



REQUEST FOR CEO ENDORSEMENT/APPROVAL
PROJECT TYPE: Full-sized Project
THE GEF TRUST FUND

Submission Date: April 2011
Re-submission Date: 18 August 2011

PART I: PROJECT INFORMATION

GEFSEC PROJECT ID: 4004

GEF AGENCY PROJECT ID: XX/URT/09/X01

COUNTRY(IES): United Republic of Tanzania

PROJECT TITLE: Mini-grids based on small hydropower sources to augment rural electrification in Tanzania

GEF AGENCY(IES): UNIDO

OTHER EXECUTING PARTNER(S):

Ministry of Energy and Minerals (MEM),

Rural Energy Agency (REA),

Tanzania Electric Supply Company Limited (TANESCO)

GEF FOCAL AREA(s): Climate change

GEF-4 STRATEGIC PROGRAM(s): CC-SP3 - Promoting market approaches for renewable energy

NAME OF PARENT PROGRAM/UMBRELLA PROJECT: N/A

Expected Calendar (mm/dd/yy)	
Milestones	Dates
Work Program (for FSPs only)	January 2010
Agency Approval date	April 2011
Implementation Start	August 2011
Mid-term Evaluation (if planned)	June 2013
Project Closing Date	May 2015

A. PROJECT FRAME WORK (CHECK WITH CORRECTION TO BE MADE)

S. No.	Project Components	INV, TA, or STA ^a	Expected Outcomes	Expected Outputs	GEF Financing		Indicative Co-Financing		Total (\$ c = a + b)
					(\$ a)	%	(\$ b)	%	
1.	Techno-economic feasibility studies for the identified demonstration sites.	TA	Site specific details on potential micro / mini hydropower sites available for further development.	1.1 Detailed feasibility studies prepared for demonstration plants in the identified potential sites.	200,000	24	650,000	76	850,000
2.	Capacity building of stakeholders in developing micro / mini hydropower based mini-grids.	TA	Investment cost of micro / mini hydropower based mini-grids reduced because of the local availability of technical experts and high quality indigenous hydropower equipments.	2.1 National micro / mini hydropower technical centre established at CoET, UDSM to provide technical support for various technical institutions in Tanzania. 2.2 Technology transferred on local fabrication of micro / mini hydropower equipments. 2.3 Existing guidelines and standards adapted to suit installation and management	700,000	50	700,000	50	1,400,000

				of micro / mini hydropower plant mini-grids in Tanzania. 2.4 Feed-in tariff (FiT) for micro / mini hydropower in place.					
3.	Viable business model for micro / mini hydropower based mini-grid developed.	TA	Interest in developing micro / mini hydropower projects increased among the local entrepreneurs.	3.1 Existing financing options of REA streamlined to benefit the local entrepreneurs interested in micro / mini hydropower.	250,000	42	350,000	58	600,000
4.	Demonstration of micro / mini hydropower plants.	INV	Technical and economic viability of micro / mini hydropower technologies demonstrated.	4.1 A number of micro / mini hydropower plants with cumulative capacity of at least 3.2 MW implemented in different locations within the country.	1,900,000	20	7,378,500	80	9,278,500
5.	Project management				300,000	30	700,000	70	1,000,000
	Total project costs				3,350,000	26	9,778,500	74	13,128,500

* List the \$ by project components. The percentage is the share of GEF and Co-financing respectively to the total amount for the component.

** TA = Technical Assistance; STA = Scientific & technical analysis.

B. SOURCES OF CONFIRMED CO-FINANCING FOR THE PROJECT (expand the table line items as necessary)

<i>Name of Co-financier (source)</i>	<i>Classification</i>	<i>Type</i>	<i>Project (USD)</i>	<i>%*</i>
Rural Energy Agency	National Government	In-cash and kind ¹	7,000,000	71.6
Andoya Hydro-Electric Power Company	Private Sector	In-Cash	2,500,000	25.5
Ministry of Energy and Minerals	National Government	In kind	36,000	0.4
College of Engineering and Technology	National Government	In kind	50,000	0.5
Behindertenhilfe Neckar-Alb	Donor	In Cash	112,500	1.2
UNIDO	GEF Agency	In Cash	80,000	0.8
Total Co-financing			9,778,500	100.0

¹ Exact split up is not known at this stage. However, as their major contribution is towards demonstration of power plants, most of their input will be in cash and some amount especially related to project management will be in kind. Once the exact split up is obtained from REA, it will be incorporated in the document.

* Percentage of each co-financier's contribution at CEO endorsement to total co-financing.

C. FINANCING PLAN SUMMARY FOR THE PROJECT (\$)

	<i>Project Preparation a</i>	<i>Project b</i>	<i>Total c = a + b</i>	<i>Agency Fee</i>	<i>For comparison: GEF and Co-financing at PIF</i>
GEF financing	60,000	3,350,000	3,410,000	341,000	3,350,000
Co-financing	60,000	9,778,500	9,838,500		7,200,000
Total	120,000	13,128,500	13,248,500	341,000	10,550,000

D. GEF RESOURCES REQUESTED BY AGENCY(IES), FOCAL AREA(S) AND COUNTRY(IES)¹

<i>GEF Agency</i>	<i>Focal Area</i>	<i>Country Name/ Global</i>	<i>(in \$)</i>		
			<i>Project (a)</i>	<i>Agency Fee (b)²</i>	<i>Total c=a+b</i>
N/A	N/A	N/A	N/A	N/A	N/A
Total GEF Resources					

¹ No need to provide information for this table if it is a single focal area, single country and single GEF Agency project.

² Relates to the project and any previous project preparation funding that have been provided and for which no Agency fee has been requested from Trustee.

E. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS:

<i>Component</i>	<i>Estimated person weeks</i>	<i>GEF amount (\$)</i>	<i>Co-financing (\$)</i>	<i>Project total (\$)</i>
Local consultants*	548	168,000	380,000	548,000
International consultants*	176	300,000	228,000	528,000
Total	724	468,000	608,000	1,076,000

* Details to be provided in Annex C.

F. PROJECT MANAGEMENT BUDGET/COST

<i>Cost Items</i>	<i>Total Estimated person weeks</i>	<i>GEF amount (\$)</i>	<i>Co-financing (\$)</i>	<i>Project total (\$)</i>
Local consultants*	396	288,000	12,000	300,000
International consultants*	16	0	48,000	48,000
Office facilities, equipment, vehicles and communications*		0	260,000	260,000
Travel*		12,000	200,000	212,000
Others ^{2**}		0	180,000	180,000
Total	412	300,000	700,000	1,000,000

* Details to be provided in Annex C. ** For others, it has to clearly specify what type of expenses here in a footnote.

G. DOES THE PROJECT INCLUDE A "NON-GRANT" INSTRUMENT? yes no

(If non-grant instruments are used, provide in Annex E an indicative calendar of expected reflows to your agency and to the GEF Trust Fund).

H. DESCRIBE THE BUDGETED M & E PLAN:

Project monitoring and evaluation will be conducted in accordance with the established UNIDO and GEF procedures.

² Sundry expenses for the project like telephone travel of government officials, etc.

Project results and resources framework matrix will provide performance and impact indicators for project implementation. This will form the basis on which the project's monitoring and evaluation system will be built.

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 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 with 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 project activities and accomplishments in relation to:

- a. Implementation of a micro / mini hydropower based mini-grid projects
- b. Replication potential of such micro / mini hydropower based mini-grid projects elsewhere in Tanzania
- c. Operation and effectiveness of national micro / mini hydropower technical centre
- d. CO₂ emission reduction resulting from the implemented projects
- e. CO₂ emission reduction potential from other replication projects Conduct of various capacity building trainings and their usefulness
- f. Level of awareness and technical capacity within relevant institutions in the market and within enterprises
- g. Improvement in Government policy measures to support micro / mini hydropower based mini-grids
- h. Effectiveness and usefulness of the dissemination activities such as trainings, seminars, site visits, mini-grid performance reports, project website, leaflets, etc.

b. Reporting

The Project Management Unit (PMU) will present a report to UNIDO every three months with detailed information on the progress of the project as per the annual business 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 summary of activities carried out over the year. The annual report will also cover the benefits and impacts achieved from 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 a mid-term and final evaluation. The mid-term evaluation will be internal and will be conducted at the end of the 2nd year of the GEF project. This evaluation will focus on various activities of the project such as the construction of the power plant, assessment of the effectiveness of the trainings, construction of micro / mini hydropower technical centre, transfer of technology on local fabrication of hydropower equipments, etc. carried out until the 2nd year of the project.

An independent final evaluation will take place three months prior to the terminal review meeting and will focus on the technical performance of the power plant and assess the impact of the project as a whole. The final evaluation will also look at 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.

The following table provides the tentative budget for the total evaluation, which has been included in Project Component 5.

Table 1: Total evaluation budget

Activity	USD
Mid-term evaluation	12,000
Mid-term evaluation travel	6,000
Final evaluation	48,000
Final evaluation travel	14,000
Total	80,000

PART II: PROJECT JUSTIFICATION:

A. STATE THE ISSUE, HOW THE PROJECT SEEKS TO ADDRESS IT AND THE EXPECTED GLOBAL ENVIRONMENTAL BENEFITS TO BE DELIVERED:

Background

Tanzania has a population of around 40 million and only less than 14% of the total population has access to electricity from the national grid. About 70% of total population live in rural areas and in that only less than 2% has access to electricity. Lower levels of electricity access and commercial energy use are the major challenges faced by the Tanzanian energy sector, which in turn holds back the country's economy.

More than 50% of the population who live in poverty spend more than 35% of their household income to meet their energy needs (like buying kerosene, charcoal and dry cells) as compared to 14.5% spent by the better-off population³. This situation burdens the poor people who are devoid of electricity with more financial constraints to satisfy their energy needs.

The Government of Tanzania has placed rural electrification in its agenda. The Government has also established REA with the views to promote rural energy services, to facilitate modern energy projects for rural areas and to provide technical support for the developers. In addition, the Government has also established a Rural Energy Board (REB) and a Rural Energy Fund (REF). On the regulatory side, Standardized Power Purchase Agreement (SPPA) and Standardized Power Purchase Tariff (SPPT) exist for small power producers (SPPs). SPPT is revised on annual basis by the regulatory agency, Energy and Water Utilities Regulatory Authority (EWURA).

The government is also working on the development of FiT, which will set a fair and stable ground for the renewable energy (RE) technologies in relation to commercial aspects. On the financing side, a World Bank (WB) credit line is available for providing subsidy to RE investments in Tanzania.

As a part of the policy reforms towards promotion of RE, the Government of Tanzania provides exemption on import duty for RE equipments. But, due to the high inflation rate prevailing in the country, the prices of the imported equipments are becoming high. As a result of this, the project developers import RE equipments very rarely and hence to a larger extent, have failed to reap the benefits of import duty exemption provided by the Government.

As of September 2009, Tanzania had a total installed capacity of 961 MW⁴, out of which, 562 MW is from hydropower. But the estimated hydropower potential of the country stands around 4,700 MW. In some areas like Usambara and Pare mountains as well as in the southern highlands, where many perennial rivers and streams with steep drops are available, there are good possibilities for hydropower generation. In addition to the potential hydro resources, these places are in close proximity to the villages that are without electricity. The proven potential for small hydro power in Tanzania is approximately around 300 to 500 MW, of which only around 24 MW has been tapped due to various constraints.

The Problem

Tanzania is one of the least developed countries (LDCs) in sub-Saharan Africa. Its economy faces a large discrepancy, as the majority of the population lacks sustainable energy. The country's power sector, for long time, has relied only upon the national power utility company, TANESCO, to do the generation and

³ *Partners for Africa Policy Dialogue Conference, 22nd - 24th June 2005, Tanzania National Energy Policy: Focus on Renewable Energy and Poverty Reduction.* J. Uisso, & N. Mwhava, Ministry of Energy and Minerals

⁴ <http://www.tanESCO.co.tz>

distribution. While the situation has been increasingly changing, necessitating the introduction of private sector in electricity generation, still, TANESCO is dominating the energy generation and distribution.

Economic acceleration depends more upon the level of rural electricity access. The low levels of electricity access and commercial energy use are the major challenges faced by the Tanzanian energy sector, which holds back its national economy.

Due to lack of alternative energy sources in most of the remote/off-grid areas, small diesel generators remain as the primary supplier of small quantity of electricity. In places where the gensets are not available, kerosene is used for lighting and cooking. These energy sources, apart from causing health problems to the local communities, also continue to increase the global warming by emitting GHGs into the atmosphere.

Tanzania has abundant RE resources such as biomass, hydro, solar and wind. The intervention and use of RE in rural electrification is extremely important for the improvement of the prevailing poor electricity access situation. Micro / mini hydro power is especially relevant because of its multipurpose use unlike solar.

The country is emphasizing on RE including micro / mini hydro, by creating conducive environment like establishing the REA for managing the rural energy funds and by introducing credit facility, etc.

But the implementation of RE, especially micro / mini hydro power, in Tanzania, is a challenging intervention, particularly because of the high investment needed. There are several barriers to improve the rural energy situation in Tanzania including the following:

(1) Lack of proper rural energy planning and implementation

Most of the energy projects are being implemented by stakeholders in an uncoordinated fashion. This makes the energy implementation in the country inefficient and unsustainable, with less impact. The stakeholders need to be coordinated and educated in the planning methodology and execution skills.

(2) Inadequate technical capacity among human as well as institutions in the area of RE development

Inadequate awareness leads to lack of technical capacity. The capacities of various personnel, such as project developers, engineering companies, construction companies, investors, etc. and institutions, such as The Government, related Ministries, technical and financing institutions, etc., who all will be involved in micro / mini hydropower projects, should be developed. Though the potential for micro / mini hydropower plants is high in Tanzania, this potential is not transformed into realistic projects, as the knowledge level and technical capacity within Tanzania is limited. This is clear from the fact that some of the micro / mini hydropower plants which were installed with the aid of foreign experts are not functioning any more. Due to the lack of human capacity, these plants have run for less than the expected plant life time.

