Out of the above incremental cost, GEF will bear a cost of USD 3,628,904 which is only about 22.9% of the total estimated incremental cost. The sources and uses of fund for the above incremental cost will be amounted as in table 11.

Table 11: Sources and uses of fund for project investment

S. No.	Sources of fund (referred from Part I, section B. Framework)	USD
1.	Co-financing from demonstration plant owners	13,950,000
2.	GEF grant from project component 3	889,000
3.	Incentive from GEF grant under project component 2 ⁴⁷	2,839,904
	Total available funds for demonstration projects	17,678,904

The total GEF resources of around USD 5.3 million are used to mitigate CO₂ emissions at a rate of USD 16/t CO₂ directly and around USD 7.3/t CO₂ indirectly. “USD/t of CO₂ analysis” does not indicate the cost efficiency of demonstration and replication projects. On the other hand, it reflects the effectiveness of each USD spent as GEF grant. GEF grant will directly result in 6.8 MW demonstration projects. In addition, through various other activities carried out under the project such as capacity building, soft loan facility and successful demonstration of the technology, it is expected that WTE projects will be replicated for at least 15 MW cumulative capacity, within a period of 10 years after the closure of the project. Hence, the emission reductions achieved indirectly through the replication projects is higher than those directly achieved through the demonstration projects.

GHG emission reductions have been calculated based on the avoidance/replacement of grid electricity by captive electricity generation and export of excess electricity (after captive usage). The total GEF resources of around USD 5.3 million are used to mitigate CO₂ emissions at a rate of USD 16/t CO₂ directly and around USD 7.3/t CO₂ indirectly. Cost efficiency for replications projects is less because of the fact the assumption that proposed project will help in replication of at least 15 MW WTE projects (as compared to 6.8 MW WTE demonstration projects). Due to the higher

⁴⁷ Excess incentive (USD 542,532) from GEF grant under project component 2 will be used for replication projects.

capacity of replication projects and consequent higher emission reductions, USD/t of CO₂ reduced for replication projects is less, as compared to the demonstration projects⁴⁸.

The table 12 shows the scenario before and after the project. It indicates the increment of the project. This increment can be practically realized to the fullest extent only with the GEF/UNIDO intervention. In the absence of the GEF project, the existing scenario would have improved only to the smallest extent which may have included a few WTE projects. But these efforts without any proper planning for sustainability and replicability would not have an impact similar to that of the proposed GEF project. The proposed demonstration projects are designed not only to demonstrate the viability of WTE technologies, but also to provide a framework for replication in other parts of Tanzania.

Table 12: Pre and Post Project Scenarios

Scenario before the project	Scenario after the project
Low human and institutional capacity on biomass and biogas technologies.	Improved human and institutional capacity.
Low level of confidence in WTE (biomass and biogas) investments.	Improved investor confidence in WTE projects.
No I&LC for WTE technologies.	I&LC on WTE technologies created at CoET, UDSM.
Low or no use of solid and liquid wastes generated in agro- industries, affecting environment	Waste management by WTE based electricity generation.
Usage of diesel for electricity needs.	Replacement of diesel electricity with WTE electricity. It is expected that 6.8 MW of electricity from the demonstration projects will reduce the diesel usage by approximately 1 million litres/year ⁴⁹ . Also through replication projects for a cumulative 15 MWe capacity, approximately 2.2 million litres/year of diesel will be avoided.

Innovation

The project proposes an innovative solution for the twin problems of lack of electricity and waste management by way of WTE based electricity generation. Also, this project provides an innovative approach in solving the electricity problem of the Zanzibar Island through electricity generation at Zanzibar sugar and ethanol factory. This project will have a significant impact on the electricity requirements of the Zanzibar Island, which currently depends heavily on the Tanzanian mainland for its electricity requirements. The excess power from the Zanzibar Sugar factory will be exported to the grid for utilization by the local communities in the island.

The proposed project will boost similar industries and will also enable investment environment and strengthen human and institutional capacities.

Sustainability

The capacity development activities at the proposed I&LC would be sustained through the following:

⁴⁸ Response to Germany GEF council member. Refer Annex L for the comment and the response given.

⁴⁹ Excluding the 4 MW cogeneration project and 400 kW waste water project, the rest of the agro-industries supplement grid electricity with diesel electricity for their operations. Diesel generator usage varies from 20-60% of the factory electricity requirements.

- A nominal fee would be charged for the training activities. This amount would be used to manage and maintain the activities of the centre sustainably.
- Well trained university / institution staff members of UDSM would be managing I&LC and hence, there would be no additional man-power cost.

The above arrangement will ensure the sustainability of capacity development even after the GEF project ends. Capacities of MEM, REA, etc., will be built throughout the duration of the project implementation. By this way, the sustainability of the methodologies, introduced by the project, would be realized and the dissemination of the project's results to a wider range of users fulfilled.

Each demonstration project will be operated and maintained by the private investor through their own operation and maintenance (O&M) staff. Local engineering and O&M companies will be trained in O&M of WTE plants through I&LC. Also, the O&M staff of the demonstration projects will be trained by the respective suppliers. Through such arrangements, the demonstration projects will continue to operate sustainably after the project implementation is over.

Scaling up

WTE technologies will be scaled up, as a result of the following:

- Successful implementation and operation of the demonstration projects: *This will lead to a boost in confidence among similar industries and private investors.*
- Incentive scheme established under REA for investors of WTE projects: *Replication projects (not receiving soft loans) can get benefit through this facility.*
- Soft loan facility for around USD 9.6 Million: *Replication projects can utilize the loan under this facility.*

The proposed demonstration projects are designed not only to demonstrate the viability of WTE technologies, but also to provide a framework for replication in other parts of Tanzania.

The project mitigates various barriers which currently prevents the scaling up of WTE technologies. Barriers and mitigation measures have been described above.

A.6 Risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and measures that address these risks⁵⁰:

Component	Risk	Proposed Mitigation Measure	Risk Level
Technical risks	WTE technologies are relatively new in the country and there is lack of technical expertise for development and implementation of such projects.	Detailed techno-economic feasibility studies will be carried out. The technical personnel in the industries will be trained on deployment of RE in industrial settings. Capacity of the government officials and relevant institutions will be built.	Moderate
Market risks	No off-takers for the generated electricity.	The demand supply gap is very high in rural Tanzania.	Low

⁵⁰For questions A.1 –A.7 in Part II, if there are no changes since PIF and if not specifically requested in the review sheet at PIF stage, then no need to respond, please enter “NA” after the respective question

Component	Risk	Proposed Mitigation Measure	Risk Level
Financing risks	General perception that investments in WTE technology based plants does not provide enough (high) returns and hence the investors are not willing to invest.	Revolving fund will be established at REA for supporting WTE financing investments. Partnerships will be developed among commercial banks, investors and financial institutions. Increased awareness, knowledge and experiences created by successful operation of the demonstration plants is expected to enhance the stakeholders' participation.	Moderate
Sustainability risk	Application of WTE technologies in agro-industries might be halted by the shortage of inputs.	The installations will be done only after a proper resource assessment study is done in order to ensure the supply of wastes from agro-industries.	Low
	Lack of human capacity to operate the demonstration projects.	All the demonstration projects O&M staffs will be trained by the respective suppliers. Moreover, under the project, there will be several trainings on successful operation and maintenance of biomass and biogas projects. In addition to this, an information/learning centre will be established for continuous capacity building activities. All these would sustain the objectives of the proposed project.	Low
Implementation risk	Failure to implement the project.	The project will be implemented in close cooperation with in-country project partners, stakeholders and developers. Agreed and transparent modus operandi will be defined before the start of the project implementation. UNIDO have enough experience to mitigate this risk.	Low
Operation risk	Demonstration plants face operational problem due to lack of training to the operators.	Capacity building at all levels is included in the project which will mitigate this risk.	Low
Co-financing risk	Co-financing not being committed by the co-financiers.	Letter of commitment will be obtained from the co-financiers to ensure their financing for the project.	Moderate
Climate change risks	Tanzania's electricity mix greatly depends on hydropower (presently 35%, down from over 50%). Due to the changing weather patterns which significantly affect the energy sector, hydropower is highly vulnerable to weather conditions and climate	Utilization of wastes for electricity generation will reduce the dependency on hydropower.	Not applicable

Component	Risk	Proposed Mitigation Measure	Risk Level
	changes.		

