



# REQUEST FOR CEO ENDORSEMENT

PROJECT TYPE: FULL-SIZED PROJECT

TYPE OF TRUST FUND: GEF TRUST FUND

## PART I: PROJECT INFORMATION

Project Title: Increased energy access for productive use through small hydropower development in rural areas			
Country(ies):	Madagascar	GEF Project ID: <sup>1</sup>	5317
GEF Agency(ies):	UNIDO	GEF Agency Project ID:	120094
Other Executing Partner(s):	Ministry of Energy and Hydrocarbons (MEH); Ministry of Environment, Ecology, Sea and Forestry (MEEMF), Rural Electrification Development Agency (ADER)	Submission Date: Re-submission Date:	03/30/2015 05/05/2015
GEF Focal Area (s):	Climate change	Project Duration (Months)	60
Name of Parent Program (if applicable)		Project Agency Fee (\$):	271,225

### FOCAL AREA STRATEGY FRAMEWORK<sup>2</sup>

Focal Area Objectives	Expected FA Outcomes	Expected FA Outputs	Trust Fund	Grant Amount (\$)	Cofinancing (\$)
CCM-3	Outcome 3.1: Favourable policy framework created for renewable energy (RE) investments	Output 3.1: RE policy and regulation in place	GEF TF	200,000	1,110,000
	Outcome 3.2: Investment in RE technologies increased	Output 3.2: Electricity and heat produced from renewable sources	GEF TF	2,655,000	13,195,000
<b>Total project costs</b>				<b>2,855,000</b>	<b>14,305,000</b>

### A. PROJECT FRAMEWORK

**Project Objective:** To stimulate the use of small hydropower to reduce Greenhouse Gas emissions and trigger productive use for income generation, in alignment with strategic and policy priorities of the Government of Madagascar

Project Component	Grant Type <sup>3</sup>	Expected Outcomes	Expected Outputs	Trust Fund	Indicative Grant Amount (\$)	Indicative Cofinancing (\$)
1. Policy and regulatory framework	TA	National Low-Carbon Energy Development Plan developed and initiatives to support SHP in place tailored	1.1 Policy framework on RE for productive use reviewed and recommendations to streamline policies/incentive schemes towards a greater use of rural-based SHP proposed 1.2 Standardised reference emission levels established	GEF TF	200,000	1,110,000
2. Private-led SHP technology demonstration	TA	New SHP capacity (at least 2 MW) constructed and operational	2.1 Target SHP projects fully prepared for development and co-financing secured <a href="#">Moldova Investment Promotion Agency</a>	GEF TF	400,000	2,000,000

<sup>1</sup> Project ID number will be assigned by GEFSEC.

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

<sup>3</sup> TA includes capacity building, and research and development.

			(MIEPO)			
	INV		2.2 SHP capacity of 2 MW on preselected sites realised		1,400,000	7,000,000
3. Capacity strengthened to ensure sustainable replication	TA	Enabling environment for sustainable SHP replication in place  Capacity of key national actors strengthened	3.1 A mechanism to facilitate sustained securing of finance set up through development of appropriate business models between public entities and private & financial sectors developed 3.2 Capacities of major actors from private, government, and finance and target SME sectors strengthened in the specifics of SHP through tailored training(s) and knowledge management 3.3 A Nationally Appropriate Mitigation Action (NAMA) for the SHP sector developed		670,000	3,400,000
4. Monitoring and evaluation and dissemination carried out	TA	Project's progress towards goals confirmed and necessary adjustments made, and evaluation system for project's GHG emission reductions in place	4.1 Mid-term and final evaluation carried out; project's progress assessed, documented and recommended actions formulated 4.2 GHG emission reductions from the project monitored and evaluated and carbon registry for the project in place	GEF TF	50,000	120,000
Subtotal				GEF TF	2,720,000	13,630,000
Project Management Cost (PMC) <sup>4</sup>				GEF TF	135,000	675,000
Total Project Cost				GEF TF	2,855,000	14,305,000

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

Please include letters confirming cofinancing for the project with this form

Sources of Cofinancing	Name of Cofinancier	Type of Cofinancing	Amount (\$)
Government	Ministry of Energy and Hydrocarbons	Cash	4,000,000
Government	Ministry of Environment, Ecology, Sea and Forest	In-kind	160,000
Private sector	ASSIST	Cash	6,500,000
Finance sector	Bank of Africa	Loan	3,525,000
GEF Agency	UNIDO	Cash	60,000
GEF Agency	UNIDO	In-kind	60,000
<b>Total Cofinancing</b>			<b>14,305,000</b>

## C. TRUST FUND RESOURCES REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY<sup>1</sup>

GEF Agency	Type of Trust Fund	Focal Area	Country Name/ Global	(in \$)		
				Grant Amount (a)	Agency Fee (b) <sup>2</sup>	Total c=a+b

<sup>4</sup>To be calculated as percent of subtotal.

<b>Total Grant Resources</b>						

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

<sup>2</sup> Indicate fees related to this project.

**F. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS:**

<b>Component</b>	<b>Grant Amount (\$)</b>	<b>Cofinancing (\$)</b>	<b>Project Total (\$)</b>
International Consultants (est.)	100,000	100,000	200,000
National/Local Consultants (est.)	500,000	1,000,000	1,500,000

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

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

**PART II: PROJECT JUSTIFICATION**

**A. DESCRIBE ANY CHANGES IN ALIGNMENT WITH THE PROJECT DESIGN OF THE ORIGINAL PIF:**

**Project duration**

At PIF stage France already suggested to consider a longer project duration than the initial 48 months, and based on the observation during PPG phase that the quality and reliability of data may pose a problem, and taking into account typical timelines for construction of small hydropower plants (SHP), the suggestion is well appreciated and project duration is accordingly changed to 60 months (5 years).