(3) High cost of importation of energy production equipment

Recently, there has been a growing interest among the stakeholders on developing micro / mini hydropower schemes. However, the investors lose their interest due to very high expenditures incurred on the imported equipment. This risk is even more relevant when all the equipments (turbines, control systems, etc.) have to be imported from abroad. This leads to higher investment cost and increased payback period, which are unattractive to most of the private investors. Creation of local equipment fabrication platform will considerably reduce the investment cost of such projects.

(4) Lack of awareness and participation through experience sharing

Despite the country's long experience in implementing hydropower schemes (about a century) the technology is not yet widespread. Although the participation of the private sector in electricity service was formally accepted in Tanzania since 1992, its involvement is still very limited. This argument is supported by the recent rural master plan study results, which show that, there are no qualified third party operators in rural areas to implement small hydropower projects except TANESCO, which has offices in almost all districts of mainland Tanzania.

(5) Policy and regulatory barriers such as lack of FiT

Though there are few policies and regulatory frameworks available to promote the RE based electricity generation, there are no defined and well framed path ways that make the policies successful to bring the desired outputs. At present, there is no FiT scheme for the micro / mini hydropower projects. In the absence of the FiT specifically for RE based power generation, it is not possible for such plants to compete with large scale hydro and fossil fuel based power generation, where the investment cost and generation cost are comparatively lower.

How the project seeks to solve the issue:

The proposed project aims at promoting RE, mainly in the form of micro / mini hydropower based mini-grids as viable options, for augmenting the rural electrification in Tanzania. This will also provide access to modern energy services for the rural public and reduce their dependency on carbon intensive energy options. GEF intervention in the project will lead to the installation of micro / mini hydropower based mini-grids of 3.2 MW cumulative capacity. The project will also strengthen the capacity of the stakeholders in developing, implementing, operating and maintaining micro / mini hydropower based mini-grids.

The project aims to train atleast 50 stakeholders, including but not limited to, the project developers, local engineering companies, government planners, technical institutions, financial institutions, plant operators, interested micro / mini hydropower equipment fabricators, EPC contractors, mini-grid operators, etc.

Advertisements will be done through the newspapers and notices about the training programs to be conducted under this project. The interested participants will be requested to apply for the training programme. National micro / mini hydropower technical centre along with UNIDO will screen the applications and select the participants. The participants will be selected based on his/her impact in developing similar micro / mini hydropower plants in other potential sites of Tanzania.

Tentative number of participants in each category is given in the following table:

Table 2: List of Participants

S. No.	Participant category	No. of participants
1.	Project developers	5
2.	Technical institutions	5
3.	Government planners	5
4.	Micro / mini hydro power plant operators	10

5.	Mini-grid operators	5
6.	Financial institutions	5
7.	EPC contractors	5
8.	Local engineering companies	5
9.	Interested equipment fabricators	5
	Total	50

In addition, the technology will be transferred on local fabrication of micro / mini hydropower equipments and also viable business models will be developed for sustained implementation of micro / mini hydropower projects.

The project will make a good platform for information sharing among the stakeholders, which has been lacking in the country. The project will lead to technology transfer from other international expertises. UNIDO will use its well established expertise from its small hydro centres in China, India and African regions. The lessons learnt during the project implementation period will be used as a tool in strengthening the national capacities of institutions, individual players and the national policy interventions.

Successful implementation of the project will create an enabling and attractive platform for the replication of the technology throughout the country. The project components address most of the issues that are barriers to the development of the mini hydropower projects in Tanzania. Once there are successful demonstration sites, enough expertise and a well established financing environment, then the micro / mini hydropower mini-grids will be developed in a much faster rate, thereby increasing the rural electrification of the country.

micro / mini

During PPG stage, prefeasibility studies were conducted in several of sites and 9 sites have been selected for the proposed project. After GEF intervention, local communities at the selected 9 sites are expected to get electricity from the respective power plants. The project will generate 3.2 MW (cumulative) of electricity from the power plants in these sites.

The criteria for the preference in the sites include:

- Ease in site accessibility to reduce the costs;
- Available of human settlements/electricity demand close to the sites;
- Potential productive uses for sustainability;
- Potential off- grid sites

The following map shows the location of the sites where pre-feasibility studies were carried out to identify potential demonstration sites in Tanzania.



Figure 1: Locations of the demonstration sites in Tanzania (red circles)

As the project will supply 3.2 MW of electricity, the nearby residential houses, health centres, dispensaries, village government offices, schools, industries, agricultural and commercial activities will be benefitted. Increased availability of electricity is expected to increase the commercial activities, thereby creating opportunities for better employment, revenue generation for the locals, etc. Use of hydro electricity will save significant amount of diesel and kerosene and hence the poor village people who are spending more than 50% of their earning for their energy needs can be reduced considerably.

Already stakeholder consultations have been carried out at the PPG stage to create awareness and sensitize the local community. In addition to the above, since the local communities are the end users of the produced electricity, the project will involve them during power plant and mini-grid construction stages. Various consultations at each site would be conducted to finalise the electricity distribution from the power plant. This would maximise the benefits of generated electricity. As the project proposes indigenous manufacturing of micro / mini hydro units, considerable reduction in the capital cost is expected which will lead to comparatively easier and cheaper replication of similar projects elsewhere in the country.

The demonstration of technical and financial viability of the 3.2 MW micro / mini hydropower based power generation and mini-grid will enable the Government to further establish appropriate policy and regulatory framework, to strengthen institutions and to build capacity leading to the creation of a conducive market environment for increased private sector investment programmes in RE.

List of micro / mini hydropower sites chosen under GEF demonstration projects are given in the following table:

Table 3: List of micro / mini hydro power demonstration projects

S. No.	Name of the site	Capacity (kW)	Project developers
1.	Tandala	407	REA, Tandala Diaconical Centre, Bruderhaus DIAKONIE Germany
2.	Andoya	1,000	REA, Andoya Hydroelectric Power Company Ltd.
3.	Chita	400	REA, Chita National Service Camp
4.	Mpando	271	REA, Imilinya village
5.	Chala	130	REA, Chala parish
6.	Uliwa	407	REA, RC Njombe Diocese
7.	Salala-Ludilu	98	REA, KKKT Makete
8.	Macheke	290	REA, Mlangali village
9.	Mhangazi	190	REA, Mhangazi Electric Cooperative Association
	Total	3,193	

Entire details of the demonstration projects are given in Pre-feasibility study report for the sites.

The proposed micro / mini hydropower based mini-grids to be set up under the project are expected to bring about global benefits by reducing 335,648 t CO₂e directly and 2,685,185 t CO₂e indirectly, which otherwise would have resulted from the use of diesel generators, as is currently the case in Tanzania.

The project is also expected to bring about considerable socio economic benefit by improving the electricity access situation, industrialization and employment generation especially through the micro / mini hydropower mini-grid demonstrations. The project will bring new technology, knowhow and skill level to Tanzania. The increased availability of power will spur the growth of other industries nearby the project location. The direct and indirect employment generation will be an added economic benefit.

Social and productive uses baseline of this project:

Social and productive uses baseline study conducted in the potential sites, proved the need of the demonstration projects. The social and productive uses are summarised in the following table:

Table 4: Potential users and demand of electricity

S. No.	Potential users	Tandala		Andoya		Chala		Uliwa		Salala-Udilu	
		No.	Demand in kW	No.	Demand in kW	No.	Demand in kW	No.	Demand in kW	No.	Demand in kW
1.	Households	1,457	364.25	759	-	1,824	456.00	600	150.00	256	64.00
2.	Primary schools	4	40.00	75	-	3	15.00	1	5.00	1	5.00

3.	Secondary schools	1	20.00		-	2	10.00	1	5.00	0	0.00
4.	Grain mills	15	180.00		-	1	20.00	2	24.00	3	36.00
5.	Micro-businesses	40	80.00	15	-	12	144.00	10	20.00	5	10.00
6.	Mission centres	3	150.00		-	10	20.00	2	30.00	1	15.00
7.	RC mission centre					1	30.00				
8.	Focal development college					1	20				
9.	Carpentry workshops					10	120				
10.	Welding workshop					1	12				
11.	Sunflower oil extractors					4	48				
12.	Mission vocational training centre									1	20.00
13.	Health centre							1	30.00		
	Total		834.25				895.00		264.00		150.00

From the studies, it was found that, the micro / mini hydropower plants in other sites namely, Chita, Mpando, Macheke and Mhangazi will be benefitting RC Missions, vocational training schools, primary and secondary schools, dispensaries, residential houses, shops, small workshops and garages, communication towers, water pumps, mills etc. that are located in and around the plant area.

Comparing Table 3 and Table 4 and the above description, it is clear that all the sites have enough off-takers of electricity and the demand in these sites exceeds the proposed power plant capacity at each site.

The study also found that the industries resort to diesel generators in the absence of grid electricity. Households depend upon kerosene for lighting purpose and firewood for cooking purpose. This scenario was common in all the proposed project locations. Based on the above findings, it was expected that the project will improve the social and productive use scenario when compared to the baseline.

Due to the increased electricity availability, productive activities will be increased so that the people will be empowered enough to pay the electricity bills. Moreover, the increased availability of electricity will in turn increase the productivity of the industries which will ensure their repayment capacity for electricity bills.

Due to the various capacity building measures and creation of favourable financing environment through creation of viable business models, the high replication potential available for hydro resources will be

utilized. If this potential is realized, then, there will be a considerable reduction in the energy related CO₂ emissions and improvement in the energy supply situation in Tanzania.

The project consists of four technical components:

Project component 1 – Techno-economic feasibility studies for the identified demonstration sites

Project Component 1 (PC1) aims at conducting techno-economic feasibility studies for the identified potential sites for demonstration.

Under this component the project will work with REA, College of Engineering and Technology (CoET), TANESCO, National and International experts and will deliver the following output:

1. Detailed feasibility studies prepared for demonstration plants in the identified potential sites

Detailed feasibility studies prepared for demonstration plants in the identified potential sites

Lack of technical knowhow has been a hindrance in the wider adoption of micro / mini hydropower technology in the country. Moreover the fact that most of the sites lack proper site assessment makes the adoption of this technology more difficult.

A thorough due diligence will be conducted by a sub-contractor on the site information including technical, social, economic viability and management modalities for the sustainability of the potential sites. Sub-contracts will be awarded for carrying out detailed feasibility studies for the identified demonstration sites.

Project component 2 - Capacity building of stakeholders in developing micro / mini hydropower based mini-grids

Project Component 2 (PC 2) aims at establishing a national micro / mini hydropower technical centre in CoET, which would function as a learning hub for micro / mini hydropower plants. This centre will provide technical support for the replication and adoption of micro / mini hydropower plants in other potential sites across Tanzania.

One of the major issues faced by the interested project investors in developing micro / mini hydropower projects is the very high cost of imported equipments. This situation arises due to the fact that there are no reliable and quality micro / mini hydropower fabricators in Tanzania. This situation poses a significant barrier for the development of micro / mini hydropower plants. To address this barrier, initially, a thorough demand assessment for local hydro-power equipments will be carried out. Also, the interested local fabricators for micro / mini hydropower equipments will be identified, trained and transferred with micro / mini hydropower equipments fabrication technology. This will ensure the availability of high quality micro / mini hydropower equipments within the country itself. Necessary licenses will be arranged for the locally trained fabricators.

PC 2 will also facilitate the capacity building on both human and institutional fronts at various levels in micro / mini hydropower based mini-grids. During the PPG stage, several meetings were conducted with key government stakeholders and during the meetings other stakeholders were also identified. Training and systematic learning programmes will be organized for the identified stakeholders of micro / mini hydropower based mini-grids including but not limited to REA, TANESCO, University of Dar-es-Salaam, River Water Basin Authorities apart from project developers, government planners, micro / mini hydro power plant operators, mini-grid operators, financial institutions, EPC contractors, local engineering companies, interested equipment fabricators, academic institutions, end-users.

Under PC2, the existing guidelines and standards will be adapted suitably for the development of micro / mini hydropower projects. The prepared guidelines will be published in collaboration with TANESCO and Tanzania Bureau of Standards (TBS).

Another significant barrier for penetration of micro / mini hydropower plants in Tanzania is the lack of FiT for RE projects. Through PC 2, the project aims at improving the policy and regulatory system by providing incremental support for the creation of a FiT for micro / mini hydropower projects.

Under this component, the project will work with MEM, CoET, REA, Small Industry Development Organization (SIDO), TANESCO, TBS, local fabricators, national experts and international experts and will deliver the following output:

1. *National micro / mini hydropower technical centre established to provide technical support for various technical institutions in Tanzania*
2. *Technology transferred on local fabrication of micro / mini hydropower equipment*
3. *Existing guidelines and standards adapted to suit installation and management of micro / mini hydropower plant mini-grids in Tanzania*
4. *FiT for micro / mini hydropower in place*

1. National micro / mini hydropower technical centre established to provide technical support for various technical institutions in Tanzania

At present, the expertise of the technical institutions on micro / mini hydropower based mini-grid is very low. In such a situation, it is very difficult to sustain and replicate the micro / mini hydropower based mini-grid projects in the country. Hence, under this component, a national micro / mini hydropower technical centre with trained personnel, necessary equipments and tools will be established at CoET at University of Dar es salaam (UDSM), in order to provide technical support for various other technical institutions in Tanzania for facilitating continuous development of micro / mini hydropower based mini-grid projects.

Along with the initial guidance from the international experts on micro / mini hydropower, the trained personnel of CoET will train various stakeholders of micro / mini hydropower systems such as experts, planners, project developers, financial institutions, local engineering companies, mini-grid operators and construction companies in micro / mini hydropower project development and implementation.

International expert along with national expert will develop training materials for all future trainings to be conducted at CoET. By this way, the centre will serve as a learning centre for the entire country and will enable further replication of similar projects elsewhere in the country.