A.7 Coordination with other relevant GEF financed initiatives

Since the PIF, there has been no change in the original project design. Hence, the section presented in PIF is not elaborated further. In addition to the relevant GEF initiatives, other donor initiatives are also presented in the CEO document.

Other donor projects

European Union

The European Union (EU) supported the preparation of a Biomass Energy Strategy (BEST) in the period between March 2012 and June 2013. The objective of the assignment is to assist the Government of Tanzania in developing a national BEST that will identify the means of (i) ensuring a more sustainable supply of biomass energy, (ii) increasing the efficiency with which biomass energy is produced and utilized, (iii) promoting access to appropriate and affordable alternative energy sources and (iv) ensuring an enabling institutional environment for implementation.

In working towards these objectives, BEST will aim to identify and work with institutional drivers for change and reform, while bearing in mind that previous efforts aimed at policy change in the field of biomass energy have had limited success⁵¹. The proposed GEF project will closely work with BEST to create a significant impact in the biomass sector.

The Government of Tanzania intends to focus the proposed scaling-up renewable energy programme (SREP) Tanzania project on the first two priorities, i.e. a) Geo-thermal power development and b) Renewable energy for rural electrification. If and only additional SREP resources are forthcoming, such resources will be used to implement the BEST⁵². However, so far no major budget allocation has been made towards BEST.

The Netherlands through SNV

Centre for Agricultural Mechanization and Rural Technology (CAMARTEC), Tanzania is implementing a four year (2009-2013) countrywide biogas program, supported by the Netherlands Government, with a target of constructing 12,000 biogas digesters of different sizes for cooking, lighting and electricity production. The project covers households and institutions. Till the end of December 2012, the program has constructed 4,000 digesters.

This program, however, mainly involved implementation of small scale digesters at the household level. The lessons learnt from this biogas program will be utilized for the proposed GEF project in going a step further to medium and large scale farms and agro industries.

As indicated in the PIF, the proposed project will seek synergy with the GEF projects and other UNIDO projects. The project will supplement the efforts of related GEF financed initiatives to achieve the global GHG emission reduction.

B. Additional information not addressed at PIF stage

B.1 Describe how the stakeholders will be engaged in project implementation

⁵¹ <http://www.euei-pdf.org/country-studies/biomass-energy-strategy-best-tanzania>

⁵² Scaling-up renewable energy programme (SREP) investment plan for Tanzania, April 2013

The proposed GEF project implementation arrangement is given below:

Implementing Agency

UNIDO is the only GEF Implementing Agency involved in this project and no specific arrangement with other GEF Agencies is sought.

Executing Agencies

Ministry of Energy and Minerals (MEM) and Rural Energy Agency (REA) will be the two main executing agencies coordinating with UNIDO.

Other partners include College of Engineering and Technology (CoET) and Tanzanian Investment Bank (TIB).

Project Implementation Arrangement

The project will be implemented by UNIDO which is responsible in the achievement of the expected outcome, in collaboration with MEM, REA, CoET, TIB and related government departments and ministries.

Ministry of Energy and Minerals (MEM)

MEM, as a government ministry responsible for energy development matters will assist in creating an enabling environment for the project execution and scaling up WTE potential by advocating the right policies, programs and strategies. MEM will also be responsible for incorporating project activities in the government annual budgetary allocations so that the project financing can be complimented by the government budget for wide adoption of the technology and services.

Rural Energy Agency (REA)

REA is a government agency responsible for promoting the rural energy development by supporting it financially and technically. It will be the main counterpart and executing partner of the project, thereby putting in line the project deliverables within the government plans. It will be responsible for undertaking parallel activities within the project scope as part of the government contribution to the project activities. REA will be liaising between the private sector and the implementing agency, as well as executing the financial incentive system. REA will also be responsible for mobilizing finance for the soft loan facility to be established at TIB. There will be a contractual arrangement with UNIDO for creating the incentive and soft loan facility.

Other Stakeholders

Demonstration Plant Owners

The demonstration projects will result in 6.8 MWe of total installed capacity. These project promoters are responsible for mobilizing financing for investment in their plants. They will also be responsible for O&M of the plant and will operate the projects throughout their projects' life time. They will also be in charge of keeping records of the plant operations necessary for monitoring the energy generated and ultimately the GHG emission.

In addition to the above, local people and village communities, where these projects will be implemented (Dodoma, Tanga, Kilimanjaro, Coast and Zanzibar), will be participating as labor force in the project. They will also take part in the consultation of background biomass/biogas resource information. There will be contracts/MOUs between the REA/ incentive facility and the developers.

TIB

TIB is the state owned bank, which is responsible for promoting investments in the country. Under this project, TIB will be the custodian of managing the soft loan for providing financial assistance to the WTE project developers. In

collaboration with REA, TIB will participate in screening the projects and issuing the loans. It will also participate in monitoring the project's performance and assist the project developers along the line of project implementation. There will be an MOU between REA and TIB.

UDSM

UDSM is the oldest public academic institution in Tanzania established in the early seventies. UDSM, through its institution, CoET has established an NECE. This project will contribute to the incremental costs in realizing the implementation of I&LC within the institution under NECE. CoET will be responsible for hosting and running the I&LC, which in return will be responsible for capacity building and advocating promotion and development of energy from agro-industries. UDSM will also allocate human and material resources for running I&LC sustainably. There will be contractual arrangement between UNIDO and UDSM.

Others

Other RE/technical institutions, financing institutions will be recipients of training on WTE technologies. This would encourage them to support development of WTE projects

UNIDO

UNIDO will be specifically responsible for:

- Monitoring;
- Reporting on the project performance to the GEF;
- Procuring the international expertise needed for delivering the planned output under the four project components;
- Approving the national experts participating for delivering the planned output under the three project components;
- Approving the selected industries for the demonstration projects;
- Approving the selected equipment suppliers for the demonstration projects;
- Managing, supervising and monitoring the work of the international teams and ensuring that the deliverables are technically sound and consistent with the project requirements.
- All minor amendments for full sized projects that are proposed after a project has been approved by the CEO will be undertaken at the discretion of UNIDO and reported to the GEF Secretariat as part of the annual Project Implementation Review (PIR) reports.

UNIDO will fulfill this responsibility by mobilizing services of its other technical, administrative and financial branches at UNIDO Headquarters and the UNIDO Office in Tanzania.

Project Management Unit

A Project Management Unit (PMU) will be established within the REA. PMU will also be the project steering committee secretariat. The PMU will consist of a Project Manager (PM), the Project Administrative Assistant (PAA) and technical advisors. The responsibilities of PMU will be as follows:

- Daily management of project execution;
- Coordination of all project activities carried out by the national experts and other partners;
- Day-to-day management, monitoring and evaluation of project activities as per planned project work;
- Organization of the various seminars and trainings to be carried out.

Throughout the period of project execution, the PMU will receive the necessary management and monitoring support from UNIDO and the monetary support from GEF and its counterparts.

Project Steering Committee

A Project Steering Committee (PSC) will be established consisting of all relevant stakeholders (key stakeholders including MEM, Ministry of Industry and Trade, (MOIT), REA, TIB, UDSM, private sector representatives and UNIDO) for providing strategic guidance and review of progress in project execution. It will also facilitate co-ordination among project shareholders and maintain transparency in ensuring the ownership and to support the sustainability of the project.

PSC will be responsible for:

- Strategic guidance in line with the country needs and priorities;
- Promoting partnership among stakeholders;
- Reviewing project progress reports, including inception report;
- Approval of work plan;
- Approving major changes in terms of outcome, output and budgets if any;
- Initiating remedial action to remove impediments in the progress of project activities that were not envisaged earlier.

The committee will be chaired by, Vice President’s Office, GEF Focal point (Operations). The final composition of the PSC will be defined during the project execution start-up phase. The PSC is expected to meet twice a year.

At the beginning of project execution, a detailed work plan for the entire duration of the project will be developed by UNIDO in collaboration with the PMU, Government of Tanzania and the international teams of experts. The working plan will be used as management and monitoring tool by PMU and will be reviewed and updated appropriately on a biannual basis. Figure 6 shows a diagram of the project implementation arrangement.