**Project methodology and merging of components**

The activities and consultations during the PPG have shown very clearly the key barriers to an accelerated and sustainable activation of the small hydropower potential. These barriers include the lack of (quality) data for Small Hydropower Project (SHP) sites, a limited involvement of private sector players due to a lack of confidence, and a policy and regulatory framework which is insufficiently streamlined and enabling to provide that confidence. The project will address those barriers by realising exemplary SHPs to demonstrate a systematic approach which can be replicated to activate the vast SHP potential in the country. This systematic approach will consist of the following three steps:

- *STEP1: Address the primary barrier hampering the development of Small Hydropower Projects (SHP) in Madagascar, namely the lack of quality data on the feasibility of project sites:*

This lack of data is due to the fact that the government does not have the resources to invest in data collection and preliminary studies, and the private sector does not have enough confidence in the policy regulatory system. The project resources will be smartly used to unlock this situation by focusing on key target sites.

- *STEP2: Trigger the realisation of 2 MW of SHP through a private-led partnership*

The construction of exemplary SHP will familiarize both the private and public sector with a straightforward approach which can easily be replicated after the project ends. From the start the initiative will be led by private sector investments, with the GEF project acting in a triggering, supporting and facilitating mode. In that sense only a limited financial incentive will be provided by the GEF project to local private sector project developers, with the rest of the investment coming from the project developer (either as equity or through loans from local banks), thus leveraging the GEF funding and from the start creating the capacity and initiative at local private sector level.

The priority sites for development under the GEF project will be decided jointly with the Government of Madagascar (based on the applicable procedures). Assuming a 20% financial support from the UNIDO-GEF project, and an average cost of US\$ 3500/kW, it is anticipated that the GEF project will directly trigger 2 MW of SHP capacity (US\$ 1,400,000 is earmarked for investment in the GEF project, which would trigger a total investment of 7 MUS\$; at an average cost of US\$3,500/kW this equals 2 MW).

- *STEP3: Replication ensured through tailored capacity building and development of a pipeline of projects*

Based on the results of Steps 1 and 2 and especially the experience of the pilot projects, and based on the collaboration with financial institutions such as Bank of Africa and African Development Bank, the best scheme can be selected to be promoted as a blueprint for future SHP project developments in the rural areas of Madagascar. The aim is for this approach to significantly and sufficiently remove the identified barriers. Technical assistance will be provided to develop a pipeline of projects which can be developed and replicated without the triggering investment support from this project.

It is expected that this exercise will take form as of the 3<sup>rd</sup> year of implementation, and will integrate the results of the mid-term evaluation. The project will work closely with national project developers, strengthen capacity at private sector level and also trigger local manufacturing of SHP components (such as the concrete poles), thus supporting innovation, sustainable industrial and economic development and long term job creation for women and men.

The first component “Policy and regulation” is being kept as a separate component as it will cover the continuous and cross-cutting set of activities to support the government in their SHP related work, and will ultimately refine and improve the existing framework in order to enable and maximize the replication of SHP projects.

Steps 1 and 2 essentially form the key activities of Project Component 2 “Private-led SHP technology demonstration”, which will generate the most concrete and tangible results in the form of SHP plants, and accordingly has the most GEF funding allocated against it. Step 3 will be covered in component 3 “Replication strategy”, and is integrating the “Capacity building” component which in the PIF was a separate component. The merging into one component is based on the rationale that the activities under the two components as mentioned in the PIF essentially serve the same purpose of ensuring sustainability, strengthening and institutionalising capacity, and on the recognition that the backbone of the project lies in component 2, with components 1 and 3 acting in support and building on the results of component 2.

The above project methodology will form the basis for the project structure and the breakdown into activities per component, and is further detailed in following sections, especially in section A.5.

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

The project will build on the existing legal and regulatory framework of the Malagasy energy sector, which has been aiming to encourage private investment and competition in the energy sector. To enable this, the Government of Madagascar (GoM) has passed legislation allowing the liberalization of the generation and distribution of energy.

The Sectoral Act (2000) and subsequent texts firstly helped establish a comprehensive institutional framework. At that time the Office for Electricity Regulation (ORE) was created (facilitated by private generators), with regulatory powers for the determination of tariff levels and investment review. The ORE guidance (Decret No. 203-194 du 04/030/03) gives a clear pricing methodology based on categories of consumers and geographical area, strengthens the development of the sector through the alignment of prices, and avoids the previous budgetary deficits created by the electrification of isolated areas.

The Agency for Rural Energy Development (ADER) and the National Electricity Fund (FNE) were created in 2000 (operational in 2005-2006) to accelerate the electrification of the country, to promote access to basic energy services to the rural population, and develop renewable energy sources, including wind, hydro and solar. The FNE through Decret No. 2003-510 22/04/03, finances rural electrification through levied investment subsidies to owners or operators and has been successful in installing some isolated electrification schemes and grid extensions.

In 2011, the Ministry of Energy initiated discussions to engage the multi-sectoral review of the policy and regulatory framework governing the development of the energy sector. In 2012, a steering committee was set up under the leadership of the Ministry of Energy (with the Ministry of Petroleum and the Ministry of Environment and Forests) to review the country's energy policy. In 2013, the Energy Task Force (consisting of representatives of GoM, civil society, private sector, technical and financial partners) offered to support the Ministry in the development of energy policy. A report “Recommendations for an Energy Policy in Madagascar” has recently been issued (June 2014) with a clear set of objectives and actions to 2050 against an overarching Energy Vision.

The Second National Communication under the UNFCCC in 2011 evaluated that the major contributor to GHG emissions in Madagascar is the energy sector (i.e. through the use of fossil fuels for the production of electricity and heat), accounting for 34.1% of the emissions. Consequently the GoM recognizes that efforts to produce electricity from small hydropower can contribute to the reduction of GHG emissions, as well as increase the energy security and reduce the cost of energy to the national economy. This approach is in line with the broad vision for the energy

sector in Madagascar that energy (whether for lighting, cooking, transportation and industry, both in the urban and rural areas) must be accessible to all, in terms of price, good availability to meet people's needs, using state-of-the-art modern technology that is adapted to the end goals. The development of energy must be based on sustainable use of potential natural energy resources, making energy efficiently, using renewable energies, and the adoption of sustainable practices.

Madagascar is a member of the Common Market for Eastern and Southern Africa (COMESA), the 19 countries of which promote regional integration through trade development and to develop natural and human resources. In 2012 COMESA embarked on an Energy Programme to promote regional cooperation in energy development, trade and capacity building. The programme is intended to harmonize energy policy and regulatory frameworks through model policy and regulatory guidelines and will facilitate trade in energy services through standards and develop regional energy infrastructure through a medium to long-term energy master plan.