International seminar on micro / mini hydropower will be conducted at the centre. This is necessary to build the human and institutional capacity in micro / mini hydropower. The centre will also strengthen the local knowledge/skill in operation and maintenance (O&M) of micro / mini hydropower plants. Based on the experience gained from the demonstration projects, the micro / mini hydropower based mini-grid project development guide will be prepared and used by CoET for further trainings.

The GEF funding under the output will cover only the training related activities and training materials, while the operational costs of the centre will be met by CoET itself. The national HP technical centre will be within CoET campus. CoET will also be allocating the space for the centre. The staff member from the CoET payroll will be trained and will be working as experts at the technical centre. This will reduce the annual budget requirement for the centre. Moreover, after the closure of the GEF project these staffs

will continue to be in the payroll of CoET and also provide services for the clients at a nominal fee. All these activities will ensure the centre's sustainability even after the completion of the project.

2. Technology transferred for local fabrication of micro / mini hydropower equipments

At present there is no local fabrication of hydro-power equipments in Tanzania and all have to be imported. A thorough demand assessment for local hydro-power equipments will be carried out initially. Also, existing local capacity in manufacturing micro / mini hydropower equipments will be evaluated and few interested suppliers for micro / mini hydropower equipments will be identified. Based on the evaluation, capacity will be built for the identified interested suppliers, through trainings, experience sharing and by providing fellowships for eligible suppliers in getting long term training in countries with advanced manufacturing technology.

Some of the interested institutions who have shown efforts in equipment fabrications are CoET at University of Dar es salaam (UDSM), Nyumbu, Renewable Energy Development Company (REDCOT), SIDO and Ulaya and Hydro Mill Ltd. Technology will be transferred in all the aspects of manufacturing micro / mini hydropower equipments to the local interested fabricators. These activities will enable high quality local fabrication of micro / mini hydropower turbines and controls, which in turn will sustain the RE activities in the country.

The National micro / mini hydropower technical centre at CoET will be a centre for capacity building on local manufacturing of micro / mini hydropower equipment, especially, the micro-turbines. The training will take place in the Technology Development and Transfer Centre (TDTC) workshop in CoET, where, the technology innovation and research activities take place. The training components include planning and designing aspects of the equipment, actual fabrication of the equipment and marketing strategies. The training will be provided by the international experts from UNIDO-SHP (Small Hydro Power) centres in India and China. National experts will assist and coordinate in these training activities.

It is planned to start the equipment manufacturing activities simultaneously along with the development of demonstration sites. UNIDO will share its experience from a similar technology transfer project carried out, which envisages local manufacturing of cross-flow turbines up to 125 kW in Nigeria. Currently trainings and other initiatives are being carried out for the transfer of technology to the interested local fabricators.

Under this project, efforts will be taken to use the local fabricated equipments in the replication sites in Tanzania. An experienced and standard turbine manufacturing private company will be subcontracted for the transfer of technology to the local manufacturers. Quality control procedures and standards would be created and recommended to the Tanzanian government for implementation. An international expert well versed in micro / mini hydropower equipment manufacturing will be engaged for this purpose.

Necessary licenses will be arranged for the trained local fabricators to manufacture micro / mini hydropower equipments.

3. Existing guidelines and standards adapted to suit installation and management of micro / mini hydropower plant mini-grids in Tanzania

At present, no guidelines and standards exist for micro / mini hydropower installation and management. Current focus is on large hydropower plants only. Therefore, under this component, project will adapt these existing large hydro guidelines and standards to suit the installation and management of micro / mini hydropower plants in Tanzania. All necessary efforts will be taken to disseminate these adapted guidelines and standards to all stakeholders. These guidelines will also consider the community managed schemes and various successful experiences within and outside the country. The major objective of this output is to make sure that the installation of micro / mini hydropower technology is done on par with the accepted standards. These adapted guidelines and standards will be published in collaboration with

TANESCO and TBS. All these activities will be carried out by international experts in assistance with national experts along with TANESCO and TBS.

4. FiT for micro / mini hydropower in place

At present, no market based systems favouring micro / mini hydropower exists in the country. One of the major policy and regulatory issue in Tanzania for the development of micro / mini hydropower is the lack of FiT scheme for RE. At present, Tanzanian government is working on the development of FiT, which will set a fair and stable ground for the RE. Under this output, an incremental support will be provided for arriving at FiT for RE based electricity generation including the micro / mini hydro. The project will engage international experts to study and recommend appropriate FiT for micro / mini hydropower to the Government. National experts will be engaged to assist the international experts.

Though development of FiT will not directly benefit the project, the FiT scheme for micro / mini hydropower is expected to help development of grid connected projects and thereby support RE capacity additions in the grid. This will lead to increase rural electrification in the future. Hence, this activity will hasten the promotion of micro/mini hydropower replications in the country.

Project component 3 – Developing viable business models for micro / mini hydropower based mini-grid

Project Component 3 (PC 3) aims at developing viable business models for the micro / mini hydropower based mini-grid projects. Moreover, PC 3 aims at increasing the capacity of local entrepreneurs to undertake micro / mini hydropower projects by streamlining the existing financing options.

Capacity of the local entrepreneurs will be improved to undertake micro / mini hydropower mini-grid projects through streamlining existing financing options from REA.

Under this component, the project will work with REA, CoET, private developers, national and international experts and will deliver the following output:

1. *Existing financing options of REA streamlined to benefit local entrepreneurs interested in micro / mini hydropower*
1. Existing financing options of REA streamlined to benefit local entrepreneurs interested in micro / mini hydropower

Various awareness programmes such as seminars, informal meeting and consultative meetings will be conducted to enable the stakeholders to gain knowledge on the available subsidies and credit lines. National experts will be engaged for this purpose. Various awareness programmes such as seminars, informal meetings and consultative meetings will be conducted along with relevant government agencies in 4 or 5 locations in Tanzania to enable the stakeholders to know the available subsidies and credit lines. During the seminars, representatives from the different funding agencies will also be invited to make presentations and interact with interested project developers. Head-to-head meetings between the private sector and the local financing institutions will be conducted for match making and facilitating the development of RE technologies including micro / mini hydropower.

Under this output, international experts will take necessary efforts and liaise with REA for the creation of separate window for micro / mini hydropower projects under the available subsidy / financing schemes. National experts will assist the international experts in the above activities. In addition, national experts will be engaged for the facilitation of securing the finance from these schemes atleast for around 10 projects. On a continuous basis support will be provided for the project developers (advisory supports) to avail the existing grants. All such advisory supports will be provided by the national micro / mini hydro

technical centre at CoET. All these will facilitate flow of financing from the available schemes to the new project developers.

Micro / mini hydropower installations for demonstration funded by this project will not receive funding from other GEF/WB project. Co-financing from donors, private sector and the Government will be used for this purpose.

Project component 4 – Demonstration of micro / mini hydropower plant based mini-grids

Project Component 4 (PC 4) aims at commissioning micro / mini hydropower based mini-grids of cumulative capacity 3.2 MW, which will replace diesel power generation, thereby contributing to a reduction of 16,782 t CO₂ emission per year. These micro / mini hydropower plants will be monitored and tested for their performances and the results will be widely disseminated. All the stakeholders are expected to gain considerable knowledge and experience and are expected to replicate such projects elsewhere in Tanzania.

Under this component, the project will work with MEM, REA, Water Basin Authorities, private developers, national and international experts and will deliver the following output:

1. *A number of micro / mini hydropower plants with cumulative capacity of at least 3.2 MW implemented in different locations within the country*
1. A number of micro / mini hydropower plants with cumulative capacity of at least 3.2 MW implemented in different locations within the country

The major objective of this output is to demonstrate at least 3.2 MW micro / mini hydropower based mini-grids for rural electrification and productive uses. All the mini-grid demonstration projects will follow the regulations / procedures stipulated by REA.

The detailed technical specifications will be prepared and incorporated in the bid documents along with commercial conditions. The bid document will be launched for sourcing micro / mini hydropower equipments. Once the bidders submit their bids, they will be evaluated and shortlisted and the project will be awarded to the most competent and capable bidder based on the scoring mechanism set forth. After the contract is awarded to the bidder, the bidder is expected to implement the project based on the cost and time frame fixed. An international expert will be hired to oversee the site construction activities. All necessary licenses, permits and contracts required for the construction and the operation of the power plant will be arranged prior to the start of the plant construction. Subcontractors will be hired to take care of this activity. Detailed design of mini-grid system, distribution lines, connections, metering, etc. will be carried out. This will also include detailed operational and management arrangements of mini-grids. National experts will co-ordinate with the sub-contractors in all these activities. Tender document preparation, launching and tender evaluation will be done for the mini-grid and the mini-grid installation company will be selected. GEF contribution of around 1.7 million USD will be used towards equipment purchase in this project. The construction and commissioning activities of the mini-grid will be supervised by national experts. This procedure will be followed for all the demonstration sites.

In the construction site, micro / mini hydropower based mini-grid owners will have a site office to manage the day-to-day activities during the construction and commissioning of the micro / mini hydropower based mini-grid. This team will work closely with the equipment supplier/EPC contractor in order to facilitate their works in the sites. UNIDO project management team, the international experts and the national experts will closely interact with the site office team and will assist and advice them in the implementation activities.

After the completion of the project, the project performance monitoring will be conducted to study the technical, financial, environmental and socio-economic performance of the project. A monitoring report

will be prepared based on the monitoring and analysis. During the performance monitoring, study would be conducted to analyse the situation before and after the implementation of the project. The study would describe the conditions which were prevailing before the project, energy sources, electricity usage, need for the project, etc and the impact of the project. The results of the project would be presented along with the monitoring results.

Full scale project demonstration site visit and seminars will be organized and the project experiences will be disseminated to various interested stake holders for increasing the replication potential of the project. Various dissemination tools such as leaflets, various publishing, website, etc. will be used for effective dissemination.

Various private developers along with REA will act as counterparts under this component. Apart from investing in the project, they will also provide various facilities as and when required for the demonstrations.

It has to be however noted that there is a possibility to marginally increase the capacity of some of the demonstration sites. Hence the total installed capacity is expected to be more than 3.2 MW.

Under this component, UNIDO will facilitate the international bidding and selection of the EPC contractor and will make sure international best practices are followed in these aspects. However, day to day activities of the plant construction and supervision will be done by project owners through co-financing fund. As described earlier, international experts will monitor the implementation of the project to make sure that the plant construction activities are carried out properly by following international standards. For all these activities, UNIDO will act as a facilitator in procuring international experts.

The following table provides a description of the execution arrangements and the stakeholders of the specific demonstration power plants.

Table 5: Project execution arrangement among stakeholders of specific demonstration plants

S. No.	Site Name	Capacity (kW)	Mini-grid owner	Partners	Role of partners
1.	Chala	130	Chala parish	REA	Provision of technical services and funds for construction of plant civil works and electromechanical equipment
				Chala parish	Community sensitisation, Mobilisation of civil works and plant management
2.	Andoya	1,000	Andoya Hydroelectric Power Company	Andoya Hydroelectric Power Company	Community sensitisation, Mobilisation of civil works and plant management
				REA	Provision of technical services and funds for construction of plant civil works and electromechanical equipment
3.	Tandala	407	Tandala Diaconical Centre	REA	Provision of technical services and funds for construction of plant civil works and electromechanical equipment
				Tandala Diaconical Centre	Community sensitisation, Mobilisation of civil works and plant management
				Behindertenhilfe Neckar-Alb	Support the construction of power transmission lines
4.	Chita	400	Chita National Service Camp	REA	Provision of technical services and funds for construction of plant civil works and electromechanical equipment
				Chita National Service Camp	Community sensitisation, Mobilisation of civil works and plant management
5.	Mpando	271	Imilinya village	REA	Provision of technical services and funds for construction of plant civil works and electromechanical equipment
				Imilinya village	Community sensitisation, Mobilisation of civil works and plant management

					management
6.	Macheke	290	Mlangali village	REA	Provision of technical services and funds for construction of plant civil works and electromechanical equipment
				Mlangali village	Community sensitisation, Mobilisation of civil works and plant management
7.	Uliwa	407	RC Njombe Diocese	REA	Provision of technical services and funds for construction of plant civil works and electromechanical equipment
				RC Njombe Diocese	Community sensitisation, Mobilisation of civil works, plant equipment and plant management
8.	Salala	98	KKKT Makete	REA	Provision of technical services and funds for construction of plant civil works and electromechanical equipment
				KKKT Makete	Community sensitisation, Mobilisation of civil works and plant management
9.	Mhangazhi	190	Mhangazi Electric Cooperative Association	REA	Provision of technical services and funds for construction of plant civil works and electromechanical equipment
				Mhangazi Electric Cooperative Association	Provide workforce for the project construction and necessary project land. Responsible for project management
	Total	3,193			

Expected global environmental benefits to be delivered

The proposed micro / mini hydropower based mini-grids project is expected to reduce a considerable amount of CO₂ emissions, which otherwise would have resulted from the use of diesel generators, as is currently the case in Tanzania (baseline). In addition, this project has a replication potential of about 24 MW in other potential sites. If this potential is realized, there will be a considerable reduction in the energy related CO₂ emissions in Tanzania. Moreover, the energy supply situation in the country will also be improved remarkably.

Based on the data collected, it has been estimated that the project will be instrumental in reducing around 335,648 t CO₂e of direct GHG emissions and around 2,685,185 t CO₂e of indirect emissions. Detailed description of direct and indirect GHG emission reduction is given in annex F.

Institutional continuity and replicability, and sustainability of global environmental benefits

The outputs to be generated by all the GEF UNIDO project components aim and contribute in creating an environment favourable for implementation of several micro / mini hydropower projects. The outputs are consistent with and instrumental in achieving the objectives of Tanzanian key energy policies as well as recommended plan of actions.

Project Component 1: Techno-economic feasibility studies for the identified demonstration sites

One of the key aspects for replicability of the project and sustainability of global environmental benefits depend upon technically feasible and commercially viable projects being demonstrated.