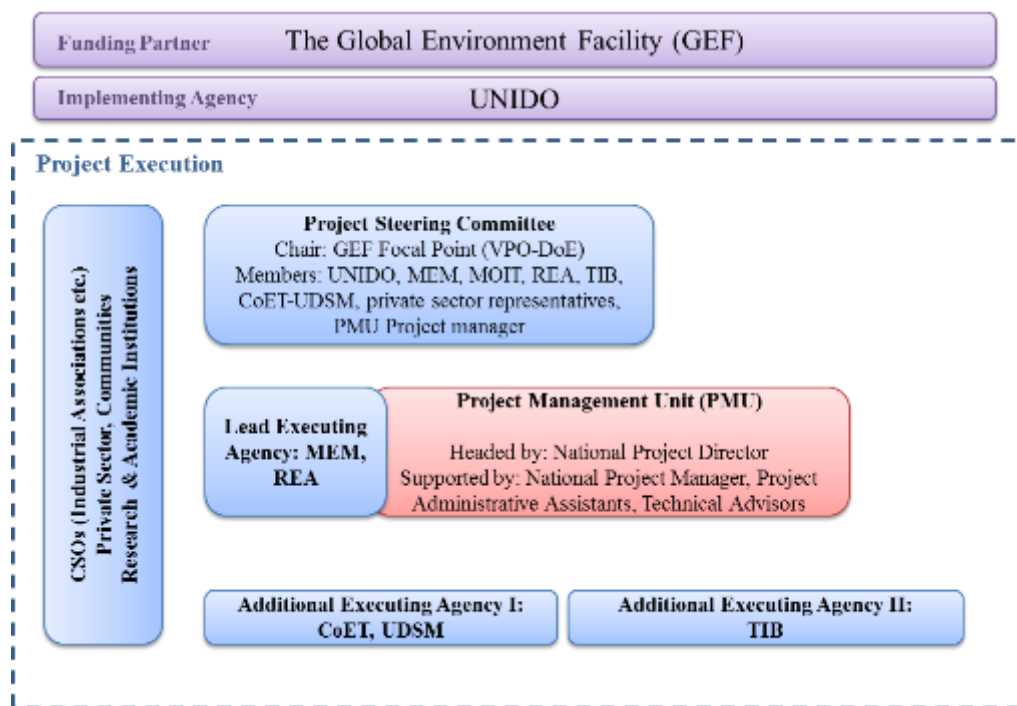


Figure 6: Diagram of project management structure

UNIDO will closely coordinate with the ongoing and planned relevant initiatives to ensure maximum synergies and the overall impact of Climate Change related technical assistance to Tanzania.

Gender Mainstreaming

Gender equality and the empowerment of women have a significant positive impact on sustained economic growth and industrial development, which are drivers of poverty reduction and social integration. The proposed project will support women staff in improving their skills and knowledge on WTE technology. All required efforts will be made by the project to enroll as many women as possible in its planned activities, both at the management and technical levels and encourage them to participate in all relevant project and decision-making activities. Eligible female candidates will be engaged as trainers and technical consultants. Terms of references (TORs) will be prepared to attract qualified applicants, preferably female experts to mainstream the gender relation in the activities of consultants and experts.

The female staff in the factories related to the proposed demonstration projects are given in the table below.

Table 13: Gender distribution

Factory	Number of workers			
	Male	Female	Total	% Female
NARCO abattoir & Ranches	50	100	150	67%
METL sisal factories	650	1000	1650	61%
Zanzibar Sugar factory	68	82	150	55%
Masasi Foods Industries	40	50	90	56%

The amount of female staff in the above factories is significantly higher when compared to their male counterparts. This indicates that the concerned industries are already well aware and will be paying importance to a maximum extent possible towards the gender mainstreaming and the proposed projects will strengthen this process.

B.2 Describe the socioeconomic benefits to be delivered by the Project at the national and local levels, including consideration of gender dimensions, and how these will support the achievement of global environment benefits (GEF Trust Fund/NPIF) or adaptation benefits (LDCF/SCCF):

The project will provide considerable socio-economic benefits to various beneficiaries both at national and the local level.

Gender Benefits

Increased access to electricity situation will improve the health services in hospitals, education services in schools, children’s study performance, reading conditions for the students during nights at home, reduce health hazards (especially eye problem), particularly to children and women who otherwise will spend many hours in poor quality lighting while doing domestic activities in the night.

Enrolment of female students in schools will be significantly increased by way of electrification in schools, public streets along with the households as a result of increased electricity availability. Reduced gender violence due to improved security during night hours and reduced women drudgery are some of other gender benefits.

Increased economic opportunities for women at home and the village are perceived to be an outcome of electrification. It will address their labour-saving and human energy needs, such as drinking water pumping, food processing like grain grinding and transport.

All the required efforts will be made by the project to enroll as many women as possible in its planned activities, both as entrepreneurs and technical staff (such as energy managers) and encourage them to participate in all the relevant project and decision-making activities.

Eligible women candidates will be involved as trainers and technical consultants. Terms of reference will be prepared to encourage qualified women applicants and experts, to mainstream the gender relation in the proposed project. Moreover, women will also be encouraged to participate as trainees in various capacity building sessions. This project will promote women's participation and leadership in energy institutions at national and local level and support women's role as energy managers.

Socioeconomic benefits at national level

Through this GEF project, the use of diesel based systems for electricity generation will be considerably reduced. This will ensure the reduction in the import of diesel and savings in foreign exchange for the country. Hence, the level of the vulnerability to the fluctuation of global oil price is also reduced.

Socioeconomic benefits at local level

The local benefits of this project includes: (1) access to clean and reliable energy for the industries and population around them; (2) improved waste management leading to better environment; (3) additional income to the agro-industries through generation of own electricity and savings from the reduced use of diesel generator (4) increased electricity access and thereby improved living quality, health and education of the nearby community of the power plant sites. Also 170 jobs will be created in various cadres as a result of the demonstration projects. Additional details are given in Appendix J.

Indirectly these demonstration projects can assist other people to get grid power thereby reducing the burden to the grid which at the moment cannot serve the available demand in the country. Also here are a good number of food processing activities in the country which when mobilized can be a good source of power generation utilizing the wastes that is currently not economically used. The power to be generated can reduce the burden of the grid power and thus release the scarce electricity available at the moment to other equally important productive sectors including rural electrification in general. These ensure the economic feasibility of the demonstration projects. These are explained in the attached feasibility studies.

B.3. Explain how cost-effectiveness is reflected in the project design

Other possible RE technologies that can be implemented in Tanzania for improving the electricity scenario includes wind, solar, hydro, geothermal, etc. However, these technologies will not solve the waste management issues faced in agro industries. Under such context, the only attractive alternative RE choice is biomass and biogas, which solves both the electricity generation through clean sources and cost effective waste management.

The project is considered to be a cost effective intervention for GEF due to the CO₂ emission reduction potential from enhanced use of WTE technologies. For a GEF contribution of USD 5.277 million, this project will directly result in 6.8 MW additional installed capacity based on biomass and biogas technologies. More importantly, the project is expected to result in the replication of several similar WTE projects for a cumulative 15 MW capacity thus making it a high impact GEF intervention. The pilot plants established by the project will increase the local capacity in such a way that the future interventions will be increasingly cost effective.

The project is expected to save a cumulative direct GHG emission of 328,877 t CO₂e and an indirect GHG emission of 725,464 t CO₂e.

C. Describe the budgeted M & E plan

Project monitoring and evaluation (M&E) will be conducted in accordance with established UNIDO and GEF procedures. The M&E activities are defined by Project component 4 and the concrete activities for M&E are specified

and budgeted in the M&E plan. Monitoring of the project will be based on indicators (for project component 1, 2 and 3) defined in the strategic results framework given in Annex A (which details the means of verification) and the annual work plans. Monitoring and Evaluation will make use of the GEF Tracking Tool, which will be submitted to the GEF Secretariat three times during the duration of the project: at CEO Endorsement, at mid-term, and at closure.