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

The project will contribute to the GEF Climate Change Strategic Objective 3: Promote investment in renewable energy technologies. The project aims to transform the small hydropower (SHP) market for productive use in Madagascar to provide sustainable income generation for women and men in the target areas. It aims to do this through triggering private sector investment in combination with public funds, through market demonstration, development of appropriate financial instruments, establishment of technical specifications, capacity building (for SMEs, academic institutions, policy makers & financial sector) and by strengthening the policy and regulatory environment. Setting up a stimulating market environment that enables the realization and replication of SHP projects will lead to significant GHG emission reductions through replacement of diesel-based generation and help Madagascar in activating its significant small hydropower potential in support of its poverty reduction strategy and transformation towards low carbon development.

## **A.3 The GEF Agency's comparative advantage**

Since its establishment, UNIDO has built up a long track record assisting countries to implement industrial support programmes. UNIDO's Energy Branch pursues the integration of low-carbon objectives into industrial development policies and activities, especially with respect to small- and medium-sized industries. In particular, UNIDO's Renewable Energy Strategy aims for the following long-term objectives and strategic outcomes:

- *Creating business development opportunities by increased access to electrification through mini-grids*
- *Mainstreaming the use of renewable energy in industrial applications, in particular for SMEs*
- *Supporting innovative business models promoting renewable energy as a business sector*

In line with UNIDO's mandate of Inclusive and Sustainable Industrial Development (ISIS), GEF council document GEF/C.31/5 states that UNIDO's overall comparative advantage is that it can involve the industrial / private sector in projects. This is also the case in the proposed project, where the focus will be on facilitating low carbon electricity systems in Madagascar. UNIDO's experience in working with the industrial sector in general and small and medium-sized enterprises in particular, is therefore critical for the achievement of the objectives set forth in this project. Furthermore, the document illustrates the comparative advantages of UNIDO services in sustainable energy and climate change as increasing economic activity and competitiveness through the introduction of state-of-the-art small hydropower technologies; and reducing GHG emissions.

UNIDO has widespread experience to interact with all levels of stakeholders from the private and public sector as well as CSOs. UNIDO gives special attention to mainstream gender equality throughout its technical cooperation project portfolio.

UNIDO has successfully implemented SHP projects including in Rwanda, Zambia and Kenya. These projects have been distinguished for a well-implemented South-South collaboration in Zambia, in terms of capacity building in Rwanda and for the creation of the energy kiosk concept in Kenya. UNIDO has a country office in Antananarivo which has been instrumental in the preparation of the project and gather support from key government and other stakeholders. It is clear that this office will be crucial in the implementation of the project. UNIDO currently has a number of projects ongoing in Madagascar especially in the agro-food sector.

To ensure up-to-date know-how, UNIDO actively collaborates with a number of small hydro technology centres, networks and learning platforms worldwide. For example, in collaboration with the International Centre for Small Hydro Power (IC-SHP), headquartered in Hangzhou, China, UNIDO recently published the first World Small Hydro Development Report 2013 (WSHPDR 2013) to develop the first small hydropower knowledge portal providing a global assessment of small hydropower capacities and potential. UNIDO also works with affiliated

centres in Trivandrum, India and Abuja, Nigeria and the Green Industry Platform, which can offer south-south partnerships for this project to promote knowledge management and best practices. UNIDO is therefore well placed to implement this project with its global network of experts and experience from its other GEF funded project portfolio.

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

##### **A.4.1 Baseline scenario**

Given that many parts of the country are suitable for the development of SHP, there has been some modest government and private sector activity in the SHP sector, yet despite this significant potential, the country's performance has not been as strong as it could be. This is evidenced by the comparatively larger amount of hydro-carbon based small energy systems operating nationwide on about 100 isolated rural grids, with the vast majority (about 80%) using diesel<sup>5</sup>. It has been estimated by the World Small Hydropower Development Report (2013) that a near-term 48.19 MW capacity of SHP could potentially be available in Madagascar, although the total economically feasible capacity of all hydro, including all large projects, is at least 2,600 MW. Despite this significant potential - which is the fifth largest hydro potential in Africa - only 6% is presently exploited.

Although there could be a few SHP projects developed by government and private operators in areas judged technically feasible and financially viable, it is clear that without the GEF intervention, mostly further diesel-based grids will be installed, increasing GHG emissions and the country's vulnerability to changes in world oil prices. The vast majority of potential stakeholders will continue to suffer from lack of information, and a limited understanding and technical capacity to take forward SHP opportunities. Without GEF support only a limited amount of supporting policy work to improve the RE/SHP sector can be prepared due to the lack of public resources to enable this.

Despite the opportunities for SHP and the policy support through Article 3 of Law No.98-032 that initiated the Agency for Rural Electrification (ADER) and the ORE, with authority to decide the electricity tariff for the grid electrification regions, the country has not enacted any secondary legislation to specifically promote and enable the development of renewable energy projects. The creation of a regulatory framework for renewable energies would promote the utilization of such energy sources in the country, as well as facilitate and improve currently-operational projects and planned projects. A feed-in tariff (FIT) structure would greatly assist technologies such as SHP, but this is not on the current policy agenda and JIRAMA has been reluctant to offer favourable rates in the meantime, with only two operators of small hydropower plants (SHP) managing to conclude individual power purchase agreements (PPA) with JIRAMA on the basis of a 10-years tenure, albeit at a low rate of USD 0.053 per kWh. The lack of certainty on tariffs implies that project developers and investors have insufficient confidence and investment security to move heavily into SHP and RE in general.

In summary, it can be concluded that the GoM has indeed been making efforts to improve the institutional structure of its energy sector, with a view to stimulate private sector participation and a preference for renewable energy projects. Yet the development of more detailed regulations to put this policy into practice is still incomplete, and the political situation has slowed down the overall process. This UNIDO-GEF project therefore aims to support the GoM in fine tuning the regulatory framework which can provide the confidence for investors and project developers, and demonstrate the use of SHP to support inclusive economic advancement. Based on the observation that political willingness, initial private sector interest and demand for electricity are all present, the project aims to play a triggering and facilitating role to reduce the risks for private sector. The project will especially focus on the capacity range of 100 to 1500 kW, as a range which has received relatively limited attention but has specific replication potential to help the government in its ambition to address the currently low access rates to modern energy services.