In the project component 1, through detailed techno-economic feasibility studies for the identified demonstration sites, the project will ensure that only the projects with high techno-economic feasibilities will be demonstrated. The success of the demonstration will increase the replicability of similar projects in Tanzania and will also increase the global environmental benefits on the whole.

Project component 2: Capacity building of relevant stakeholders in developing micro / mini hydropower based mini-grids

Under this component, a national micro / mini hydropower technical centre will be established and will take the key responsibility of providing trainings to technical institutions in the country. This institute will also impart training in developing micro / mini hydropower based mini grids to experts, planners and institutions. By this way the confidence of developing micro / mini hydropower based mini-grid projects locally will be enhanced. Under this component, technology will be transferred for local fabrication of micro / mini hydropower equipments. Guidelines and standards for micro / mini hydropower implementation and management will be developed. After the completion of the project, the technical centre will nominally charge for its services to generate some revenue for their sustainable operation. The sustenance of the centre will ensure the continuity, replicability of similar project and global environmental benefits of the project.

Earlier resource assessment conducted indicates the potential of small hydro plants to be 300-500 MW. A replication potential of 24 MW is assumed for the next 10 years which is conservative and a practically achievable target.

Project component 3: Developing viable business models for micro / mini hydropower based mini-grid

Through the various seminars, informal and consultative meetings between the financial institutions, government agencies and interested project developers, private sector will benefit from the available government subsidies and WB credit lines. Head-to-head meetings between the private sector and local financing institutions will facilitate the development of RE technologies including micro / mini

hydropower. Also under the project efforts will be taken for the creation of separate funding for micro / mini hydro under the existing schemes and available funding. This financing environment created will be a big boost for institutional continuity and replicability of similar projects.

Project component 4: Demonstration of micro / mini hydropower based mini-grids

3.2 MW micro / mini hydropower projects to be implemented under this component will demonstrate the technology, economics and environmental benefits of the projects throughout Tanzania. This will further ensure the sustainability of global environmental benefits that result from the operation of the micro / mini hydropower plants.

The monitoring, evaluation and dissemination of the results of micro / mini hydropower based mini-grids will increase the replicability of similar projects in Tanzania and will also increase the global environmental benefits on the whole.

B. DESCRIBE THE CONSISTENCY OF THE PROJECT WITH NATIONAL AND/OR REGIONAL PRIORITIES/PLANS:

The energy institutional framework for Tanzania has been undergoing restructuring for the past few years. The aim has been to enhance energy security and electricity access to its population. The National Energy Policy was reviewed in 2003. The policy considers the need to: (i) have affordable and reliable energy supply throughout the country; (ii) reform the market for energy services and establish an adequate institutional framework; (iii) enhance the development and utilization of indigenous RE sources and technologies; (iv) adequately take into account environmental considerations for all energy activities; (v) increase energy efficiency (EE) and conservation in all sectors; and (vi) increase the energy education and build gender-balanced capacity in energy planning, implementation and monitoring.

The policy had the following specific objectives: (a) to develop the abundant hydroelectric potential available in the country; (b) to reduce the deforestation through efficient use of woody biomass; (c) to promote the RE resources; (d) to promote the EE and conservation; and (e) to develop the human resources for facilitating the development of energy technologies.

According to the current National Energy Policy of the United Republic of Tanzania (2003), the goal of the rural electrification is the widespread improvement in standard of living of the rural population, thus attaining balanced socio-economic growth among all Tanzanians. Underpinning the policy objective is the issue of poverty alleviation, social development and environmental conservation objectives. Small scale industries, agricultural-processing industries and other income generating activities are given primary importance in planning rural programs. In order to accelerate social development in rural areas, schools, educational institutions, health facilities, water supply, communication and community centres are targeted in rural electrification projects. In addition, rural electrification has an objective of conserving the environment to minimize the impacts of deforestation, climate change, air pollution (indoor & outdoor) and land degradation on mankind development.

In June 2008, the new Electricity Act was passed by the President. This act provides a pivotal role to attract substantial private sector participation in the development of the power sector by creating legal security to the private sector involved in the development of electricity sector.

The government of Tanzania formed a regulatory body, the Energy and Water Utilities Regulatory Authority (EWURA) which became operational in 2006 with the role for ensuring regulatory oversight to promote private sector investment in the energy sector.

The country by recognizing the importance of supporting the rural energy development, created the Rural Energy Agency (REA) which became operational in 2007 to implement rural electrification programs via the Rural Energy Fund (REF). In the three years of operations, several efforts have already been made by

the agency to promote private sector investment in rural energy technology development in an affordable manner.

The proposed micro / mini hydropower plants of at least 3.2 MW cumulative capacity to be implemented under GEF project, is in coherence with the national policies of Tanzania by promoting RE technologies in the country. This will also be in line with the National Energy Policy of the United Republic of Tanzania (2003) by supplying the generated electricity to mini-grids. By generating the renewable electricity and supplying it to the mini-grid, the project will improve the social and environmental objectives of the policy.

The project will also strengthen and improve the policy and regulatory system for RE, including micro / mini hydropower, by providing incremental support FiT. The project addresses the efforts required to improve the private sector participation in the micro / mini hydropower projects through various trainings, streamlining of available financing mechanisms, etc. Under the GEF project, transfer of technology to interested micro / mini hydropower equipment fabricators will be done to enable local fabrication. This would ensure that similar projects will be replicated in other potential sites. Therefore, it is clear that this project is in line with all the above mentioned government policies and decisions and also fits well within the national priorities of providing access to rural energy through expanded rural electrification in the country.

C. DESCRIBE THE CONSISTENCY OF THE PROJECT WITH GEF STRATEGIES AND STRATEGIC PROGRAMS:

The project is consistent with the GEF Climate Change focal area Strategic programme SP-3: Promoting market approaches for renewable energy. As described in the climate change focal area strategy, the proposed project will contribute positively to the RE market transformation process, which will result in reduced fossil fuel use in the power sector and GHG emissions reduction. The demonstration of viable and sustainable micro / mini hydropower projects will improve the policy and regulatory system.

D. JUSTIFY THE TYPE OF FINANCING SUPPORT PROVIDED WITH THE GEF RESOURCES

The GEF resources will be utilized to support the development of micro / mini hydropower based mini-grid thereby demonstrating the viability of such projects. GEF resources will also be used for the following activities:

1. Preparation of detailed feasibility studies for the demonstration plants
2. Capacity building in developing micro / mini hydropower based grids;
3. Establishment of a national micro / mini hydropower technical centre with trained personnel;
4. Capacity building and transfer of technology for local fabrication of micro / mini hydropower equipments;
5. Technical assistance in developing FiT, guidelines and standards for micro / mini hydropower
6. Conduct of several seminars, meetings and match making between the financial institutions, government agencies with the interested project developers and
7. Implementation of 3.2 MW micro / mini hydropower projects for the demonstration.

The context and barrier analysis as well as stakeholders discussions carried out during the PIF preparation and PPG implementations have clearly shown that:

- The Government has insufficient resources, lack the technical expertise and institutional capacity to implement micro / mini hydropower projects and to implement programs for promoting and supporting micro / mini hydropower based mini-grid projects in Tanzania.
- The very limited expertise currently available in Tanzania is not going to be addressed without transfer to knowledge, expertise and implementation experience from other countries.

- Very high cost of the imported hydropower equipments leads to the decreased financial viability due to which the project developers lose interest.
- To convince private sectors that investing in micro / mini hydropower projects make a very good and economical sense and availability of national success story is a critical component for the effective promotion of micro / mini hydropower projects in Tanzania.
- Lack of successful demonstration project

The project is targeted to address and remove existing policy gaps and technical capacity barriers at the institutional and market level by providing technical assistance. GEF resources are needed to secure incremental international and national expertise; human resources and services needed to address and remove many of the identified barriers to implement micro / mini hydropower based mini-grids by carrying out the described activities.

E. OUTLINE THE COORDINATION WITH OTHER RELATED INITIATIVES:

There are currently two GEF funded projects that are being implemented by UNDP and WB, respectively, with which the proposed project is complementary and with which the coordination and synergies will be sought. They are: (1) transformation of the rural photovoltaic (PV) market (2004-2009), being implemented by UNDP in cooperation with the Ministry of Energy and Minerals, which aims at reducing Tanzania's energy-related CO₂ emissions by introducing solar PV electricity as a substitute for kerosene used for lighting in off-grid rural areas and at slowing down the rate of additional diesel-based captive generation or grid extension schemes to the non-electrified areas. (2) "Energy Development and Access Expansion in Tanzania", implemented by WB, aims at improving the quality and efficiency of the electricity service provision and at establishing a sustainable basis for access expansion. The UNDP has an on grid component, which supports TANESCO in expanding the grid (T&D, PV Market development and TA to REA). The WB project deals with off-grid investments especially in small power generation from small hydro, biomass and PV. Discussions with the WB project team confirmed that the proposed UNIDO project will be strategic and will help develop small hydro power (including micro / mini hydro) sector in Tanzania, which can then be scaled up by investments envisaged in the TEDAP (WB Project).

The current project will also be in line with the UNIDO's ongoing project in Nigeria which envisages the local manufacturing of turbines by transferring technology up to 125 kW.

F. DISCUSS THE VALUE-ADDED OF GEF INVOLVEMENT IN THE PROJECT DEMONSTRATED THROUGH INCREMENTAL REASONING :

At present, there are several barriers for the development and implementation of micro / mini hydropower mini-grid projects in Tanzania. The GEF funding is being requested to remove those barriers. This funding will provide the necessary support for the development and implementation of micro / mini hydropower mini-grid projects through improved policy and regulatory system, local fabrication of micro / mini hydropower equipments, increased local capacity to support the development of micro / mini hydropower projects, streamlining of available credit lines and subsidies, etc. The GEF funding to be used in the 3.2 MW micro / mini hydropower based mini-grid demonstration projects will demonstrate their respective technical feasibility and commercial viability, thereby helping in replication of such power plants in the future.

The identified barriers will be significantly removed through the implementation of the project and realization of replications. GEF financing will help in the establishment of National micro / mini hydropower technical centre, building of capacity as well as in provision of incremental support to FiT mechanism. The fund will also help in the project management in coordination activities.

Baseline

Tanzania is currently experiencing severe shortage of electricity for household, commercial and industrial applications. Only less than 14% of the total population has access to electricity from the national grid. In rural areas, the electricity access is less than 2%.

Lack of electricity leads to the increased use of kerosene, charcoal and more predominantly diesel generators, for satisfying the energy needs. Use of diesel generators in industrial and commercial sectors contributes significantly to the CO₂ emissions. On the other hand, proven hydro power resources exist in close proximity to the villages that are without electricity. The proven potential for small hydro power in Tanzania is approximated to around 300 to 500 MW.

Though electricity can be generated through the available hydro resources, only around 24 MW has been tapped. This is due to various constraints such as lack of proper institutional structure to support the development of small hydropower schemes, lack of technical expertise, high cost and difficulties in sourcing and importing equipment and lack of local manufacturing capabilities/facilities.

Significant capacity building is needed in the form of trainings to improve the situation. Local fabrication of the micro / mini hydropower equipments is extremely essential to have a significant penetration of the micro / mini hydropower technology in Tanzania. The Government is very well aware of these barriers, resources and capability constraints and is seeking the GEF support to remove those barriers.

Baseline trajectory

In the absence of the proposed GEF- UNIDO project, no significant improvement is expected within a short term. Micro / mini hydropower based mini-grid implementations cannot be expected to happen, that too up to the present envisaged capacity of 3.2 MW, in the immediate few years.

Without the GEF intervention, funding for this project could be difficult considering the barriers present in the country, in developing micro / mini hydropower based mini-grid projects and related investments. As in many other developing countries, the public sector in Tanzania will not be able to finance all the investments needed to satisfy the growing energy demand. Thus, it is important to seek the help of international funding agencies for the financial support to remove the existing barriers and to mobilize the necessary technical requirement for project implementation by the private sector.

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 MDGs, especially, environmental sustainability and poverty reduction. But, GEF support will be instrumental for the deployment of micro / mini hydropower based energy systems in Tanzania, in support of Government initiatives, for the betterment of energy situation in the country.

In the absence of the proposed GEF-UNIDO project, there will be lack of knowledge, understanding and technical capacity to manufacture the micro / mini hydropower based equipments. Potential stake holders will continue to suffer from lack of information, understanding, experience and technical capacity in micro / mini hydropower mini-grid projects. There will not be any project to demonstrate smooth operations of such projects. Without the help of this project, very little efforts would be taken towards the establishment of national technical centre, which would function as the learning hub for micro / mini hydro in the country. Without such establishments, it would be very difficult for concrete efforts on the faster penetration of micro / mini hydro technology.

In conclusion, the baseline scenario would not be able to bring about significant mitigation of most of the barriers that hamper the implementation of micro / mini hydropower based mini-grid projects in

Tanzania within a short period of time. The underlying critical problems such as the lack of adequate institutional capacity, supporting policies and regulations programs, local fabrication, technical expertise and skills on the market would remain unsolved for micro / mini hydropower mini-grid projects.

GEF Project Alternative scenario

The proposed UNIDO-GEF project would provide the necessary technical, financial and policy inputs required for supporting and effectively leveraging the national efforts in setting up and maintaining an infrastructure capable of supporting RE and in obtaining relevant GHG emission reductions. In doing so, the project would greatly multiply the impact and global environmental returns of resources allocated by the Tanzanian Government as well as by other international initiatives and programs.

GEF financing will be used to conduct detailed feasibility studies for the potential demonstration sites.