UNIDO as the Implementing Agency will involve the GEF Operational Focal Point and project stakeholders at all stages of project monitoring and evaluation activities 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, reports and other documentation related to the project; and (ii) facilitate interviews with staff involved in the project activities.

The overall objective of the M&E process is to ensure successful and quality implementation of the project by: i) tracking and reviewing the execution of project activities; ii) taking early corrective action if performance deviates significantly from the original plans; and iii) adjusting and updating project strategy and implementation plan to reflect possible changes on the ground results achieved and the corrective actions taken.

a. Monitoring

A detailed monitoring plan for tracking and reporting on project time-bound milestones and accomplishments will be prepared by UNIDO in collaboration with the established Project Management Unit (PMU) and project partners at the beginning of project implementation and then will be updated periodically. Monitoring activities will be carried out on the basis of the periodic reports developed by the PMU with the frequency aligning to the quarterly reports.

By making reference to the impact and performance indicators defined in the Project Results Framework, the monitoring plan will track, report and review the WTE project activities and accomplishments in relation to:

- a. Implementation
- b. Operation and effectiveness of I&LC
- c. Conduct of various capacity building trainings and their usefulness
- d. Level of awareness and technical capacity of relevant institutions in the market and within agro-industries
- e. Implementation of incentive and soft loan facility, its operation and impacts on project implementation
- f. Replication potential of similar projects elsewhere in Tanzania
- g. CO₂ emission reduction resulting from the implemented projects
- h. CO₂ emission reduction potential from other replication projects
- i. Effectiveness and usefulness of the dissemination activities such as trainings, seminars, site visits, performance reports, project website, leaflets, etc.

b. Reporting

PMU will present a report to UNIDO every six months with detailed information on the progress of the project as per the annual implementation plan and activities that have been carried out during the period of each report. An annual report shall be submitted by PMU at the end of each project cycle year with a summary of activities carried out over the year and will be the basis of Project Implementation Review (PIRs). The annual report will also cover the benefits gained and impacts made on the implementation of the project. In addition, the report will include the evidence to demonstrate the progress made in the achievement of the indicators highlighted in the Logical Framework.

c. Evaluation

The project will be subjected to mid-term and final evaluations. The project will be monitored from the beginning and a mid-term evaluation will be carried out at the end of the 2nd year of the GEF project and follow up corrective actions

will be taken. This evaluation will focus on various activities of the project such as the construction of the demonstration plant, assessment of the effectiveness of the trainings, establishment of I&LC, establishment of incentives and soft loan facilities, etc. carried out until the 2nd year of the project.

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 and the achievement of global environmental benefit goals. The final evaluation will also provide recommendations for follow-up activities.

According to the Monitoring and Evaluation policy of the GEF and UNIDO, follow-up studies like Country Portfolio Evaluations and Thematic Evaluations will also be initiated and conducted. All project partners and contractors will be 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.

The table 14 provides the tentative budget summary for the total evaluation, which has been included in Project Component 4.

Table 14: GEF M&E budget

Activity	GEF (USD)	Responsible party
Monitoring of project impact indicators	26,000	<ul style="list-style-type: none"> • Independent M&E expert to provide feedback to PMU • PMU will submit inputs for consolidation and approval by PSC • PSC submits final inputs / reports to UNIDO PM
Measurement of GEF tracking tool specific indicators		
Mid-term evaluation		
Periodic Monitoring Reports (will be completed through co-financing resources)	0	
Final evaluation	34,000	Independent M&E expert for submission to UNIDO PM
Total	60,000	

Legal Context

The Government of the United Republic of Tanzania agrees to apply to the present project, mutatis mutandis, the provisions of the Standard Basic Assistance Agreement between the United Nations Development Programme and the Government, signed and entered into force on 30 May 1978.


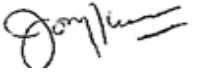
PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)

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 form. For SGP, use this [OFP endorsement letter](#)).

NAME	POSITION	MINISTRY	DATE (MM/dd/yyyy)
Dr. Julius Ningu	GEF Operational Focal Point	Vice President's Office	08/17/2012

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 CEO endorsement/approval of project.

Agency Coordinator, Agency Name	Signature	Date (Month, day, year)	Project Contact Person	Telephone	Email Address
Mr. Philippe R. Scholtès, Managing Director, Programme Development and Technical Cooperation Division - PTC, UNIDO-GEF Focal Point		11/18/2014	Jossy Thomas, Project Manager, PTC/ECC/RRE	+43 - 1 - 26026- 3727	j.thomas@unido.org 

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).

Project Narrative		Objectively verifiable indicators				
		Indicator	Baseline	Target (quantified and time-bound)	Source of verification	Risks and Assumptions
Goal	Increased installation of WTE plants for energy use in agro-industries and emission reduction	<ol style="list-style-type: none"> 1. MWs of WTE plants installed in agro-industries 2. tCO₂ emission reduced 	<ol style="list-style-type: none"> 1. Agro-industries depend upon either grid electricity/heavy oil fired plants or diesel generators 2. Around 2.3 million tCO₂e emission from agro-industries 	<ol style="list-style-type: none"> 1. At least 4 investors invest in WTE plants for a cumulative 6.8 MW capacity 2. Replication plants for at least 15 MW capacity⁵³ 3. Achieve 328,877 t CO₂e of emission reduction directly (through demonstration plants) 4. Achieve 725,464 t CO₂e of emission reduction indirectly (through replication plants) 	<ol style="list-style-type: none"> 1. Physical verification of the WTE plants 2. End of project M&E report 	Support from Government and private investors
Objective of the project	To promote investments in WTE technologies for energy generation in agro processing industries	USD investment in WTE technologies	Low level of investments in WTE technologies	At least approximately USD 14.1 million investment in 6.8 MW WTE projects	<ol style="list-style-type: none"> 1. REA reports 2. End of project M&E report 	Support from Governments, REA, TIB, and private investors
Outcome 1	Improved awareness, knowledge and capacity on WTE technologies in	<ol style="list-style-type: none"> 1. Creation and operation of the special centre for improving the 	Insufficient human and institutional capacity to develop WTE projects	<ol style="list-style-type: none"> 1. Establish the I&LC within first six months from the start of the GEF 	<ol style="list-style-type: none"> 1. Physical verification of the centre 	Continuous support from Government, training participants

⁵³ Within 10 years after the end of the project project.

Project Narrative		Objectively verifiable indicators				
		Indicator	Baseline	Target (quantified and time-bound)	Source of verification	Risks and Assumptions
	Tanzania.	human and institutional capacity 2. Number of trained personnel by the centre 3. Number of women trained		project 2. Undertake capacity building activities to at least 50 ⁵⁴ beneficiaries from each group 3. To target at least 10 women participation in each group	2. USDM reports 3. Training reports 4. End of project reports	and CoET
Project Component 1: Capacity development and knowledge management						
Output 1.1	An information and learning centre (I &LC) established for WTE at the University of Dar es salaam (UDSM)	1. Business plan and annual work plans created 2. Creation and operation of the centre	Lack of one-stop technical centre on WTE	1. Business plan and annual work plan creation within first 3 months of the GEF project start 2. Creation and operation of the centre within 6 months of the GEF project start	1. Physical verification 2. Business plan and work plans - Status reports 3. End of project M&E report	Continuous support of the CoET and Government of Tanzania
Output 1.2	Capacity developed for at least 50 policy makers	1. Number of trainings organized 2. No. of key policy makers trained 3. Number of women trained	Inadequate capacity among the key policy makers	1. Conduct at least 2 trainings 2. Educate and train at least 50 policy makers on WTE potential, technology and project development	Training reports	Continuous support of the key policy makers and CoET

⁵⁴ For any training group, at least 20% women participation will be targeted.