##### **A.4.2 Baseline project for SHP in Madagascar**

###### **A.4.2.1 Government initiatives**

In 2008, given the continued dependency on oil imports, the GoM set ambitious targets for extending electricity access under the Madagascar Action Plan (MAP 2007-2012), in line with the long term development of the country. The MAP was the medium term framework for achieving the country's long term development aspirations as well as achieving targets in the Millennium Development Goals (MDGs). One of the targets was to increase the electricity access rate to 74% in urban areas and 10% in rural areas by the year 2011 with encouragement given to all possible sources of energy (solar, hydro, wind, non-traditional biomass). But by the end of 2014, the national

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<sup>5</sup> Parc Existants - Electrification Rurale - ORE, December 2013

electrification rate was only about 15.7%, with urban area coverage of 44.38% while that of rural areas was 4.96%. A National Development Plan (NDP) to replace the MAP is currently under development and will be available in the course of 2015. Additional background on Madagascar's energy situation is presented in Annex 6.

The GoM has a tendering procedure in place to award SHP sites to project developers through a "call for projects"; more details on the project site selection including ADER's procedures for awarding sites are presented in Annex 7.

In the final quarter of 2014, a regional energy strategy policy proposal from the ADER to the Ministry of Energy and Hydrocarbons for the 4 regions of **Sava, Sofia, Bongolava and Ihorombe** had been agreed. Two sites proposed by UNIDO had been integrated to this project for the regions of Sava and Sofia respectively for the sites of **Ankitsika and Marobakoly**.

Finally the national utility JIRAMA can conclude Power Purchase Agreements (PPAs) with Independent power Producers (IPPs) especially for SHP projects.

#### A.4.2.2 Other initiatives

With support from GiZ, from late 2013 onwards, ADER has begun to collate more detailed hydrological studies for 20 sites to validate their potential. UNIDO used this information to pre-select with ADER some of these locations as part of the GEF project. Also African Development Bank is monitoring private SHP projects and may consider providing financing for such (typically larger capacity) projects.

#### A.4.3 Key barriers identified during PPG

The project preparation grant (PPG) phase has identified in detail the existing barriers and constraints to the development of small hydropower. The barriers include policy-related, technical, financial and capacity and awareness-related issues, and are described in more detail in Annex 6. The table below focuses on those barriers which are deemed critical to accelerate SHP development, and which the project will be able to effectively tackle.

These key barriers are the lack of (quality) data for Small Hydropower Project (SHP) sites, a limited involvement of private sector players due to a lack of confidence, and an insufficiently streamlined and enabling policy and regulatory framework to provide that confidence. The overview of the key barriers and the response the project will provide, is presented in the table below.

**Table 1: Key barriers as identified during PPG phase**

<b>Primary Barriers</b>	<b>Detail</b>	<b>Mitigation activities that will be supported by the GEF project</b>
<b>Policy and regulation</b>	Legal framework is insufficiently enabling for development of RE sector, including a lack of a detailed regulatory framework governing the use of water from rivers and defining technical conditions for SHP development, a need to simplify complex approval procedures, very high fees for use of water, multiplicity of entities to obtain different permissions etc.	The project will support government in its SHP related work, and especially on the implementation of the New Law No.034-2008 (13 November 2008) - once approved and adopted - by developing tailored regulatory initiatives for reform of the electricity sector and by bringing in the experience from the demonstration projects, international best policy practice, and private sector perspectives
<b>Technical</b>	Lack of reliable hydrological data therefore inaccurate energy potential estimates and uncertain economics. No funding available and long time required for completion of feasibility studies and associated work (public sector has limited funds; private sector has insufficient confidence to make the investment in preparatory studies)	<p>The project has already started pre-feasibility studies for 5 sites during PPG phase, and will continue to provide the technical assistance in the technical preparation of the project sites, in coordination with the government entities</p> <p>The project will improve and institutionalise the data collecting in a central database, including through the use of data from 'Fleuves et rivières de Madagascar' (1993 revised 2005) and a step-by-step increase in gauging data availability for Madagascar rivers and ADER recording data</p> <p>The project will prepare a pipeline of projects for replication after the end of the project</p>
<b>Financial</b>	Lack of confidence from private sector including due to policy-related risks, and worsened by high initial investment cost and long duration of return on investment for the implementation of SHP projects	The project will facilitate the coordination with government entities and provide a limited yet critical financial incentive (approx. 20%) to trigger the investment decision and support the private sector-led SHP development
	High interest rates prevent potential developers engaging in SHP and a lack of a business model for SHP commercialization	The project will establish a distribution model that will allow the local population to benefit, reduce the risk and thus increase financial attractiveness for the private sector
<b>Demonstration, awareness and capacity</b>	Lack of information and awareness among potential project developers, financial institutions, policy makers and the general public	Active dissemination of SHP project information for all stakeholders to strengthen knowledge of SHP effectiveness, including problems encountered and lessons learnt, and factors that led to successes or failures
	Lack of qualified personnel in SHP sector. Lack of management skills of project developers and operators	Training provided and capacity institutionalised, involving academic institutions and international partners

#### A.4.4 Identification of priority sites

Based on a long selection process 5 project sites have now been prioritised, as shown in the table below. The selection of potential sites for this GEF project goes back to even before the PPG when ADER had already started identifying preferential hydro sites for 4 regions (Sava, Sofia, Bogonlava, Ihorombe) but was faced with the unreliability of some hydrological data and flow measurements. The full history of the prioritisation exercise is presented in Annex 7.

These final 5 sites were assessed in July 2014 from a business viability perspective in order to present business plans for the private sector to consider possible investment. Socio-economic profile (and capacity to pay), technical details, design drawings, grid routines, costs and financing, are presented in full in Annexes 1 – 5, and are summarised below. All estimation costs are including the cost of the grid and/or connection lines.