GEF financing is being sought to establish a National micro / mini hydropower technical centre, which would function as a learning centre, in providing technical trainings to relevant institutions for further replication of micro / mini hydropower projects in potential sites. GEF funding will also be used to strengthen the local fabrication of micro / mini hydropower equipments through the interested fabricators/manufacturers. Without GEF involvement, no private developer will be interested in developing the local fabrication capacity and transferring technology by themselves. Under such condition, GEF funding for such technology transfer is highly significant. Local fabrication of micro / mini hydropower equipments will bring down the investment costs of micro / mini hydropower plants drastically and this will in turn result in increased number of private developers willing to develop micro / mini hydropower plants.

Also, GEF financing will be used to streamline the existing financing options. Efforts will be made to include the micro / mini hydropower projects for the available government subsidies.

GEF project will provide technical assistance for implementing 3.2 MW micro / mini hydropower based mini-grid projects. The GEF co-financing would facilitate this project to get off the ground. Hence, without the GEF funding, this project would not move ahead. The implementation and dissemination activities of this project will result in significant confidence building in Tanzania and will enhance the interest in developing similar projects. The GEF financing will strengthen the institutional capacities, local knowledge and the expertise in the development, implementation, operation and maintenance of micro / mini hydropower based mini-grid projects. Use of hydropower electricity will save significant amount of diesel. The amount spent by the general public and commercial and industrial establishments on the purchase of diesel for power generation can be utilized for other alternative productive purposes.

Considering the articulated structure of the GEF-UNIDO project and its high complementary with other ongoing and planned RE related technical assistance programs, the project implementation would provide and receive critical contributions for multiplying the overall impact of Climate Change related technical assistance to Tanzania.

G. INDICATE RISKS, INCLUDING CLIMATE CHANGE RISKS, THAT MIGHT PREVENT THE PROJECT OBJECTIVE(S) FROM BEING ACHIEVED AND OUTLINE RISK MANAGEMENT MEASURES:

Eight categories of risks related to the project and achieving its objectives are considered:

1. Technical
2. Market
3. Financing
4. Policy
5. Governance/political
6. Sustainability
7. Implementation
8. Climate change risk

Component	Risk	Potential impact	Probability	Risk management
Technical risk	Micro / mini hydropower based mini-grids present some technological risks as they are relatively new to the rural areas of Tanzania.	High	Very low	<p>This risk is considered low, as there will be detailed techno-economic feasibility studies carried out on the identified sites and the actual project development will be based only for proven sites.</p> <p>Moreover, hydropower technology requires only minimum maintenance and it poses fewer problems from the point of view of technical aspect.</p> <p>Through the various trainings offered under the project, micro / mini hydropower plants can be operated successfully in rural areas of Tanzania with very low technical risk.</p>
Market risk	No off-takers for the generated electricity.	Medium	Very Low	<p>The electricity generated from micro / mini hydro power plants will be supplied to the local communities and other identified customers in each site. The present demand of electricity outstrips the supply and hence there will not be any risk for electricity off-take.</p>
Financing risk	No investors willing to invest in micro / mini hydropower based mini-grids.	High	Very low	<p>Letters for financial commitments from all the relevant stakeholders have been already obtained. Hence, the project does not have any financing risk.</p> <p>Under PC 2, incremental efforts will be taken to establish a FiT scheme for micro / mini hydropower projects. When such a scheme is implemented, grid connected micro/mini hydropower projects will become very attractive for the project investors.</p> <p>Under PC 3, by streamlining the</p>

				existing financing options from REA for MHP projects, the capacity of the local entrepreneurs to undertake micro / mini hydropower projects will be increased.
Policy risk	The current policies are too generic, addressing the energy issues in broader aspect. Failure to fix FiT for RE electricity.	Moderate	Moderate	This risk is low, as the government of Tanzania through the MEM is now revising the policy to see the possibility of developing a FiT for promoting RE technologies. The MEM in collaboration with the TANESCO is, with the ultimate aim of having a FiT in the country that will create an attractive environment for most of the private investors. In addition, the proposed project is mini-grid based and will not be affected by FiT. However, the project has been designed with a broader vision of promoting micro/mini hydropower on the whole within the country, which will be accelerated only if FiT is available exclusively for the grid connected micro / mini hydropower projects.
Governance / political risk	New governments change the existing policies on RE and withdraw support to the GEF project.	High	Very low	As the electricity requirement is a basic demand in Tanzania and is essential for its economic growth, even when the government changes, there is less possibility for not continuing this project.
Sustainability risk	Failure to achieve project outcomes and objective after successful delivery of outputs.	Moderate	Very low	Sustainability of the project will be ensured right from the beginning until the completion of the project. Detailed feasibility studies and productive use of electricity by the beneficiary communities will ensure the sustainability of the project.
Implementation risk	Failure to implement the project	Medium	Very Low	UNIDO will mitigate this risk through detailed development of activity plans 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.
Climate change risk	Drying of water resources	Moderate	Very low	Enough water storage facility will be provided so as to take care of the water requirement during the dry season. Hence, this risk can be overcome.
	Flooding	Moderate	Very low	Tanzania is vulnerable to moderate

				flooding only. Proper spillways and diversion channels will be constructed to overcome this risk in the flood prone sites.
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H. EXPLAIN HOW COST-EFFECTIVENESS IS REFLECTED IN THE PROJECT DESIGN:

The project is considered as a cost effective intervention for GEF due to CO₂ emission reduction potential from the enhanced use of renewable energy for mini grid based electrification in Tanzania. Currently, most of the individual electricity generation in Tanzania is small scale diesel based. For a GEF contribution of US\$ 3.35 million, this project will directly result in 3.2 MW installation of additional capacity based on micro / mini hydropower. More importantly, the project is expected to result in the replication of several such projects in Tanzania, thus making it a high impact GEF intervention with enormous potential for promoting renewable energy markets in the region as well as in the country. The pilot projects will increase the local capacity in such a way that, the future interventions will be further cost effective. The project is expected to save cumulative GHG emission savings of 335,648 t CO₂e directly and 2,685,185 t CO₂e indirectly.

Incremental cost principle applied on emission reduction from the project

Business-as-usual (BAU) scenario:

The BAU scenario describes what would happen without the GEF project. In the absence of this project, most of the rural communities continue to operate using diesel for their electricity source.

Even though there is a great potential for micro / mini hydropower plants in Tanzania, the potential will be left untapped due to lack of any technical expertise and policy regime in favour of micro / mini hydropower plants. Therefore, the baseline scenario would be the establishment of a diesel generator of capacity equivalent to 3.2 MW instead of micro / mini hydropower based mini-grids. This will lead to increased emissions due to burning of diesel. The investment under baseline scenario of installing a diesel generator of capacity equivalent to 3.2 MW is estimated at about 4.15 million USD.

GEF Project scenario:

The alternative scenario relies on the electricity production using available hydro resources through micro / mini hydropower plants. Several micro / mini hydropower plants of cumulative capacity 3 MW will be installed at the potential sites. The electricity will be supplied to the local communities through mini-grids. In the baseline, the same amount of electricity would have been generated using diesel generators.

For GEF project scenario, the investment for the 3.2 MW micro / mini hydropower based mini-grids is around 9.3 million US\$. This project will replace diesel power generation and will contribute to the emission reduction of about 335,648 t CO₂e over a lifetime of 20 years (assuming an emission factor for diesel is 0.8 t CO₂/MWh).

	Baseline	Alternative	Increment
Renewable electricity available for usage (MWh)	0	419,560	419,560
Grid displaced emission reduction, t CO ₂ e	0	335,648	335,648
Investment, '000 USD	4, 150	9,278.5	5,128.5
Incremental Cost USD/t CO ₂	15.3		

There is a part of GEF contribution towards equipment purchase for demonstration projects (except Andoya). Without GEF grant for this activity, the breakeven electricity sales price from these power plants will be very high and it will be very difficult to find electricity buyers near the project site. GEF involvement will bring down the electricity sales price to a reasonable level and will help in the realisation of the project.

Without GEF grant in other components, the expected overall outcomes of the project are not likely to materialise. Hence, without GEF contribution, there will not be significant development in micro/mini hydro power generation in Tanzania in the near future.

PART III: INSTITUTIONAL COORDINATION AND SUPPORT

A. INSTITUTIONAL ARRANGEMENT:

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

B. PROJECT IMPLEMENTATION ARRANGEMENT:

UNIDO will take the responsibility of implementing the project, the delivery of the planned outputs and the achievement of the expected outcomes. The project will be executed by UNIDO in collaboration with the concerned Government Ministries and private sector stakeholders.

UNIDO will administer/manage and allocate the funds of the project on behalf of the GEF Secretariat. UNIDO will provide assistance in the procurement process for any acquired equipment if requested, in the selection of national and international consultants as well as the subcontractors in accordance with the operational rules and regulations.

UNIDO will also provide the assistance on the formal GEF procedures that will apply to project execution including reporting issues and be the formal channel of correspondence between the project and the GEF secretariat. GEF specialist will provide technical backstopping to the project as deemed necessary.

UNIDO will be responsible for:

- The general management and monitoring of the project;
- Reporting on the project performance to the GEF;
- Procuring the international and national expertise needed for delivering the planned outputs under the four project components;
- Designating the national consultant and the programme officer who will be the focal point of the project;
- Coordinating with the project steering committee to review the project every 2 months during the project implementation period;
- Providing administrative support and financial budgetary follow up required for the execution of the project;
- Annual auditing of the project by following GEF procedures;
- Managing, supervising and monitoring the work of the international teams and for ensuring that the deliverables are technically sound and consistent with the project requirements.

REA will be responsible for:

- Construction of the various demonstration sites
- Establishment of the national micro / mini hydro technical centre

- Streamlined financing options for micro / mini hydro projects

CoET will be responsible for:

- Providing staff for the national micro / mini hydro technical centre
- Preparing the various training materials targeting different stakeholders
- Human and institutional capacity building in micro / mini hydro, by conducting suitable trainings

MEM will be responsible for:

- Providing additional institutional support for the recommendations on FiT for RE projects including micro / mini hydro projects.

TANESCO will be responsible for:

- Publishing the adapted guidelines for micro / mini hydro installation and management.

A Project Management Unit (PMU) will be established and hosted within one of the committee member institution. The PMU will consist of the National Project Manager (NPM) and the Project Administrative Assistant (PAA).

The PMU will be responsible for:

- Coordinating all the project activities carried out by the national experts and other partners by having close association with MEM and CoET.
- Day-to-day management, monitoring and evaluating the project activities as per planned project work.
- Organization of the various seminars and trainings to be conducted under Project Components 2 and 4.

UNIDO will provide the PMU with the necessary management and monitoring support. It will also provide financial support for the project evaluation.

A Project Steering Committee (PSC) will be established. The purpose of this committee will be to review the progress in project implementation, to facilitate the co-ordination among project shareholders and to maintain the transparency in ensuring the ownership and to support the sustainability of the project.

PSC will be responsible for:

- Guiding the project development strategically in line with the country needs and priorities
- Promoting the partnership among energy stakeholders
- Reviewing the project progress reports

The PSC will have a balanced representation from key stakeholders including MEM, which is responsible for policy formulation and execution of energy related matters in Tanzania, REA, which is responsible for promoting rural energy in the country and TANESCO, which is the national power utility and the major electricity generation and distribution company in the country, and VPO-DoE, which is the GEF focal point in the country. UNIDO and the CoET, UDSM are responsible for facilitating the capacity building activities.

The committee will be chaired by the GEF Focal point (Operations). The final composition of the PSC will be defined during the project implementation start-up phase. The PSC is envisaged to meet twice a year.

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

REA will be the core counterpart in executing the proposed project and will be responsible for carrying out and completing it. REA and MEM, as co partners will be responsible for:

- Providing in-kind contribution to the project coordination and administrative issues.
- Assisting with office space to accommodate the project coordination personnel and giving him/her necessary technical and administrative support.

Auditing the project voluntarily by following the national legislation, in case it is deemed necessary
 The figure below presents a summary of the proposed project implementation arrangement:

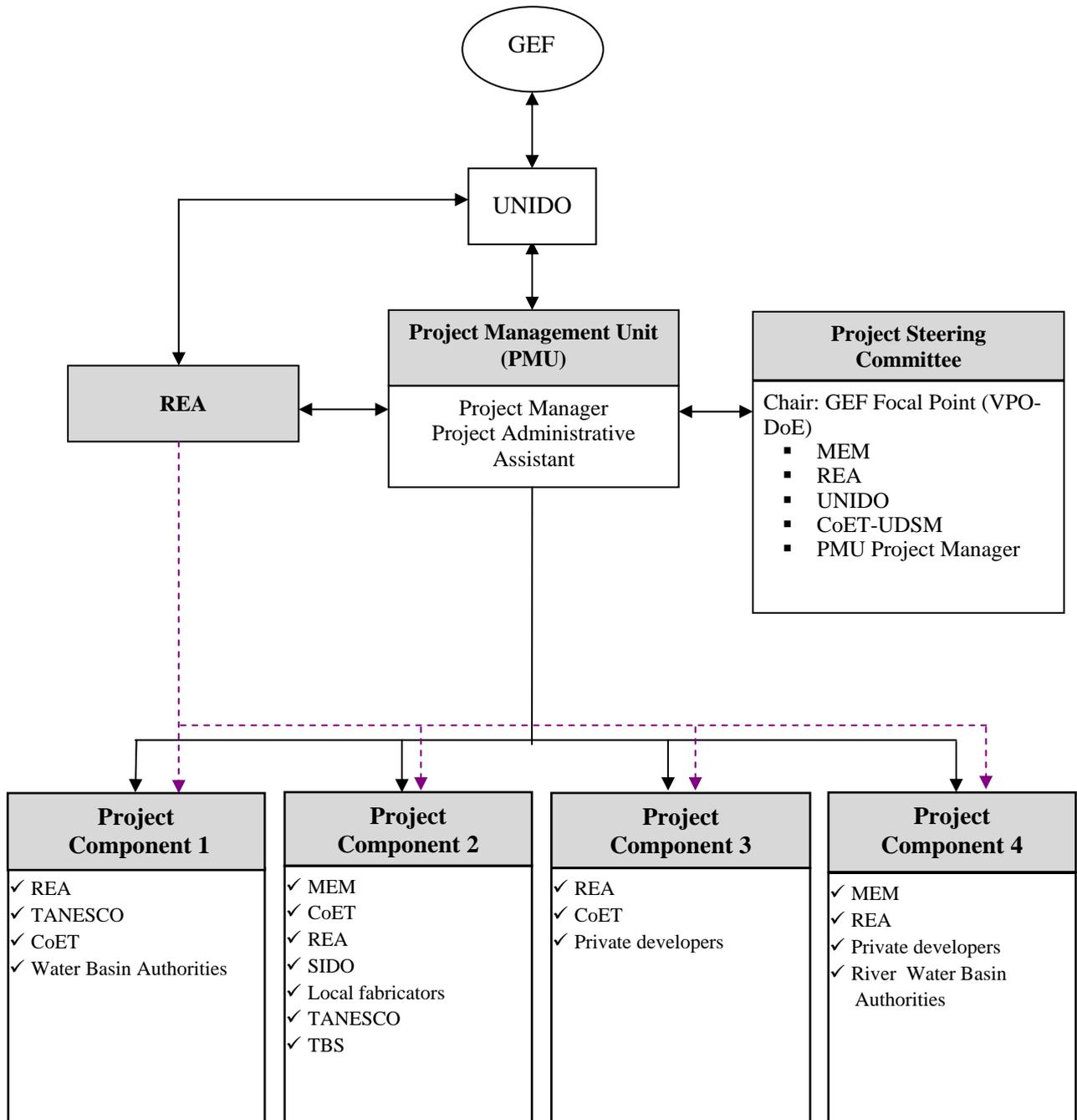


Figure 2: Schematic of project implementation arrangement

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

PART IV: EXPLAIN THE ALIGNMENT OF PROJECT DESIGN WITH THE ORIGINAL PIF:

The final design of the project is in line with the approved PIF. Further to the context analysis, review of existing barriers, meetings with various stakeholder groups carried out during the PPG phase, have confirmed the strong relevance of the original UNIDO GEF project and its additionality to ongoing and planned national programs to promote and support increased micro / mini hydropower based electricity in Tanzania.

The table below lists and compares the original PIF expected outputs and the final project design expected outputs. Observations are also made regarding the changes.

	Original PIF Expected Outputs	Final Project Design Expected Outputs	Observation
PC1	<p>1.1 Micro / mini hydropower resource assessment carried out.</p> <p>1.2. Existing micro / mini hydropower data-bases updated and map of potential sites developed.</p> <p>1.3. Potential sites for demonstration plants identified, and detailed studies undertaken.</p>	<p>1.1 Detailed feasibility studies prepared for the demonstration plants in the identified potential sites.</p>	<p>1. Since micro / mini hydropower databases on potential sites exist already, output 1.1 is removed</p> <p>2. Since detailed feasibility studies are developed, better outputs are obtained when compared to that of PIF.</p>
PC2	<p>2.1 Capacity of selected national technical institutions such as the University of Dar es Salaam enhanced to build local technical capability in micro / mini hydropower technology and rural energy planning</p> <p>2.2 Experts and planners are trained in micro / mini hydropower project planning and methodologies for micro / mini hydropower based mini grid development.</p> <p>2.3 Capacity for local manufacturing of micro / mini hydropower equipment and components built through transfer of technology and strengthening of local private sector fabrication facilities.</p> <p>2.4 Quality standards for micro / mini hydropower installation & management formulated.</p>	<p>2.1 National micro / mini hydropower technical centre established at CoET, UDSM to provide technical support for various technical institutions in Tanzania.</p> <p>2.2 Technology transferred on local fabrication of micro / mini hydropower equipments.</p> <p>2.3 Existing guidelines and standards adapted to suit installation and management of micro / mini hydropower plant mini-grids in Tanzania.</p> <p>2.4 FiT for micro / mini hydropower in place.</p>	<p>1. In the new project design, outputs 2.1 and 2.2 of PIF have been merged into a single output 2.1.</p> <p>2. For output 2.3 of PIF, in the final project design it was found appropriate to establish a single National micro / mini hydropower technical centre for providing support to technical institutions.</p> <p>3. The output on experts and planners training is changed into an activity under the output 2.1 in the new project design. Under the present design, after the establishment of National micro / mini hydropower technical centre, a separate activity on training the experts and planners will be carried out.</p> <p>4. International standards already exist. Hence, instead of developing new standards for Tanzania, the</p>

			<p>existing standards and guidelines will be prepared adapting to suit the Tanzanian conditions.</p> <p>5. A new output for providing incremental support for the ongoing FiT creation activities for RE projects has been added.</p>
PC3	<p>3.1 Develop sustainability indicators for micro / mini hydropower schemes capable of ensuring sustainability and financial viability of the mini grids.</p> <p>3.2 Local private sector capacity to undertake micro / mini hydropower projects as viable business venture increased through streamlining existing financing options such as the WB credit line for RE projects and other subsidies provided by the Government⁵.</p>	<p>3.1 Existing financing options of REA streamlined to benefit the local entrepreneurs interested in micro / mini hydropower.</p>	<p>1. Since sustainability indicators exist already, the same indicators can be used for the demonstration projects. Hence the output 3.1 is removed</p>
PC4	<p>4.1 A number of micro / mini hydropower plants with capacity totalling at-least 3 MW are designed, developed (10 sites with capacity ranging between 100-1000 kW), and commissioned in different areas in the country.</p>	<p>4.1 A number of micro / mini hydropower plants with cumulative capacity of at least 3.2 MW implemented in different locations within the country.</p>	<p>After the PPG stage where the pre-feasibility studies for different potential sites were conducted, 9 sites have been decided for 3.2 MW output.</p>

During the PIF preparation, there was an indication to get co-financing of USD 4,200,000 from bilateral aid agencies in Norway and Sweden. However, the money from the donor agencies is now being channelled through the government agencies.

The following table compares the indicative budget estimate during the PIF stage and during the CEO stage:

⁵ Micro / mini hydropower installations for demonstration funded by this project will not receive funding from other GEF/WB project. Co-financing from donors, private sector and Government will be used for this purpose.

		During PIF Stage			During CEO Stage		
Project Component		Indicative Budget Estimate (US\$)			Indicative Budget Estimate (US\$)		
No	Details	GEF Fund	Co-financing	Total	GEF Fund	Co-financing	Total
1	Technical assessment and mapping of micro / mini hydropower resources in Tanzania	400,000	800,000	1,200,000	200,000	650,000	1,050,000
2	Capacity building of relevant stakeholders in developing micro / mini hydropower based mini-grids	1,000,000	800,000	1,800,000	700,000	700,000	1,700,000
3	Developing viable business models for micro / mini hydropower based mini-grid	400,000	400,000	800,000	250,000	350,000	600,000
4	Demonstration of micro / mini hydropower plant based mini-grids.	1,400,000	4,800,000	6,200,000	1,900,000	7,378,500	8,778,500
5	Project management	150,000	400,000	550,000	300,000	700,000	1,000,000
Total		3,350,000	7,200,000	10,550,000	3,350,000	9,778,500	13,128,500

In the PIF, the total indicative co-financing for the project was around USD 7,200,000 only. But in the new project design, as a result of pre-feasibility studies carried out at the different sites during PPG stage, the co-financing amount has been increased to around USD 9,778,500 which is much higher than that of the original PIF value. This increase in cost is mainly due to the increase in requirements of civil works and cost of equipments during the PPG period.

Although the co-financing amount has been increased, the GEF financing under the new project design still remains as USD 3,350,000, which is same as that of the PIF.

Since few of the outputs of PC 1 and PC 2 have been revised, GEF grant has been reduced. The decreased GEF grant is relocated to PC 4 with increased demonstration from 3 to 3.2 MW. During the PPG stage it was found that the GEF allocation for the project management in the PIF was underestimated. Since the project involves 9 sites, it was decided to increase the project management budget from 150,000 USD (PIF) to 300,000 USD.

Similarly from detailed investigation it was found that GEF fund allocation for project component 3 is high. Hence in CEO stage it was decided to increase the project management budget from 150,000 USD to 300,000 USD. PC 3, budget was reduced from 400,000 USD to 250,000 USD.

Also, the project management budget from co-financing has been increased from 400,000 USD to 700,000 USD. The extra budget for this has been reallocated from PC 1, PC 2, and PC 4. Therefore, the budgets of PC 1, PC 2 and PC3 in CEO stage are slightly lower that that was proposed during the PIF stage.

PART V: AGENCY (IES) CERTIFICATION

This request has been prepared in accordance with GEF policies and procedures and meets the GEF criteria for CEO Endorsement.

Agency Coordinator, Agency name	Signature	Date (Month, day, year)	Project Contact Person	Telephone	Email Address
Mr. Dmitri Piskounov, Managing Director, UNIDO GEF Focal Point		20/04/2011	Mr. Jossy Thomas, Industrial Dev. Officer, Energy & Climate Change Branch, PTC, UNIDO	+43- 1 - 26026- Ext. 3727	j.thomas@unido.org

ANNEX A: PROJECT RESULTS FRAMEWORK

Project Strategy		Objectives verifiable indicators				
		Indicator (quantified and time-bound)	Baseline	Target	Source of verification	Risks and assumptions
Goal	To reduce GHG emissions related to the use of carbon intensive energy sources in rural areas in Tanzania.	<ol style="list-style-type: none"> 1. Percentage increment in use of micro / mini hydropower based electricity by rural population. 2. Percentage Increment in CO₂e emission reductions (t CO₂e). 	<ol style="list-style-type: none"> 1. Only 2% of rural population has access to grid electricity. 2. CO₂ emission due to diesel based local power generation. 	A cumulative of 3.2 MW micro / mini hydropower based mini-grids installed during the project duration (2011-2015).	<ol style="list-style-type: none"> 1. Physical verification of the projects in operation. 2. End of project M&E report. 	<ol style="list-style-type: none"> 1. Continuous support of relevant government departments and private investors are in place. 2. Policies are in place.
Objective of the project	To promote micro / mini hydropower based mini grids in Tanzania to augment rural electrification.	<ol style="list-style-type: none"> 1. Number of MWs of micro / mini hydropower based mini-grids in operational. 2. Number of locally fabricated micro / mini hydropower equipments and accessories. 3. Number of institutions and entrepreneurs available for developing micro / mini hydropower plants. 4. FiT for RE including small/micro / mini hydropower plants in place. 	<ol style="list-style-type: none"> 1. Only 2% of rural population has access to grid electricity. 2. No local fabricators available for micro / mini hydropower equipments. 3. Lack of technical capacity (human and institutional). 4. Weak policy and regulatory regime. 	<ol style="list-style-type: none"> 1. 3.2 MW (cumulative capacity) of micro / mini hydropower plants with mini-grids established. 2. At least 5 institutions and 5 entrepreneurs available for developing micro / mini hydropower plants. 3. FiT for RE including small/micro / mini hydropower plants established. 	<ol style="list-style-type: none"> 1. Physical verification of the implemented projects. 2. Physical verification of the fabrication units. 3. Published FiT rates for micro / mini hydropower mini-grids. 	<ol style="list-style-type: none"> 1. Sustained support of the Government (through different policies), REA, all project participants and project investors. 2. Interested local fabricators available.

Project Strategy		Objectives verifiable indicators				
		Indicator (quantified and time-bound)	Baseline	Target	Source of verification	Risks and assumptions
Outcome 1	Site specific details on potential micro / mini hydropower sites available for further development.	1. Detailed techno-economic feasibility studies for the identified 9 demonstration sites..	1. Lack of detailed studies for the demonstration sites.	1. Feasibility studies of identified demonstration sites developed.	1. Feasibility study reports.	Continuous support of Government agencies, national utility and the private sector.
Project Component 1: Techno-economic feasibility studies for the identified demonstration sites						
Output 1.1	Detailed feasibility studies and plant designs prepared for the demonstrations in the identified potential sites.	Number of feasibility reports of the demonstration sites (cumulative 3.2 MW).	No feasibility studies exist for the micro / mini hydropower plants development.	To undertake feasibility studies of demonstration sites.	9 feasibility study reports including plant designs for the demonstration sites.	Sustained private and Government support upon agreed project activities.
Outcome 2	Investment cost of micro / mini hydropower based mini-grids reduced because of the local availability of technical experts and high quality indigenous hydropower equipments.	<ol style="list-style-type: none"> 1. Number of trained local planners and experts on micro / mini hydropower based mini-grids. 2. Number of institutions capable of guiding and supporting micro / mini hydropower plant development in future. 3. Number of micro / mini hydropower turbines and controls systems manufacturing facilities operating in the country. 	<ol style="list-style-type: none"> 1. No sufficient local knowledge exists on developing, implementing and managing the micro / mini hydropower projects. 2. Inadequate institutional capacity exists in the country. 3. Micro / mini hydropower turbines and control systems are imported. 	<ol style="list-style-type: none"> 1. To strengthen the capacity of at least 100 persons from CoET, experts, planners and other relevant stakeholders to support micro / mini hydropower mini-grids development in the country. 2. To build capacity of TANESCO and River Basin Authorities in developing and managing micro / mini hydropower systems. 	<ol style="list-style-type: none"> 1. Number of trained persons. 2. Number of institutions capable of guiding and supporting micro / mini hydropower plant. 3. Physical verification of operating personnel in the power plant. 4. Training materials. 5. Training evaluation report. 6. Number of trained 	<ol style="list-style-type: none"> 1. Sustained private, institution and Government support upon agreed project activities. 2. Interest of local fabricators.