Project Narrative		Objectively verifiable indicators				
		Indicator	Baseline	Target (quantified and time-bound)	Source of verification	Risks and Assumptions
				3. Include at least 10 women policy makers in the training		
Output 1.3	Technical capacities developed for relevant RE institutions, agro-industries and project developers (target at least 50 numbers each)	1. Number of trainings organized for different target groups 2. No. of persons trained 3. Number of women trained	Insufficient local capacity to develop, support, operate & maintain WTE plants	1. Conduct at least 2 trainings 2. Train at least 50 personnel from each of the target groups ⁵⁵ 3. Include at least 10 women for each target group	Training reports	Support of the participating ministries, agro-industries, RE/technical institutions, banks/financial institutions, CoET
Outcome 2	Increased use of WTE technologies in agro-industries	MWh of electricity from WTE technologies	Developers do not trust WTE projects due to lack of knowledge and the risks perceived.	41,446 MWh generated electricity from WTE plants are used in the agro industries ⁵⁶	1. Plant operation records 2. End of project M&E report	Sustained support of Government and private investors, banks and financial institutions
Project Component 2: Demonstration of WTE technologies						
Output 2.1	Detailed plant designs prepared for participating demonstration projects	Project progress status	Lack of plant design reports for further project development.	Detailed plant design reports for the demonstration projects	Detailed plant design reports of each demonstration plant	Sustained support from government and agro-industry owners
Output 2.2	WTE power plants established for 6.8 MW cumulative capacity	MW of installed capacity	1. Lack of demonstrable commercial WTE plants	6.8 MW WTE plants supplying electricity to agro-industries	1. Physical verification of the sites 2. End of project	Agro-industries ready to invest in WTE plants

⁵⁵ Target group involves (a) technical institutions, (b) banks, financial institutions, funding agencies, (c) agro-industries, (d) local engineering and O&M companies

⁵⁶ This may vary. The main objective is to generate electricity from these WTE plants and utilize for captive usage in industries. Any excess remaining electricity will be exported to grid. During the project stage, industry utilization and grid export will be finalized.

Project Narrative		Objectively verifiable indicators				
		Indicator	Baseline	Target (quantified and time-bound)	Source of verification	Risks and Assumptions
			2. Agro-industries depend on diesel or grid (fossil-fuel dominated based) electricity		M&E report	
Output 2.3	WTE technologies transferred to agro-industries	1. No. of technology know-how workshops conducted 2. No. of field visits to WTE plants	Agro-industries have inadequate knowledge on WTE technologies and its potentials	1. Conduct at least 2 technology know-how workshops 2. Conduct at least 2 field visits and hands-on training at WTE plants	1. Technology know-how workshop reports 2. Field visit reports 3. End of project M&E report	Sustained support from Government, willingness of agro-industries and co-operation of WTE plant owners
Outcome 3	Increased involvement of private investors in WTE projects	No. of project developers developing WTE projects	Low interest from private investors to engage in WTE plants development	1. Involve at least 4 project developers in demonstration projects 2. Install at least 9 demonstration projects for a cumulative capacity of 6.8 MW 3. Install at least 5 replication projects for a cumulative capacity of 15 MW	1. Physical verification of operating WTE plants 2. Physical verification of the plant finance documents 3. Physical verification at financing institutions / banks 4. REA reports 5. End of project report	Support of REA and interest of private investors along with the TIB
Project Component 3: Creation of favorable investment environment						
Output 3.1	Gap analysis on policy requirements conducted	Gap-analysis report	Existence of few policies to promote Renewable Energy. On the other hand, there is	One detailed gap-analysis report within first year of the GEF	Gap-analysis report	Support of RE Sustained support of Government and REA

Project Narrative		Objectively verifiable indicators				
		Indicator	Baseline	Target (quantified and time-bound)	Source of verification	Risks and Assumptions
			lack of motivation among private investors	project start		
Output 3.2	Incentive and soft loan facilities designed	<ol style="list-style-type: none"> 1. Number of incentive scheme designed 2. Number of soft loan facility designed 	Inadequate financing facilities to attract investments in WTE projects	<ol style="list-style-type: none"> 1. At least one incentive scheme designed 2. At least one soft loan facility designed 	<ol style="list-style-type: none"> 1. REA documents 2. Bank data 	Sustained support of Government and REA
Output 3.3	Incentive scheme established under REA for investors of WTE projects	USD incentives based on incremental cost principle to WTE projects	Inadequate financing facilities to attract investments in WTE projects	Establish incentive scheme with USD 3.4 million GEF grant for the demonstration and replication projects	<ol style="list-style-type: none"> 1. REA documents 2. Bank data 	Support of REA and interest of private investors along with the TIB
Output 3.4	Soft loan facility established under REA for investors of WTE projects	<ol style="list-style-type: none"> 1. USD soft loan 2. No. of private companies benefitted through the soft loan facility 	Inadequate financing facilities to attract investments in WTE projects	<ol style="list-style-type: none"> 1. USD 9.6 million soft loan established 2. At least 5 private sector initiatives benefitted under the soft loan scheme 	<ol style="list-style-type: none"> 1. REA documents 2. Bank data 	Support of REA and interest of private investors along with the TIB

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).

STAP Scientific and Technical screening of PIF:

Date of screening: October 17, 2012

S. No.	STAP Comment	Response to STAP comment
1.	<p>The key technology to be supported by the project is biogas generation. The biogas technologies for digesting agro-industrial raw materials are quite complex. STAP recommends a thorough techno-economic analysis of biogas designs for digesting the agro-industry wastes identified. The experience learned from previous biogas programs in Tanzania should be considered while designing this project, especially since many previous initiatives have not succeeded.</p>	<p>Biogas technology is a proven technology, implemented in various countries.</p> <p>The demonstration sites and the raw material involved are given below:</p> <ol style="list-style-type: none"> NARCO - cow dung (one site) + abattoir waste (second site); METL – sisal wastes; Zanzibar ethanol factory – waste water; Masasi – food processing waste along with cow manure, fruit and vegetable leftovers. <p>Feasibility studies have been conducted for the above mentioned demonstration sites. Feasibility study reports are attached in Annex E.</p> <p>In the above list, only sisal and abattoir wastes are complex. However, it has to be noted that the demonstration projects are technically facilitated by UNIDO.</p> <p>UNIDO has been in the forefront in promoting biogas for electricity generation in Tanzania.</p> <p>UNIDO has previous experience in dealing with such wastes. The proposed GEF project will be implemented based on the experiences gained by UNIDO in these projects.</p> <p>UNIDO has previously piloted three biogas systems in Zanzibar, Lindi and Kigoma, each producing 10 kW of electricity plants. The feed stocks for these plants are slaughter house waste, animal manure and market wastes as well as fish wastes.</p> <p>It also has supported the implementation of a 300 kW industrial scale sisal waste biogas power plant, Hale, Tanga.</p> <p>Major barriers cited in these programs are:</p> <ul style="list-style-type: none"> Inadequate attractive credit facilities; Inadequate technology; Inadequate awareness on costs and benefits of the technology; Declining financial support from the Government of Tanzania; Inadequate co-ordination between sector-actors. <p>The proposed GEF project aims to mitigate some of the above mentioned barriers by:</p> <ul style="list-style-type: none"> Introducing incentives/soft loan facility (mitigated through

S. No.	STAP Comment	Response to STAP comment
		<p>project component 2);</p> <ul style="list-style-type: none"> • Establishing I&LC for capacity building and awareness generation to various stakeholders of the value chain (policy makers, relevant RE institutions, agro-industries, project developers and bank/financial institution), database maintenance on various aspects on WTE, etc. (mitigated through project component 1); • Demonstration of the WTE technologies (mitigated through project component 3).
2.	<p>STAP recommends consideration of the seasonality of raw material/ feedstock supply for biogas generation. Fluctuation in year round availability of feed stocks may impact the identification of end users. The transportation cost of agro-residues to the power plant may also be a factor in long term sustainability. STAP recommends conducting a study on the distance and costs involved in transporting the residues from decentralized sources to the power utility. Assuring sustainable supply of raw materials could be a significant challenge to project success.</p>	<p>The wastes to be used for the biogas plants are generated and used in-house within the same factory premises. Hence the sustainability of the supply of raw materials is ensured. The waste availability in the demonstration plants are summarized below:</p> <ol style="list-style-type: none"> a) Zanzibar sugar factory: It operates for 240 days (milling days). Excess bagasse stored during these milling days is used for operation of 90 additional days (off-milling). Hence, the total operation of the plant is estimated to be 330 days (7,920 hours). b) Zanzibar ethanol factory: It operates for 330 days and correspondingly its biogas plant also operates for 330 days. c) NARCO: The wastes in the Kongwa ranch and Ruwu abattoir are not subjected to seasonal variations. The ranch always maintains more or less the same number of animals, while the abattoir also slaughters the same number of heads every day. This ensures the sustainability of the feedstock from the proposed biogas plants. d) METL: The wastes targeted as feedstock is available at the factory premises and are available throughout the year as the production is also year round. This results in continuous operation of the factories and thus guarantees the availability of the feedstock. e) MASASI: Feedstock is projected to be available throughout the year as it does not depend entirely upon the seasonal variations. Different food items are processed all-round the year in the factory, which guarantees the supply of feedstock to the biogas plant. Additional feedstock is also expected to be available throughout the year, as it includes animal manure and available food remains.
3.	<p>The end use of the electricity has to be seriously considered in this proposal to ensure biogas production is economically viable in the long term. The proposal aims to export power to the grid. This would involve interventions for linking small decentralized systems to the national grid. The cost factor in doing so could be high.</p> <p>Further, feed-in-tariffs has to be attractive for selling electricity to the national grid.</p>	<p>Most of the demonstration plants, would be exporting electricity to the grid only the excess after their own utility. Currently the sources of electricity in these plants are either grid or diesel. Considering the avoided cost of grid electricity, financial analyses in the feasibility studies indicate a healthy return for the demonstration projects. It has to be noted that if avoidance of diesel electricity is considered, the financial returns will be even better.</p> <p>Cost of interlinking to 11 kV line in the same voltage level is</p>