**Table 2: Final list of priority SHP sites for UNIDO GEF project (with Business plans)**

Site	Region	Capacity	Energy pa (kWh)	Grid type	Est. cost
Bemanavy	Sava	200 kW	1,575,340	Isolated grid	\$ 1,063,168
Marobokoly	Sofia	1,050 kW	4,968,963	30 km to JIRAMA	\$ 3,839,317
Ankistsika	Sava	1,000 kW	7,937,261	28 km to JIRAMA	\$ 2,773,198
Andriamanjavona	Sava	500 kW	3,405,866	6 km to JIRAMA	\$ 1,524,737
Andampibe	Sava	250 kW	1,917,097	Isolated grid	\$ 1,212,960
<b>TOTAL</b>		<b>3,000 kW<sup>7</sup></b>		<b>(no contingency)</b>	<b>\$ 10,413,379</b>
<b>Cost/kW</b>	<b>\$ 3,471</b>		<b>19,804,527</b>		

Source: UNIDO PPG phase for Madagascar 2014

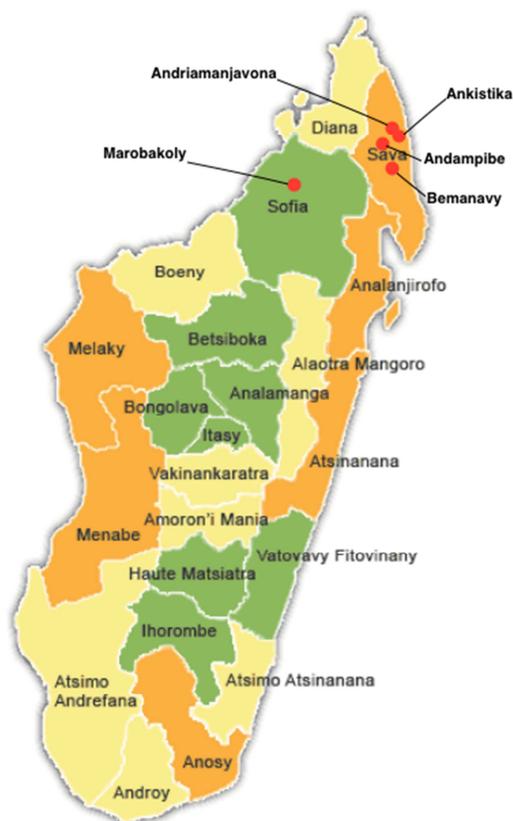


Figure 1 Final list of priority SHP sites for UNIDO GEF project on Madagascar map

Source: UNIDO PPG phase for Madagascar 2014

<sup>7</sup> It is anticipated that from this short-list at least 2 MW of SHP capacity will be realized with direct support from the GEF project

At present UNIDO is waiting for the result of the tender to know which company will receive the concession for the sites of Ankitsika and Marobakoly. The call for proposals was launched in February 2015. In addition of the two sites of Marobakoly and Ankitsika, another project site with the company HYDELEC has been analyzed by UNIDO and may be considered for a partnership under the project. Indeed, last year HYDELEC already agreed with the ADER to increase the capacity of the site of Sahanivotry I which is already producing 15MW in the region of Vakinankaratra in the district of Antsirabe II. African Development Bank (AfDB) participated to the co-financing of this site. The electricity produced is fed into the national grid. Now, HYDELEC would like to increase the capacity of the first site with a capacity of 800 KW, Sahanivotry II, in order to offer to local communities of Sahanivotry and Manandona access to electricity with pre-paid meter technology. Hydelec is waiting for a cofinancing from FNE for the grid connection. The AfDB is ready to co-finance the project of Sahanivotry II as it has already been involved in the co-financing of Sahanahivotry I. The GEF project may consider to directly support (through both technical assistance and partial investment) the private sector player for the development of the relevant site, subject to the private sector player obtaining the authorisation and concession. The objective will be to build the capacities of private partners in the construction, distribution and management of the energy supply, which does not exist in Madagascar yet. A similar approach may be considered for other project sites and other private partners, such as MADO SAINTO (for a site of 250 kW in the Vakinankaratra Region, which would make the mineral water producer energy independent, and will electrify the villages near by the factory) and with ASSIST (for a site of 750 kW in the Aloatra Mangoro region) or for other projects in the Sava region. Project selection will be decided on obtaining the relevant government permits (from ADER and/or JIRAMA), and additional transparent criteria including suitability of the site, cofinancing commitments, technical capacity, replicability and greenhouse gas emission reductions.

The GEF project may make use of ADER's tendering procedure and could establish a partnership with the selected private sector project developers (such as but not limited to HYDELEC, TOZZI ENERGY, ENELEC, ASSIST, HENRI FRAISE, MADO SAINTO etc.) for the site defined by the procedure or any other sites for which private sector companies have concluded a memorandum of understanding (MOU) with the Ministry of Energy and Hydrocarbons – subject to compliance with UNIDO's rules and procedures. Other ongoing procedures at GoM level such as the conclusion of Power Purchase Agreements between JIRAMA and Independent Power Producers can form the basis for selection of a project developer restricted to the national level if applicable. Such decisions will be discussed and endorsed by the Project Steering Committee.

#### A.4.5 Stakeholder consultation to verify key barriers and challenges

Throughout the preparatory phase of the GEF project, UNIDO has maintained continuous contact with the main government partner and lead agency, ADER, the body responsible for development of rural electrification. ADER has made available to UNIDO a comprehensive set of documents on SHP potentials at numerous sites in the country (APS and APD documents) and other important studies (e.g. Plan de Electrification Rurale des Regions), as prepared by GiZ. ADER has also shared its Programme for Rural Electrification in 2014, the Procedure Manual for its 'Call of Interests for Rural Electrification Projects' and its Matrix for Evaluation, which has enabled UNIDO to gear the 5 projects for Calls for Tender from the private sector.

UNIDO maintains continuous communication with the other key government bodies involved in rural electrification, being ORE, JIRAMA and the Ministry of Energy and Hydrocarbons and Ministry of Environment, Ecology, Sea and Forestry (host to the GEF Operational Focal Point). Once the sites had been selected, for example, special meetings were set up to seek sanction from the Ministry who agreed that their agencies should be at the front of any expressions of interest put into the public domain, to show that GoM is at the heart of initiatives to bolster SHP in the country.

As part of the groundwork for the project, UNIDO has met with a number of private sector companies that have either established SHP projects (Hydelec, Henri Fraise, Enelec, HIER) or have mature plans to do so (Assist, Tozzi-Green, Mado Sainto) as well as those who have experience in operating rural electrification systems based on solar PV and diesel gen-sets (Electricité de Madagascar).