Project Strategy		Objectives verifiable indicators				
		Indicator (quantified and time-bound)	Baseline	Target	Source of verification	Risks and assumptions
				3. To transfer technology for facilitating local fabrication of micro / mini hydropower plant equipments to at least 5 interested suppliers.	fabricators. 7. Physical verification of the manufacturing facilities.	
Project Component 2: Capacity building of stakeholders in developing micro / mini hydropower based mini-grids						
Output 2.1	National micro / mini hydropower technical centre established at CoET, UDSM to provide technical support for various technical institutions in Tanzania.	Approval received and Centre operating.	Insufficient technical capacity exists in various institutions on micro / mini hydropower systems.	To establish the centre, strengthen it with trained personnel and equip with necessary tools and systems for micro / mini hydropower plant development.	1. Physical verification. 2. Government reports. 3. End of project M&E report.	Continuous support of the participating technical institutions, private sector and Government of Tanzania.
Output 2.2	Technology transferred for local fabrication of micro / mini hydropower equipments.	1. Number of local fabricators trained and licensed in manufacturing of micro / mini hydropower equipments. 2. Number of locally fabricated turbines used in at least 2 installations of the project.	All hydropower equipments imported.	1. To transfer and adapt micro / mini hydro turbine technology to Tanzania. 2. To train at least 5 interested suppliers.	1. No. of trained fabricators 2. License certificates 3. Training evaluation report 4. No. of trained persons 5. Physical verification	Interest of local fabricators and investors.

Project Strategy		Objectives verifiable indicators				
		Indicator (quantified and time-bound)	Baseline	Target	Source of verification	Risks and assumptions
Output 2.3	Existing guidelines and standards adapted to suit installation and management of micro / mini hydropower plant mini-grids in Tanzania.	Existing guidelines and standards adapted to suit the micro / mini hydropower development, installation and commissioning in Tanzania	No guidelines and standards exist for micro / mini hydropower installation and management. Current focus is on large hydropower plants only.	To prepare and disseminate guidelines and standards on installation and management of micro / mini hydropower mini-grid projects.	1. Guidelines on project development, installation and commissioning. 2. Government reports.	Continuous support of Government, close collaboration of TANESCO and TBS.
Output 2.4	Feed-in tariff for micro / mini hydropower in place.	Feed-in-tariff system favouring RE including micro / mini hydropower market available.	No market based systems favouring RE including micro / mini hydropower exists in the country.	To facilitate introduction of feed-in-tariff for micro / mini hydropower systems	Communiqué of regulatory authority.	Sustained collaboration among Government, micro / mini hydropower training centre, relevant institutions and private stakeholders.
Outcome 3	Interest in developing micro / mini hydropower projects increased among the local entrepreneurs.	1. Number of micro / mini hydropower plants developed and invested by local entrepreneurs.	1. Low interest from private entrepreneurs to engage in micro / mini hydropower development.	1. To create interest among investors and entrepreneurs in micro / mini hydropower projects of at least 24 MW capacity	1. Number of investors. 2. Business models developed. 3. Physical verification of the operating power plants	Interest of local entrepreneurs.
Project Component 3: Developing viable business models for micro / mini hydropower based mini-grid						
Output 3.1	Existing financing options of REA streamlined to benefit local entrepreneurs	Percentage increase in engagement of local entrepreneurs to develop micro / mini hydropower	Low interest from private entrepreneurs to engage in micro / mini hydropower	At least 10 private sector initiatives facilitated for micro / mini hydropower based	1. Project progress reports. 2. End of Project	Sustained support of Government and the private stakeholders.

Project Strategy		Objectives verifiable indicators				
		Indicator (quantified and time-bound)	Baseline	Target	Source of verification	Risks and assumptions
	interested in micro / mini hydropower.	projects.	project development.	mini-grids.	survey.	
Outcome 4	Technical and economic viability of micro / mini hydropower technologies demonstrated.	<ol style="list-style-type: none"> 1. Number of rural households with access to electricity. 2. Number of micro / mini hydropower plants in operation. 	Only around 2% of the rural population has access to grid electricity.	To establish at least 3.2 MW (cumulative) capacity of micro / mini hydropower based mini-grids in rural areas.	<ol style="list-style-type: none"> 1. Physical verification. 2. Report of commissioning. 	Sustained support of Government and private stakeholders.
Project Component 4: Demonstration of micro / mini hydropower plant based mini-grids						
Output 4.1	3.2 MW implemented in different locations within the country.	Micro / mini hydropower power plants established and running in different sites of Tanzania.	Currently only 5 MW of the potential 250 MW micro / mini hydropower exist.	To develop micro / mini hydropower plants within the capacity ranging from 98 kW – 1MW in selected sites.	<ol style="list-style-type: none"> 1. Physical verification of the implemented projects. 2. Performance monitoring report 3. Site visit / seminar. 4. Seminar material, leaflets, various publications and website. 	<ol style="list-style-type: none"> 1. Sustained support of the Government. 2. Sustained investor support to visit the project while in operation and data collection.

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: 08th February 2010

Sl. No.	STAP Comment	Response to STAP comment
1.	The project should develop interventions addressing the following barriers	
i.	Small scale of the power system and lack of economies of scale for commercialization	The project design envisages the manufacturing of equipments required for micro / mini hydro power systems. In order to achieve this, the project is designed to establish a National micro / mini hydro technical centre and also to provide training for the interested manufacturers with the support of international manufacturing experts, local institutes and private sectors. Efforts would be taken to utilise the locally fabricated equipments in the potential replication sites.
ii.	Dispersed and remote locations of SHP systems, away from potential demand centres, hence making it expensive to transmit power	In order to take care of this comment, the project has been planned for the mini-grid for each of the site. By this way, even the remote and dispersed locations can be supplied with electricity and no need to depend upon the availability of national transmission lines. Also the potential sites have sufficient electricity demand near the power plants.
iii.	Potentially low demand and purchasing power in rural areas for any commercial scale operation	The sites have been selected based on the prefeasibility study conducted and also on where there is a good potential for electricity generation as well as equal demand for electricity
iv.	Financial viability for private sector needs to be demonstrated	There will be 9 demonstration power plants in this project, which will demonstrate the financial viability of the micro / mini hydro power projects to the private sectors. Moreover, financial viability models will be developed which will be useful for private sector investors/developers
2.	The following “factors of success” of have to be considered in the project:	
i.	Matching the installed capacity to local demand	Based on the prefeasibility study, the installed capacities of the micro / mini hydropower plant based mini-grids match with the respective local electricity demand
ii.	Repayment capacity and appropriate repayment mechanisms	Appropriate tariff and billing systems developed will take care of this. The focus will be on encouraging development of productive activities around the power plant so that people will be empowered enough to pay the electricity bills.

		Moreover, increased availability of electricity will in turn increase the productivity of the industries which will ensure the repayment capacity for electricity bills.
iii.	Demand for electricity for commercial activities in the area to generate income for the entrepreneurs	During the prefeasibility study itself, the demand for commercial activities are studied so as to generate/improve income for the entrepreneurs.
iv.	Clusters of SHPs to facilitate economies of scale, since dispersed and isolated systems are difficult to maintain and operate	Local manufacturing occurring due to the project activity will bring down the cost and hence to certain extent take care of the economy of scale factor. The project also conducts training on micro / mini hydropower systems operation and maintenance. These trained persons will be available to take care of this cluster in all locations.
v.	Guaranteed technical performance of the SHP systems	UNIDO intervention and assistance in capacity building, technical aspects, monitoring, performance evaluation and tracking during the project period will create and sustain the technically skilled personnel for future operations, and hence will guarantee the technical performance of these systems throughout the life time.
vi.	Assured service, maintenance and supply of spare parts for decentralized systems	The project is designed to envisaged to train for the interested manufacturers/suppliers. This will also include the training for after sales service, maintenance and supply of spare parts for the micro / mini hydropower based mini-grids within the country itself. This assures the availability such services within reach.
vii.	Sale of surplus electricity to the national grid, if the local demand is not adequate (may be a technological challenge in remote areas).	The prefeasibility study shows the demand and the designed capacity of the sites. As these sites are selected based on the demand and supply potential, there will not be any surplus to supply to the national grid apart from Andoya hydroelectric power plant from which a part of electricity will be supplied to the national grid
3.	There is a need of clear strategy of scaling up from the demonstration projects	The project will identify the potential sites for further development. The identification will consider the electricity demand of the sites. By successfully demonstrating 3.2 MW micro / mini hydropower projects (involving 9power plants), the private entrepreneurs will be encouraged to install such plants in other potential sites. These plants will be either based on mini-grids or if the demand is lower, it will be directly connected to the government grid.

ANNEX C: CONSULTANTS TO BE HIRED FOR THE PROJECT USING GEF RESOURCES

<i>Position Titles</i>	<i>\$/person week*</i>	<i>Estimated person weeks**</i>	<i>Tasks to be performed</i>
For Project Management			
National Project Manager	1,250	192	Responsible for the organization, management, monitoring, coordination of all the project activities. Responsible for organization of the training sessions to be held under PC2 and PC 4. Full-time assignment for the entire duration of the project, i.e., 4 years. 1 week= 5 working days; 1 months= 4 weeks;
Project Administrative Assistant	250	192	Responsible for the financial and administrative activities of the project, tracking and ensuring timely disbursement of project funds, assist the PM in the organization of the training sessions and to be held under PC2 and PC4. Full-time assignment for the entire duration of the project, i.e., 4 years. 1 week= 5 working days; 1 months= 4 weeks;
For Technical Assistance			
International Experts			
International Experts on micro / mini hydro-power			
PC 2	3,000	48	<ul style="list-style-type: none"> • Assessing capacity building needs for various technical institutions • Developing training manuals for micro / mini hydropower trainings • Establishing the micro / mini hydropower technical centre • Training the expert planners and institutions on micro / mini hydropower project development and implementation • Preparing the micro / mini hydropower projects development guide • Sharing micro / mini hydropower related experiences from other countries • Adaption of existing guidelines and standards for local micro / mini hydro power plants installation and management
PC 3	3,000	24	<ul style="list-style-type: none"> • Facilitating head-to-head meetings between the private sector and local financing institutions • Recommendation on exclusive micro / mini hydropower fund within the existing subsidies / financing options
PC 4	3,000	8	<ul style="list-style-type: none"> • Full scale demonstration of the projects

<i>Position Titles</i>	<i>\$/person week*</i>	<i>Estimated person weeks**</i>	<i>Tasks to be performed</i>
International Expert for Policy and Feed-in tariff			
PC 2	3,000	4	<ul style="list-style-type: none"> • Providing incremental support to the Tanzanian Government in drafting the feed-in-tariff scheme for RE projects
International Expert on Fabrication of Mini/Micro hydro equipment			
PC 2	3,000	16	<ul style="list-style-type: none"> • Foreseeing the manufacturing process and devising the means to sustain the process
National Experts			
PC 2	1,000	112	<ul style="list-style-type: none"> • Co-ordinating with the international expert in assessing capacity building needs for various technical institutions and CoET • Co-ordinating with the international expert in developing training manuals for micro / mini hydropower trainings • Co-ordinating with the international expert in establishing the micro / mini hydropower technical centre • Co-ordinating with the international expert in preparing the micro / mini hydropower projects development guide • Co-ordinating with the international expert in foreseeing the manufacturing process and devising the means to sustain the process • Facilitating the issuance of licenses to the trained fabricators • Co-ordinating with international expert, TANESCO, TBS in publishing the standards and manuals • Co-ordinating with the international policy expert in the providing incremental support for the establishment of feed-in-tariff
PC 3	1,000	48	<ul style="list-style-type: none"> • Creating awareness among the stakeholders on the available subsidies and available credit lines • Co-ordinating with the international expert in facilitating head-to-head meetings between the private sector and local financing institutions • Facilitation to secure the available financing/subsidies for 10 projects
PC 4	1,000	8	<ul style="list-style-type: none"> • Assisting the international expert in the full scale demonstration of the project
PC 2 – International expert travels – USD 52,000 PC 2 – Local expert travels – USD 57,000 PC 3 – International expert travels – USD 20,000			

<i>Position Titles</i>	<i>\$/person week*</i>	<i>Estimated person weeks**</i>	<i>Tasks to be performed</i>
PC 3 – Local expert travels – USD 30,000 PC 4 – International expert travels – USD 8,000 PC 4 – Local expert travels – USD 6,000 PC5 – Travel allocation – USD 12,000			

* Provide dollar rate per person week. ** Total person weeks needed to carry out the tasks.

CONSULTANTS TO BE HIRED FOR THE PROJECT USING CO-FINANCING RESOURCES

<i>Position Titles</i>	<i>\$/person week*</i>	<i>Estimated person weeks**</i>	<i>Tasks to be performed</i>
For Project Management			
International expert	3,000	16	Conduct an independent evaluation of the project (final evaluation)
National expert	1,000	12	Conduct the mid-term evaluation of the project
For Technical Assistance			
International Experts			
International Experts on micro / mini hydro-power			
PC 4	3,000	76	<ul style="list-style-type: none"> • Bidding document preparation for the demonstration sites • Bid launching and evaluation • Selection of equipment supplier/EPC contractor • Performance monitoring of the projects and preparation of monitoring reports. • Supervision of projects during project implementation. • Development of dissemination tools
National Experts			
PC 1	1,000	16	<ul style="list-style-type: none"> • Carrying out due-diligence on the potential sites • Co-ordinating with the sub-contractor in delivering the feasibility reports for the potential sites
PC 2	1,000	16	<ul style="list-style-type: none"> • Co-ordinating with the international expert in training the expert planners and institutions on micro-mini hydropower project development and implementation • Co-ordinating with the sub-contractor in training the interested suppliers in fabricating the micro / mini hydro equipments and controls
PC 4	1,000	348	<ul style="list-style-type: none"> • Coordinating with international expert for the preparation of bidding document for the power plants • Coordinating with the international expert for launching the bid document, bidding, evaluation and selection of contractor for power plants • Assistance in O&M planning for the micro / mini hydropower plants • Developing bidding document for mini-grid and distribution network • Launching the tender document for mini-grid

<i>Position Titles</i>	<i>\$/person week*</i>	<i>Estimated person weeks**</i>	<i>Tasks to be performed</i>
			<ul style="list-style-type: none"> • Evaluating the bid for mini-grid bid and selecting the mini-grid supplier • Supervision of micro / mini hydro power plants construction and commissioning • Supervision of mini-grid construction and commissioning • Dissemination of project results and findings • Coordinating with international expert in the monitoring, testing and reporting on plant performance • Other power plant development works

* Provide dollar rate per person week. ** Total person weeks needed to carry out the tasks.