S. No.	STAP Comment	Response to STAP comment
		<p>around USD 35,000 and to 33 kV line in the same voltage level is around USD 45,000⁵⁷. These costs are considered under the equipment investment costs in the feasibility studies.</p> <p>Financial analysis has been conducted for each of the demonstration plants, which are included in the attached feasibility studies in Annex E. The analysis show financial viability on WTE investments over the long term.</p> <p>As per the electricity order 2012 (standardized small power projects tariff for the year 2012), feed-in-tariffs for grid connected systems stands at 0.101 USD/kWh⁵⁸ and for off-grid systems it is around 0.32 USD/kWh⁵⁹. Feed-in-tariff for grid connection systems are on par with the present grid electricity usage tariff, whereas the off-grid electricity export is more than 3 times of the electricity tariff. However, it has also to be noted that FiT is revised annually. Hence by the time of commissioning the WTE plants (which would take 12-18 months), the FiT expected to be further increased, making the proposed projects more viable.</p> <p>During the implementation stage, detailed plant design would be completed, which would prioritize the customers (including grid) based on their repayment capacities.</p>
4.	<p>The investment and O&M costs of power generation at the decentralized scale could be high for utilizing the electricity generated. The proponents have not explained how these costs will be recovered by producers.</p>	<p>The investment cost and O&M costs are factored in the financial analysis of the proposed demonstration projects. Refer to the attached feasibility studies (Annex E).</p> <p>However, it has to be noted that the financial analysis did not consider the potential GEF grant. If this aspect is considered then, the viability of these plants increases.</p> <p>The generated electricity will be used for captive purpose. Avoidance of grid electricity (either through grid or diesel) would be savings for the producers. In case, they export electricity to grid or nearby community, they will receive additional revenue from sales. By this way, the investment cost and O&M costs can be recovered.</p>

⁵⁷ Based on the data provided by the local UNIDO consultant, Mr. Immanuel during November 2013

⁵⁸ Currency Exchange rate of 1,517.65 TZS/USD. Value taken from “The Electricity (Standardized Small Power Project Tariff for Year 2012) Order, 2012 released by EWURA on 1st May 2012”

⁵⁹ The Electricity (Standardized Small Power Project Tariff for Year 2012) Order, 2012 released by EWURA on 1st May 2012

ANNEX C: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS⁶⁰

A. PROVIDE DETAILED FUNDING AMOUNT OF THE PPG ACTIVITIES FINANCING STATUS IN THE TABLE BELOW:

PPG Grant Approved at PIF: \$ 50,000			
<i>Project Preparation Activities Implemented</i>	<i>GEF/LDCF/SCCF/NPIF Amount (\$)</i>		
	<i>Budgeted Amount</i>	<i>Amount Spent To date</i>	<i>Amount Committed</i>
Supplemental data collection	6,000	6,000	0
Finalization of revolving fund	7,000	7,000	
Finalization of sustainable operating procedure for the information/learning centre	6,000	6,000	0
Selection of potential sites and carrying out of detailed feasibility studies	13,000	13,000	0
Preparation and finalization of full-sized project document	18,000	15,330	2,670
Total	50,000	47,330	2,670

⁶⁰ If at CEO Endorsement, the PPG activities have not been completed and there is a balance of unspent fund, Agencies can continue 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.

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

Not applicable

ANNEX E: FEASIBILITY STUDIES

- a) Zanzibar Sugar Factory
- b) NARCO
- c) METL
- d) MASASI

See separate attachments.

ANNEX F: CO-FINANCING LETTERS

a) REA

THE UNITED REPUBLIC OF TANZANIA
RURAL ENERGY AGENCY (REA)

Telephone: +255 22 241 2001/2/3
 +255 22 241 2007
Facsimile: +255 22 241 2007
E-mail: info@rea.go.tz



Mawasiliano Towers,
Sam Nujoma Road,
P.O Box 7990,
DAR ES SALAAM

Ref. No: BC 72/157/08/38

18th November, 2014

The Chief Executive Officer,
Global Environment Facility (GEF),
1818 H Street, NW,
Washington DC 20433,
USA.

**RE: RE: PROMOTION OF ENERGY GENERATION FROM AGRICULTURAL
WASTES IN TANZANIA**

**Subject: Commitment from the Rural Energy Agency on Supporting the Project
Commitment**

Reference is made to the above heading and a meeting held between UNIDO and REA at REA offices on 20th October, 2014.

This is to express that the Rural Energy Agency (REA) is highly supportive of the UNIDO-GEF Project on “Promotion of waste-to-energy applications in agro-industries of Tanzania”. The Rural Energy Agency works on promotion of increasing access to the rural energy services through provision of financing and technical assistance. Under the same spirit, REA is supporting UNIDO initiatives, particularly on the proposed project under GEF 5 cycle. As part of its mandate REA will collaborate with UNIDO on this project thereby raising cash during the Financial Year 2015/16 up to US\$ 6.5 Million (Six Million Five Hundred Thousand US Dollars) in cash, which may be considered as a co-financing to complement the resources already approved by GEF and other partners to support activities related to this initiative during the project period and beyond.

The Government of Tanzania believes that the project will supplement the already on-going efforts to ensure that available renewable energy resources are being deployed to contribute to the national sustainable development visions while contributing to global efforts in promoting green economy.



Eng. Bengiel H. Msofe
FOR: DIRECTOR GENERAL

Copy: Mr. Philippe R. Scholtès
Managing Director,
PTC, UNIDO GEF Focal Point

Mr. Jossy M. Thomas
Industrial Development Officer,
Rural & Renewable Energy Unit
UNIDO

b) TIB



Tanzania Investment Bank Limited

P. O. Box 9793, Dar es Salaam - Tanzania, Mlimani City Office Park, Block No. 3, Sam Nujoma Road
Tel: +255 22 2411101-9, Fax: +255 22 2411095, E-mail: md@tib.co.tz, Website: www.tib.co.tz

Ref: TIB/ORG/18

DATE: 13TH December 2013

The Chief Executive Officer
Global Environment Facility (GEF)
1818 H Street, NW
Washington DC 20433
USA.

RE: NO OBJECTION FROM TIB DEVELOPMENT BANK LIMITED (TIB) ON SUPPORTING THE PROJECT OF PROMOTION OF ENERGY GENERATION FROM AGRICULTURAL WASTES IN TANZANIA

TIB Development Bank Limited (TIB) has been working in close collaboration with the Rural Energy Agency in addressing the financing barriers for renewable energy project developers in Tanzania. TIB is especially involved in managing financing facilities for promotion of energy related interventions in the country.

TIB is expressing its interest in managing revolving fund facility to be established under the UNIDO-GEF Project on "**Promotion of waste-to-energy applications in agro-industries of Tanzania**". In supporting the initiative, TIB has already financed 3 projects in sisal and sugar plantation to the tune of USD 1.6 million which will be considered as first beneficiaries under this programme. TIB will also avail a co-financing of up to **\$6.755 mil** (\$3.5m in cash and \$2.55m in-kind) to complement the revolving fund facility.