UNIDO in Madagascar is represented in all relevant committees pertaining to rural electrification, energy policy and with groups that want to see faster development of renewable energy as part of initiatives to combat climate change, for example the GroupeEnergie (composed of GoM, private sector, bi- and multi-lateral donors, NGOs, civil society members, and UNIDO for the UN agencies) and UN bodies). UNIDO also keeps abreast of climate change studies for the country (so as to understand this particular risk to SHP) and liaises with international groups such as WWF and IC-SHP to hear the latest from the international SHP sector. Therefore, following consultations with many stakeholders and completion of the PPG phase of the project in May 2014, a full understanding of barriers pertaining to development of SHP in rural areas of Madagascar had been gathered as shown in previous Table 1.

Much of the detailed mitigation measures required have been documented in the Group Energie's report (June 2014) "Recommandations pour une Politique de l'Énergie à Madagascar".

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

#### A.5.1 Value added through incremental reasoning

Following meetings with various stakeholders (GoM, SMEs, NGOs) and other agencies, information was forthcoming under the project preparatory phase which shows the strong relevance of the GEF project particularly for additionality and complementarity, incremental reasoning as well as the ability to shift from the baseline.

The GEF funding is being requested to add to and complement the ongoing and planned SHP activities in Madagascar, which have a certain momentum but not enough to tip the balance towards a fully supported and sustained sector in its technical, financial and human capacity requirements.

Most importantly, the GEF funding will also provide the incremental policy inputs required to support and effectively leverage national efforts in facilitating the increased take-up of SHP by SMEs with a catalytic support to help create and sustain a market environment conducive to investments in SHP.

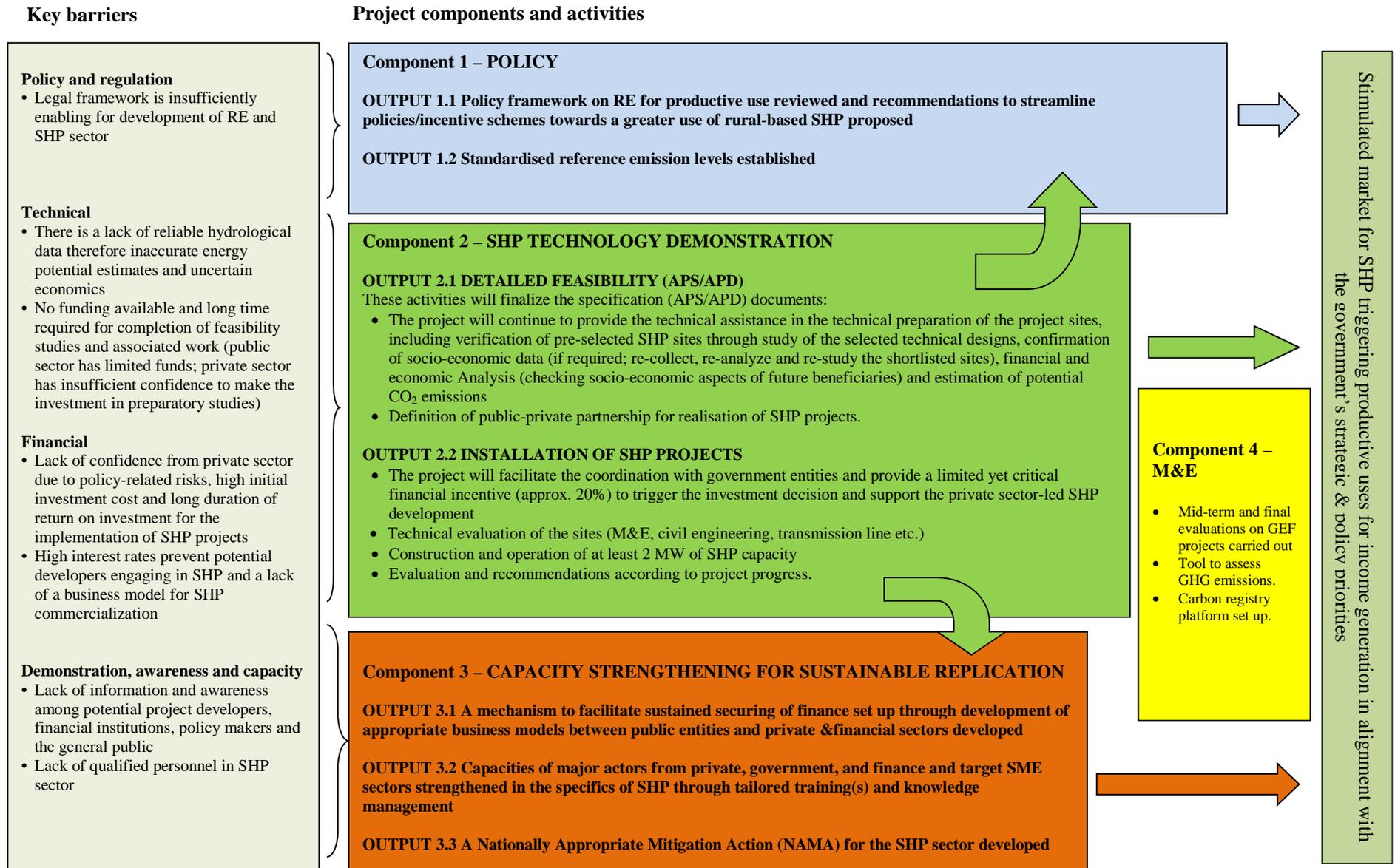
#### **GEF Project Alternative Scenario**

Considering the proposed structure of the GEF-UNIDO project, and based on the baseline described in earlier sections, this GEF project will provide critical contributions for the creation of a strong market environment that will facilitate greater investment by Malagasy operators in SHP energy projects.