ANNEX D: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS

A. EXPLAIN IF THE PPG OBJECTIVE HAS BEEN ACHIEVED THROUGH THE PPG ACTIVITIES UNDERTAKEN.

PPG objectives have been almost fully achieved.

B. DESCRIBE FINDINGS THAT MIGHT AFFECT THE PROJECT DESIGN OR ANY CONCERNS ON PROJECT IMPLEMENTATION, IF ANY:

Findings that might affect project design

Although co-financiers have committed to invest in the power plant projects, the money transfer has not yet taken place. Private investors support is very crucial for the successful implementation of the 3.2 MW hydro power plant projects. Implementation of these projects is the most important for building confidence among various stake holders. Result of monitoring and evaluation of implemented project is very beneficial for knowledge transfer. Other than this, there is no finding that might affect project design.

Any concerns on project implementation

No additional concern beside the risks discussed in PART II, SECTION G.

C. PROVIDE DETAILED FUNDING AMOUNT OF THE PPG ACTIVITIES AND THEIR IMPLEMENTATION STATUS IN THE TABLE BELOW:

<i>Project Preparation Activities Approved</i>	<i>Implementation Status</i>	<i>GEF Amount (\$)</i>				<i>Co-financing (\$)</i>
		<i>Amount Approved</i>	<i>Amount Spent To date</i>	<i>Amount Committed</i>	<i>Uncommitted Amount*</i>	
Collection of supplemental data	Completed	20,000	20,000		0	20,000
Stakeholder consultations	Completed	20,000		20,000	0	20,000
Design of demonstration projects	Completed	10,000	10,000		0	10,000
Project strategy and implementation detailing	Completed	10,000	10,000		0	10,000
		60,000	40,000	20,000	0	60,000

* Any uncommitted amounts should be returned to the GEF Trust Fund. This is not a physical transfer of money, but achieved through reporting and netting out from disbursement request to Trustee. Please indicate expected date of refund transaction to Trustee.

ANNEX E: CALENDAR OF EXPECTED REFLOWS

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

NOT APPLICABLE

ADDITIONAL ANNEXES

ANNEX F: ESTIMATE OF GHG EMISSIONS REDUCTIONS

The project activity is the installation of 3.2 MW micro / mini hydropower plants. The project involves direct and indirect emission reductions. The activity contributing to direct emission reduction is due to the installation of 3.2 MW micro / mini hydropower based mini grids and that of indirect emission reduction is replication of similar type of power plants within 10 years in other potential sites.

Direct emission reduction:

3.2 MW micro / mini hydropower plants directly results in emission reduction through electricity generation that replaces diesel usage. The direct emission reduction is calculated using fuel savings attributable to the investment.

Power capacity	: 3,193 kW
Capacity factor	: 75%
Annual electricity generation	: $3,193 \times 8,760 \times 0.75$
	: 20,978,000 kWh
	: 20,978 MWh

Water resource availability in each site, varies on a monthly basis. Due to budget constraints extensive data collection process could not be conducted as the number of projects involved for demonstration are high. Infact more sites were studied and 9 sites were shortlisted. Hence detailed data collection during PPG stage was not possible. Already a study was conducted on Tanzanian hydro power sites by University of Twente, The Netherlands and there average data of 75% is used for the time being. During the project stage, detailed study on capacity factor for each site will be conducted.

The power plant has a useful lifetime of 20 years. Over its lifetime, micro / mini hydropower based electricity will replace existing diesel based electricity generation. The emission factor for the technology used in baseline scenario is 0.8 t CO₂/MWh.

Amount of electricity generated (A)	: 20,978 MWh
Emission factor for diesel (B)	: 0.8 t CO ₂ /MWh
Average useful investment lifetime (C)	: 20 years

$$\begin{aligned} \text{Direct emission reduction} &= A \times B \times C \\ &= 20,978 \text{ MWh} \times 0.8 \text{ t CO}_2/\text{MWh} \times 20 \text{ years} \\ &= 335,648 \text{ t CO}_2\text{e} \end{aligned}$$

The direct emission reduction from the generated electricity, which replaces diesel usage in the baseline scenario, is 335,648 tCO₂e.

Indirect Emission Reduction (Bottom-up Approach):

The installation of micro / mini hydropower plants also contributes in emission reduction after the project completion, which is accounted as indirect emission reductions. The approach used in this project to calculate indirect emission reduction is bottom-up approach, which considers only the number of times that the project might be replicated after the project completion.

The project activity has long term emission reduction after the project that is achieved through the installation of similar type of power plants in the project area. The number of similar projects in a period of 10 years represents the replication factor. Based on the available estimates for micro / mini hydropower potential, it is conservatively assumed that around 26 MW of micro / mini hydropower plants would be replicated in other potential sites.

Direct emission reduction (A) : 335,648 t CO₂e
Replication factor (B) : 8

Indirect emission reduction = A x B
= 335,648 t CO₂e x 8
= 2,685,185 t CO₂e

Results

Emission reductions	t CO₂e
Direct emissions reductions	335,648
Direct post project emissions reductions	-
Indirect emissions reductions	2,685,185

ANNEX G: LETTERS OF CO-FINANCING

THE UNITED REPUBLIC OF TANZANIA
RURAL ENERGY AGENCY

Telephone: +255 (22) 241200/1/2/3
+255 (22) 2412005/6
Facsimile: +255 22 2412007
E-mail: info@rea.go.tz



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

Ref. No: BC 72/157/08/3

08th March, 2011

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

**RE: COMMITMENT FROM THE RURAL ENERGY AGENCY ON SUPPORTING THE
PROJECT OF MINI - GRIDS BASED ON MINI/MICRO-HYDROPOWER SOURCES
TO AUGMENT RURAL ELECTRIFICATION IN TANZANIA**

This is to express that the Rural Energy Agency (REA) is highly supportive of the UNIDO- GEF initiated project titled "Mini Grids Based on Mini/Micro Hydropower Sources to Augment Rural Electrification in Tanzania". To ensure the full and successful implementation of this Project, the REA will provide counterpart funding of up to Seven Million US Dollars (\$7mill) in cash and kind to complement the resources already approved by the GEF and other partners.

The Government believes that the project will complement previous and on-going efforts of the Government of Tanzania for the provision of mini grids on mini-hydro sources to augment rural electrification. The Government is aware of the current generation capacity which is far below what is required for rural dwellers and for alternative sources for isolated rural communities.

The duration of the co-financing of the above total will be made available over the next four years (2011-2015).

At this point REA would like to express its acknowledgement to the consideration and looking forward to seeking the cooperation in the implementation of this important project.

Sincerely,


Lutengano U. A. Mwakahesya
DIRECTOR GENERAL

Copy: Mr. Dmitri Piskounov,
Managing Director,
PTC, UNIDO

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

~~CONFIDENTIAL~~
THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF ENERGY AND MINERALS

Telegrams "ENERGY"
Telephone: 255-22-2117156-9/2119158
Fax No.: 255-22-2116719/2120799



754/33 SAMORA AVENUE
P. O. BOX 2000,
DAR ES SALAAM

Ref. No. CAB 88/321/01

14/02/2011

Managing Director,
UNIDO GEF Focal Point,
P. O. Box 9182,
DAR ES SALAAM

**RE: COMFORT LETTER FOR THE CO-FINANCING FROM GOVERNMENT
OF TANZANIA TO SUPPORT THE IMPLEMENTATIONS OF GEF-4
PROJECT IN TANZANIA**

Reference is made to your letter dated 18th January 2011 regarding the captioned subject.

The Ministry of Energy and Minerals (MEM) in collaboration with TANESCO have carried out identification and assessment of Small Hydro Power Projects in Rukwa, Mbeya, Iringa, Ruvuma and Kagera regions. So far the identified potential in SHP is approximated to be 475MW of which 8MW has been developed.

Meanwhile, the arrangement to carry out assessment in Morogoro and Kigoma regions is in progress. The schedule for this task will take place effectively from May to October 2011. MEM and TANESCO are also planning to carry out an additional assessment in Iringa region during October and November 2011 to cover the remaining areas not covered during the previous assessment. The estimated total cost for this task is **US\$36,000** taking into consideration that, assessment for SHP in one region is estimated to cost **US\$12,000** for two months.

Based on the aforesaid, the Ministry of Energy and Minerals has capacity to co-finance the project in the form of in-kind contribution. This support is in form of human resources, instruments, equipment and transport to and from the site.

Your cooperation is appreciated.

BM

Eng. B. J. Mrindoko

FOR: **PERMANENT SECRETARY**

~~CONFIDENTIAL~~

Andoya Hydro Electric Power Co. Ltd



Stand Street Plot No. 199 Block A, P.O. Box 45 Mbinga Tanzania
Tel/Fax: +255 25 2640075, Mob: 0704-002042, 0760-002042, 0704-000620,
Email: andoyahepo@yahoo.com

AHEPO/02/2011

10th March 2011

Dmitri Piscounov
Managing Director
Programme Development and Technical Cooperation Division
P.O. Box 300, 1400 Vienna, **Austria**.

Dear sir,

RE: CO-FINANCING COMMITMENT TO FOR DEVELOPMENT OF 1MW PLANT AS PART OF UNIDO GEF-4 PROJECT ON PROMOTION OF 'MINI GRIDS BASED MINI/MICRO HYDRO POWER FOR THE ARRANGEMENT RURAL ELECTRIFICATION IN TANZANIA"

We would like to thank UNIDO for showing interest in promoting mini hydro plants in Tanzania, Andoya Hydroelectric Power Co Ltd is committed to develop such projects in Tanzania as part of efforts to increase the national electrification share.

Andoya Hydroelectric Power Company Limited (AHEPO) is a Company established for the purpose of developing and running mini hydro plants for power generation for the rural Tanzania. To start with, the Company will develop 1MW Mini Hydro Plant under the UNIDO GEF 4 project cycle.

The company will mobilise cash amounting to US\$ 2,500,000 in relation to project development through Own equity, bank loans and beneficiary contributions. The company will also be responsible in plant installation and operation work throughout the project lifetime.

We would like to sincerely thank UNIDO for its interest in supporting our project and hope to continue with such cooperation.

Yours Sincerely,

A handwritten signature in blue ink, appearing to read 'Menas Andoya', is written over a horizontal dotted line.

.....
Menas Andoya
Managing Director
AHEPO CO. LTD



**UNIVERSITY OF DAR ES SALAAM
COLLEGE OF ENGINEERING AND TECHNOLOGY
OFFICE OF THE PRINCIPAL**

P.O. BOX 35131 - DAR ES SALAAM - TANZANIA

Tel.: +255 22 2410753 (Direct) or 4210501-9/Ext.2800
Fax: +255 22 2410114 or 2410411 or 2410029

E-mail: principalcoet@udsm.ac.tz
Website: www.CoET.ac.tz

Our Ref.: CoET/001/JHYK/

Date: 08th January 2011

UNIDO-GEF Project

Project title: Mini-Grids Based on Micro Hydropower Sources to Augment Rural Electrification in Tanzania

Re: CoET in-kind Co-financing Commitment

The College of Engineering is committed to implement the project and therefore it will provide in kind support worth USD 50,000. In this regard CoET will avail its facilities and staff to facilitate fabrication of turbines, capacity building activities such as training of technical personnel and policy makers, skilled technicians to undertake maintenance of facilities during and after the project. Specifically our contribution can be categorized as follows:

- i) Availing TDTC workshop (space, some machinery and personnel) for turbine manufacturing training place;
- ii) Availing TDTC workshop (space, some machinery and personnel) as local turbine manufacturing centre and training centre for local entrepreneurs in turbine manufacturing;
- iii) Venues for technical training, seminars and workshops;
- iv) Office space and/or secretary for project training coordination;
- v) 20 academic staff to be trained as trainers;
- vi) 1 academic staff as member of national steering committee of the proposed project;
- vii) 5 Staff to serve as Project Committee at the College of Engineering and Technology to oversee the components that CoET will be coordinating.

Prof. JHY Katima
Principal

Behindertenhilfe

Behindertenhilfe
Neckar-Alb
Federnseestr. 3
72764 Reutlingen

Friedemann Salzer
Leitung
00497121/9300611
00491752632343
friedemann.salzer@bruderhausdiakonie.de

Evangelische Kirchengemeinde Eilsleben
in Zusammenarbeit mit dem
Kirchenkreis Egelin
(Evangelische Kirche Mitteldeutschland)



Christoph Timme
A2 Eilsleben
Ostend 2
004939409502
timme.eilsleben@t-online.de

Micro-hydropower Project Tanzania Ijangala-Tandala (Downstream)

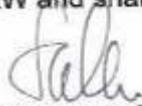
We, the Protestant (Lutheran) Church in Eilsleben in cooperation with the church district Egelin(Protestant (Lutheran) Church of Middle Germany)

and

the Behindertenhilfe Neckar-Alb (Organisation helping special aid people in the area of Reutlingen, Germany)

commit ourselves to contribute to finance the Micro-hydropower Project Tanzania Ijangala-Tandala. We are ready to take over the cost of the transmission line for the amount of 112,500 US Dollars.

The (main) purpose of our cofinancing this project is the support of the Dianconical Centre of Tandala. The need of electricity of this centre is 50 - 100 kW and shall become reality through our contribution.

 12.1. 2011

Friedemann Salzer
Director of
Behindertenhilfe Neckar-Alb

bruderhausDIAKONIE
Stiftung Gustav Werner und Haus am Berg
Behindertenhilfe Neckar-Alb
Federnseestraße 3
72764 Reutlingen



Christoph Timme
for
Evangelische Kirchengemeinde
Eilsleben