The co-financing will be made available during the project period.

Sincerely,
TIB Development Bank Limited

A handwritten signature in black ink, appearing to read 'DM', written over a dotted line.

David Mhenga
Senior Officer, Managed Funds

A handwritten signature in black ink, appearing to read 'Prisca Chang'a', written over a dotted line.

Prisca Chang'a
Head Managed, Funds

Copy: Mr. Dmitri Piscounov
Managing Director,
PTC, UNIDO GEF Focal Point

Mr. Jossy M. Thomas
Industrial Development Officer,
Rural & Renewable Energy Unit
UNIDO

c) NARCO



NATIONAL RANCHING COMPANY LIMITED
(KAMPUNI YA RANCHI ZA TAIFA LIMITED)

Mavuno House, Azikiwe Street, P.O. Box 9113 Dar es Salaam, TANZANIA
Phone: +255 22 211 0393/211 1956. Fax: +255 22 211 1956, E-mail info@narco.co.tz Web: www.narco.co.tz

Ref. No: NARCO/ADM/C/64/B/2/42

Date: 15th August, 2014

The Chief Executive Officer
Global Environment Facility (GEF)
1818 H Street, NW
Washington DC 20433
USA.

Dear Sir,

**RE: LETTER OF COMMITMENT TO INVEST INTO POWER GENERATION
FROM ANIMAL WASTE**

Please refer to the above subject.

We wish to reiterate that NARCO commits to raise cash contribution up to 2.6m US \$ towards co financing the above project to be undertaken in our ranches and abattoir.

Yours sincerely,

NATIONAL RANCHING COMPANY LIMITED

Dr. John Mbogoma
GENERAL MANAGER

Copy: Mr. Dmitri Piscounov
Managing Director,
PTC, UNIDO GEF Focal Point

Mr. Jossy M. Thomas
Industrial Development Officer,
Rural & Renewable Energy Unit
UNIDO

ALL OFFICIAL COMMUNICATIONS SHOULD BE ADDRESSED TO THE GENERAL MANAGER AND NOT TO INDIVIDUALS

d) METL



TO : The UNIDO REPRESENTATIVE

22 October, 2013

45, Regent Estate

P.O Box 9182, DAR ES SALAAM

KIND ATTENTION : Mr. EMMANUEL MICHAEL

Dear Sir,

RE : CO-FINANCING FOR SISAL BIO-GAS ELECTRICITY GENERATION PROJECT

We thank you for the preparation of Feasibility study report after visiting our sisal estates for establishment of 4 units of Sisal Bio-gas Electricity Generation plants at 4 different sisal estates of Mohammed Enterprises(T) Ltd at a total cost of US\$ 3000 per installed KW electricity.

Considering the possible opportunity of getting significant grants from different agencies, we here by commit to co-finance up to US\$ 3 million for establishment of 4 units with a total power generation capacity of 1,238 KW provided that Mohammed Enterprises(T)Ltd could select the Contractor for supply of relevant machineries and installation of Bio-gas & power generation units.

For MOHAMMED ENTERPRISES(T)LTD

Dr.N.Subbiah

Director - Agriculture

Second Floor, Textile House, Indira Gandhi/Morogoro Road
P.O. Box 20660, Dar es Salaam, Tanzania
Tel: (022) 2121866, 2118930-1. Fax: 2121866, 2113183. E-mail: agriculture@metl.net
Sisal Estates: Alavi, Fatemi, Hassani, Hussein, Mazinde, Mabogo, Kwalukonge,
Mjesani, Bamba and Lanconi.
Tea Estates: Arc - Mountain, G.D. Estate, Balangai, Dindira.

e) **Zanzibar Sugar Factory**

ZANZIBAR SUGAR FACTORY LTD

P.O.BOX 3178 ZANZIBAR

OFFICES AT MAHONDA VILLAGE

Tel 00255 773 326/972 0773 039 033/ 0774 000 999 FAX 00255 22 2182 770 EMAIL ZSFL@ZANLINL.COM

BRANCH OFFICE: P.O.BOX 9580 DAR ES SALAAM TEL 00255 22 2185401 CELL NO 0173 326 972

PLOT NO 25, UHURU STREET, 2 nd BUILDING FROM LUMUMBA ROAD (2nd Floor)

THE UNIDO REPRESENTATIVE

P.O.BOX 9182

DAR ES SALAAM

May 22nd, 2013

F. A. O. Mr. Emmanuel G. Michael

RE: COMMITMENT TO THE CO-FUNDING OF THE UNIDO GEF 5 CO-GENERATION PROJECT FOR ZANZIBAR SUGAR FACTORY LIMITED

Dear Sir,

Kindly refer to National Project Coordinator's letter dated April 3, 2013 in which he informed us of the approval of partly funding for the Co-generation Project by Global Environment Facility (GEF) and the discussions we had in our Office on April 8, 2013 during his visit regarding the GEF commitment of minimum of USD 2,000,000 as grant for the Co-Generation Project.

We are pleased to inform you that the Management of Zanzibar Sugar Factory Ltd has agreed and committed to source the funds required during the execution of this project amounting to USD 8,000,000/=

We take this opportunity to thank UNIDO for their efforts in the development of this Co-generation Project.

Thanking you,

Yours truly,

ZANZIBAR SUGAR FACTORY LIMITED



Babubhai M. Ladwa

Managing Director

CC. Emmanuel Michael

National Project Coordinator

f) MASASI

MASASI FOOD INDUSTRIES COMPANY LIMITED

Plot 185,186/7 Kibaha Industrial Estate, P.O Box 30277 Kibaha, Coast Region, Tanzania

Email ID: md@luluproducts.co.tz Tel: +255 23 2402216; +255 784 577557

Our Ref: MFI/UNIDO/PR/13

Thursday, October 17, 2013

The UNIDO Representative,

P.O Box 9182,

Dar es Salaam. F.A.O: Mr. Emmanuel Michael,

Dear Sir,

**RE: CO-FINANCING COMMITMENT FOR DEVELOPING BIOGAS – ELECTRICITY
PLANT AT MASASI FOOD INDUSTRIES FACTORY**

We wish to refer to your email dated October 15, 2013 regarding the subject matter above.

We are pleased to confirm our commitment for co-financing the biogas project at our factory; consequently our Company undertakes to invest **USD 450,000** into the project.

We take this opportunity to thank UNIDO for their efforts in coordinating and facilitating the project which will not only benefit the Company but also the community surrounding the factory located at Kibaha Township.

Yours truly,

MASASI FOOD INDUSTRIES COMPANY LIMITED


Charles M. Zacharia
Chief Financial Controller

ANNEX G: INFORMATION & LEARNING CENTRE SUSTAINABLE OPERATIONAL PLAN

See separate attachment.

ANNEX H: PROJECT IMPLEMENTATION SCHEDULE

Activity	Year 1				Year 2				Year 3				Year 4			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
PC 1 - Capacity development and knowledge management																
1.1 An information and learning centre (I&LC) established for WTE at the University of Dar es salaam (UDSM)																
a. Establishing the information and learning centre for WTE projects at UDSM																
b. Business plan and annual work plans of the centre are implemented successfully																
c. Training to centre staff on operation and management of the centre																
d. Creation of database and information required for developing WTE projects at the centre																
e. Preparation of training materials for different trainees to be trained at the centre																
f. Available guidebooks on biomass and biogas technologies and power plant development will be customised for adapting to the local conditions																
g. Public announcement and media campaign to publicize the services of learning centre																
h. Preparation of leaflets and website for WTE information dissemination through the I&LC																
1.2 Capacity developed for at least 50 policy makers																
a. Assessment of capacity of policy makers																
b. Training to at least 50 policy makers on WTE project development																
1.3 Technical capacities developed for relevant RE institutions, agro-industries and project developers (target at least 50 numbers each)																
a. Assessment of capacity requirement of different target groups																
b. Training to at least 50 personnel from different RE/technical institutions in developing WTE projects																