#### A5.2 Proposed additional GEF activities (including detailed design)

In order to effectively address the key barriers to SHP project development outlined in section 4.5 above, a structure for the GEF project is explained in section A "Describe any changes in alignment with the project design of the original PIF. The project design is set out in Figure 2 below which shows how the project components importantly interact with each other:

**Figure 2: Proposed project components and their link to removing barriers to achieve project goal.**



## **COMPONENT 1: POLICY AND REGULATORY FRAMEWORK**

Based on the existing legal and institutional framework, the recent regulatory initiatives and the current working documents of ORE, this component will strengthen the policy and the legal and institutional framework in order to promote the development of renewable energy projects, especially SHP, for productive uses in rural areas.

### **OUTCOME 1 NATIONAL LOW-CARBON ENERGY DEVELOPMENT PLAN DEVELOPED AND TAILORED INITIATIVES FOR SUPPORT OF SHP IN PLACE**

In this component, the strategy of the project activities will be to build on the existing policies governing the electricity sector on the one hand then prepare a roadmap in line with the new policy framework (NLCEDP), covering technical and monitoring standards and fiscal incentives, in order to start to overcome the obstacles preventing the development of a sustainable SHP sector, working closely with the Ministry of Energy and Hydrocarbons, ADER, ORE and other bodies.

#### **OUTPUT 1.1 Policy framework on RE for productive uses reviewed and recommendations to streamline policies/incentive schemes towards a greater use of rural -based SHP proposed.**

##### **1.1.1 Review of the policy and regulatory framework including law 98-032 concerning reform of the electricity sector and the regulatory frameworks concerning use of waterways and conditions for SHP development.**

The existing framework including recent regulatory initiatives by GoM will be reviewed and the project will work with the respective Ministries to support continued improvements in the electricity reform Law No. 98-032. Such improvements are expected to focus on following elements:

- *Raising the threshold for power facilities under the licensing agreement for SHP and for distribution*
- *Review the Decree No. 2003-942 of 9 September 2003 on the use of water for hydroelectric by simplifying administrative procedures for the granting of authorizations for the use of water*
- *Review the regulatory frameworks related to fees for use and spills (Decree No. 2003-792 of 15 July 2003 and Decree n° 16284/2008 of 11 August 2008)*
- *Support the Electricity National Plan (ENP), by coordinating planning between technical aspects and the economic development potential. This will include strengthening the ADER capacity, to evaluate demand for electricity and productive capacities, and stress on electricity distribution barriers. This may also include detailed assessment of the demand for electricity for specific sites or focus regions, which in turn will improve business plans for scale-up of SHP projects*
- *Provide ORE with the opportunity to propose electrification standards to the Ministry of Energy and Hydrocarbons instead of having standards that prevent the encroachment of ORE on the Ministry of Energy and Hydrocarbon's jurisdiction*
- *Establish the fees rate based on water usage and not on the type of sector*
- *Plan specific flexible legal conditions for hydropower since the water is not being consumed but only diverted and does not change its composition in comparison with other types of water uses (agricultural use: irrigation, watering livestock, cleaning and industrial use: food, manufacturing.*
- *Establish a regulatory framework for the use of waterways to avoid conflicts between agriculture, fisheries, biodiversity and hydro-electricity producers*
- *Establish a regulatory framework defining the technical conditions for development of hydropower as provided by the Water Code*

##### **1.1.2 Preparation of a National Low-Carbon Energy Development Plan (NLCEDP) with recommendations to harmonise and improve existing legislation for the deployment of RE and SHP in particular**

The National level Low Carbon Energy Development Plan (NLCEDP) will be prepared as a clear and coordinated energy planning tool to last several years in promoting renewable energy sources in Madagascar focusing primarily on SHP projects. The plan will identify the need for investment in a well-defined period with the aim of putting the Madagascan energy sector on a low carbon trajectory. The plan will need to firstly understand the economic feasibility of potential SHP and other RE sites in order to start facilitate the granting of funding from financial partners and internally from FNE. It is essential that the Ministry of and Hydrocarbons take the lead and defines a programme of tailored policy improvements for the development of SHP and renewable energy, taking into account

the economic development policy and promotion of investment in the productive sectors (agriculture, small-scale industry, tourism and hospitality services etc.). In addition the Ministry of Environment Ecology, Sea and Forestry just recently created a Climate Change Coordination unit in early 2015, which should play a key role in this endeavor.

In order to give the high level plan ability to improve the legislative picture, a working group will be established to work on these recommendations. This group will consist of members of the ministries involved in SHP projects (Ministry of Energy and Hydrocarbons, Ministry of Water, Ministry of the Environment, Ecology, Sea and Forestry) with support from ADER, ORE and ANDEA (Water Authority). An expert on national regulations will be on hand for the working group in order to bring the detail of planned regulatory initiatives from Activity 1.1.1 while ensuring the drafting of new regulatory frameworks that should boost the development of SHP and other RE projects.

Alongside this activity, because of the role ADER plays in the development of SHP and other renewable energy (which are mainly found in the rural areas), the project will support ADER to increase its performance as a single interface body by:

- *Setting up a coordination platform with key stakeholders from both GoM and private sector to agree on a common methodology to evaluate proposed SHP on their technical, financial, environmental and socio-economic merits;*
- *Strengthening ADER's capacity to carry out such multi-dimensional assessments through tailored training*

### **1.1.3 Establishment of a SHP roadmap based on NLCEDP to build a sustainable SHP sector, including concrete and tailored initiatives**

Within the NLCEDP, the roadmap for SHP deployment will outline concrete and tailored initiatives to unleash the development of SHP for the short and medium term. The roadmap will be developed in consultation with key stakeholders (Ministry of Energy and Hydrocarbons, ADER, ORE, donors) as well as ministries responsible for the most important productive sectors including agriculture, tourism activities, hoteliers, community services, handicrafts etc.

Examples of most appropriate initiatives are described below. The completion of the SHP roadmap will yield more proposed initiatives.

- *SHP Quality Infrastructure assessed, key improvement measures proposed and action plan developed*

Standards in renewable energy are instrumental in achieving national and international energy and trade objectives as they represent policy-driven market-based tools that are voluntary in nature, that increase competitiveness for industry and facilitate international trade and fair market access. However, policy makers and the private sector in developing countries are facing numerous challenges in implementing such standards, including effective conformity assessment services as well as technical know-how on how to adopt them. While national and sectorial initiatives are being developed, UNIDO is promoting the harmonization of international standards and stimulate their adoption, as it has successfully done with the ISO 50001 Energy Management System standard. Furthermore, UNIDO will assist stakeholder groups in developing their capacities for implementing sustainable energy targets, including policies, standards and regulations.