Activity	Year 1				Year 2				Year 3				Year 4			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
c. Training to at least 50 personnel from banks, financial institutions and funding agencies in assessing the WTE projects																
d. Training to at least 50 agro-industries for project implementation																
e. Training to at least 50 personnel from local engineering and O&M companies in O&M of WTE plants																
PC 2 - Demonstration of WTE technologies																
2.1 Detailed plant designs prepared for participating demonstration projects																
a. Detailed plant designs for the demonstration sites																
2.2 WTE power plants established for 6.8 MW cumulative capacity																
a. Arranging the necessary licenses, permits and contracts for the WTE plants																
b. Study on insurance required for the WTE plants during construction and operation																
c. Preparing bidding document for WTE plants																
d. Launching the bid document, bidding, evaluating and selecting contractor for WTE plants																
e. Finalization of WTE plants O&M plan																
f. Financial closures																
g. Construction and commissioning of the WTE plants																
h. Conducting expert inspection during construction and commissioning by Owner's Engineers																
i. Monitoring, testing and reporting on WTE plants performance																
j. Conducting full scale demonstration site visit and seminar (only for 3 sites)																
k. Disseminating the information through leaflets and website																
2.3 WTE technologies transferred to agro-industries																

Activity	Year 1				Year 2				Year 3				Year 4			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
a. No. of technology know-how workshops conducted																
b. No. of field visits to WTE plants																
PC 3 - Creation of favorable investment environment																
3.1 Gap analysis on policy requirements conducted																
a. Gap analysis on policy requirements																
3.2 Incentive and soft loan facilities designed																
a. Recommendations on the modalities and procedures of the incentive scheme																
b. Liaising with REA and TIB for the establishment of the soft loan																
c. Recommendations on the modalities and procedures of the soft loan																
3.3 Incentive scheme established under REA for investors of WTE projects																
a. Establishment and operation of the incentive scheme																
b. Raising awareness among the stakeholders on the availability of incentives through seminars and road shows																
3.4 Soft loan facility established under REA for investors of WTE projects																
a. Establishment and operation of the soft loan																
b. Raising awareness among the stakeholders on the availability of soft loan through seminars and road shows																
PC 4 - Monitoring and Evaluation (M&E)																
4.1 Mid-term M & E report prepared																
a. Preparation of TORs & recruitment of evaluation consultant																
b. Conduct of mid-term evaluation and preparation of M&E report																
4.2 End of project M & E report prepared																
a. Preparation of TORs & recruitment of evaluation consultant																

ANNEX I: ITEMIZED BUDGET

See separate attachments.

ANNEX J: EMPLOYMENT GENERATION THROUGH DEMONSTRATION PLANTS

Zanzibar Sugar Factory – Cogeneration and Biogas Power Plants

Cogeneration plant

In the project scenario in addition to the existing cogeneration plant manpower, a new overseas plant manager and 2 engineers will be hired for the smooth operation of the cogeneration plant.

Biogas power plant

There will be 5 operators per shift, including a shift-in-charge. Totally there will be 20 operators for the biogas plant. Mainly they will be engaged in controlling the feedstock, digester operation, safe operation of electrical equipment, etc.

The existing cogeneration plant manager will also be responsible for the biogas plant.

The cogeneration plant administration staff will take care of the administration of the biogas plant.

Hence, total job creation at Zanzibar Sugar Factory is around 23.

NARCO, METL, MASASI Biogas Power Plants

As mentioned above, there will be 5 operators per shift, including a shift-in-charge. Totally there will be 20 operators for the biogas plant. Mainly they will be engaged in controlling the feedstock, digester operation, safe operation of electrical equipment, etc.

Apart from the above, each power plant will have a plant manager responsible for the overall operation and maintenance of the power plant.

The factories administration staff will take care of the administration of the biogas plant.

Hence, total job creation at each biogas power plant is around 21.

Total job creation at each industry is given in the table below:

S. No.	Name of the industry	No. of biogas power plant sites	Total no. of job generation
1.	NARCO	2	42
2.	METL	4	84
3.	MASASI	1	21
	Total	7	147

Overall job generation through the demonstration projects is given in the below table:

S. No.	Name of the industry	Total no. of job generation
1.	NARCO	42
2.	METL	84
3.	MASASI	21
4.	Zanzibar	23
	Total	170

However, it has to be noted that this is tentative. The actual number of power plant staff may vary according to the design philosophy of the selected equipment suppliers.

Source: Feasibility study reports and general project experience in similar operating plants

ANNEX K: UNIDO IN-KIND CONTRIBUTION

S. No.	Contribution	Amount (USD)
1.	Time of project manager in project management, evaluation, technical reports preparation and other project related activities.	36,000
2.	Time of other UNIDO staff in project management, evaluation, technical reports preparation and other project related activities.	18,000
3.	Vehicle usage	10,000
4.	Provision of office space and communication cost (telephone, fax, internet, etc.)	13,000
5.	Provision of venues for meeting, workshops, etc.	8,000
6.	Other local expenditure	5,000
	Total	90,000

ANNEX L: RESPONSE TO GEF COUNCIL MEMBER COMMENTS

Council member country	Comment	Response to GEF secretariat comments
Canada	<p>The project proposes setting up a revolving financing facility and then investing in demonstration projects. We would be interested in hearing whether it would be preferable to have a few demonstration projects in key sectors before offering financial support.</p> <p>Alternatively, if the technology and the market are ready, perhaps a separate demonstration project is not required, and the initiatives supported initially by the financing facility can be used as “demonstrations” for broader uptake. Please comment.</p>	<p>Establishment of revolving financing facility is no longer part of the project. Instead, a soft loan facility is being created. Under the revised project concept, GEF grant will be used to create an incentive system for the demonstration projects⁶¹ and co-financing will be used to create a soft loan facility for the replication projects.</p> <p>Since the WTE technology has not seen market penetration in Tanzania, it is essential that financial support is provided upfront to drive the private investments for the initial projects (that is what is done through the demonstration projects in the proposed GEF project). It is not possible to have demonstration projects without any financial support.</p> <p>Also, the technology and market is not ready for WTE investments in Tanzania and hence, technology popularization cannot be done directly without the demonstration projects.</p>
Germany	<p>The project proposal argues that the replication potential depends on the availability of agro-industrial wastes, of which there is plenty and on appropriate enabling environment. However, economic feasibility of waste-to-energy projects is another key factor in achieving the targeted replication rate.</p> <p>We thus recommend including an (indicative) investment analysis for the promoted technologies. Such analysis would be the basis to explain the significant difference in cost efficiency between supported demonstration projects (USD 13.9/tCO₂e) and the replication projects (USD 2.78/tCO₂e)</p>	<p>“USD/t of CO₂ analysis” does not indicate the cost efficiency of demonstration and replication projects. On the other hand, it reflects the effectiveness of each USD spent as GEF grant.</p> <p>GEF grant will directly result in 6.8 MW demonstration projects. In addition, through various other activities carried out under the project such as capacity building, soft loan facility and successful demonstration of the technology, it is expected that WTE projects will be replicated for at least 15 MW cumulative capacity, within a period of 10 years after the closure of the project.</p> <p>Hence, the emission reductions achieved indirectly through the replication projects is higher than those directly achieved through</p>

⁶¹ Total GEF grant is USD 3,382,436.

USD 2,839,904 will be grant towards demonstration projects. Remaining, USD 542,532, will be used as grant support to developers of replication projects, depending upon their proposed installed capacities.

Council member country	Comment	Response to GEF secretariat comments
		<p>the demonstration projects.</p> <p>The total GEF resources of around USD 5.3 million are used to mitigate CO₂ emissions at a rate of USD 16/t CO₂ directly and around USD 7.3/t CO₂ indirectly⁶².</p> <p>Due to the higher capacity of replication projects and consequent higher emission reductions, USD/t of CO₂ reduced for replication projects is less, as compared to the demonstration projects.</p> <p>Investment analysis for the demonstration projects has been included in the submitted feasibility study reports.</p> <p>Replication projects have not been identified yet. Feasibility studies (to be carried out later) for such projects will include the investment analysis.</p>

⁶² Cost efficiency for replications projects is less because of the fact the assumption that proposed project will help in replication of at least 15 MW WTE projects (as compared to 6.8 MW WTE demonstration projects).