In particular, the project will assess the current situation in terms of quality infrastructure, meaning the combined set of human and physical capacity to assure quality, ranging from the adoption of national and international standards related to SHP, testing capacity for conformity assessment, and overall human capacity for installing, operating, maintaining and quality assurance of SHP systems. From this assessment recommendations will be developed as per the UNIDO methodology (currently in progress) and put into practice as per their priority.

## **OUTPUT 1.2 Standardized reference emission levels established**

### **1.2.1 System for standardisation of reference CO<sub>2</sub> emissions levels established**

Being a clean form of energy, SHP projects can contribute to the reductions in greenhouse gas emissions. To help stakeholders assess the potential reduction of greenhouse gas emissions generated by the proposed SHP projects, it is essential to develop standardized baselines as well as a standard form of description of the project. The end goal will be to be able to monitor the CO<sub>2</sub> emissions from SHP, in a format that is recognised as per the international standard. The GEF tracking tool for climate change mitigation projects will be useful for this activity. An expert will be responsible for the development of this GHG emission level standard reference with the support of the Department of Climate Change within the Ministry of Environment, Ecology, Sea and Forestry.

***Long-term sustainability of global environmental benefits and institutional continuity through national ownership for Component 1 – POLICY AND REGULATORY FRAMEWORK***

The activity of forming a new National Low Carbon Energy Development Plan, incorporating a Master Plan for SHP and other renewable energy, represents the first time this level of detail will have been captured for Madagascar and with all stakeholders participating, it will ensure that these technologies remain a focus beyond the timeframe of the project leading to future R&D programmes to ensure that local manufacturers and academic institutions are at the forefront of SHP technology development. By enabling the Ministry of Energy and Hydrocarbons to have the long-term national ownership for this policy component, and involving ADER and ORE as much as possible, a high degree of sustainability and institutional continuity will be engendered.

**COMPONENT 2: PRIVATE-LED SHP TECHNOLOGY DEMONSTRATION**

This component will demonstrate the technical and commercial viability of at least 2 MW of new SHP capacity. While the actual SHP realisation will be driven by private sector players, the project will provide incremental support (technical and financial) to support private sector player(s). A list of pilot projects has already been chosen following significant field level activities that identified the technical capabilities of the sites and a full assessment of the socio-economic data from the beneficiary communities. The detailed technical assistance to develop replicable economic models will provide the experience and tools to establish a sustainable replication as part of the scale-up component.

**OUTCOME 2 SHP FOR PRODUCTIVE USE AND INCOME GENERATION DEMONSTRATED**

The main agencies in the field, ADER, ORE and JIRAMA, have already listed several SHP sites in rural areas but most of them are only at a preliminary recognition level noted on maps and there is more work remaining to capture reliable technical data, such as the type of installation, capacity, access issues, beneficiary profile, costs etc. The activities in this component will establish at least two SHP demonstrations, which will serve as a learning exercise to provide the methodology to replicate SHP systematically for the future, and train those engaged in the sector.

**OUTPUT 2.1 Target SHP projects fully prepared for development and co-financing secured**

**2.1.1 Support the national process to select and confirm target sites and private sector partner(s) and refine and confirm the Business Plan data (financial and economic analysis including checking socio-economic aspects of future beneficiaries and estimation of potential CO<sub>2</sub> emissions).in coordination with the GoM and private sector partner(s).**

The minimum target of new SHP capacity under this project is 2 MW. During the PPG phase the UNIDO project team in consultation with GoM partners agreed on the five short-listed sites and bring them to the private sector with full business plans, as shown below. These five priority sites with a combined capacity of 3 MW were studied in more detail for potential inclusion under the project. Towards the end of the PPG phase, when remaining risks became apparent for some of the sites (including ongoing changes at Government level in terms of which sites or regions should be prioritised for SHP development), the target was revised to 2 MW as being more realistic (and assuming a 20-25% investment support from GEF). The exercise of selection is presented in full in Annex 7, and the pre-feasibility studies and business plans are in Annexes 1-5.

Site	Region	Head	Flow	Capacity	Energy pa (kWh)	Grid type
Bemanavy	Sava	101.5 m	0.29 m <sup>3</sup> /s	200 kW	1,575,340	Isolated grid
Marobokoly	Sofia	11.8 m	13.91 m <sup>3</sup> /s	1,050 kW	4,968,963	30 km to JIRAMA
Ankitsika	Sava	175 m	0.82 m <sup>3</sup> /s	1,000 kW	7,937,261	28 km to JIRAMA
Andriamanjavona	Sava	59 m	1.27 m <sup>3</sup> /s	500 kW	3,405,866	6 km to JIRAMA
Andampibe	Sava	28.8m	1.39 m <sup>3</sup> /s	250 kW	1,917,097	Isolated grid
<b>TOTAL</b>				<b>3,000 kW</b>	<b>19,804,527</b>	

The five pre-selected sites listed above have a high demonstration impact, as they have a wide range of technology type and capacity; 2 are high head sites (using pelton or turgo turbines) in relatively remote corners of the road from Andapa with one small scheme seeking to supply an isolated grid, while the other being 1000 kW can support a grid extension to the nearest grid line; 2 are medium head and medium capacity sites taking a different technical approach (crossflow or turgo with shorter penstock pipes) supplying nearby village grids and 1 is low head propeller machine on a large river, but near the road and access to supply a large local grid once the lines are extended from the plant.

Once the sites are pre-selected as per the national selection process (through call for proposals) this activity will provide technical assistance in particular to the prioritised project sites. Technical assistance will include:

- *Verification of all existing data on the preselected sites (cartographic, topographic, geotechnical, hydrological) including the sites' detailed hydrology and evaluation of the parameters of capacity and energy available from watershed characteristics, rainfall, seasonal flows, etc.*
- *The location of the site relative to population centres to be supplied: length of transmission line, access.*
- *Confirmation of socio-economic data collected; situation of the villages to be supplied and existence of productive/economic activities using energy.*
- *The adequacy between the demand and the site potential, i.e. annual energy potential of the site, future increase in demand, etc.*

From the verification of site identifications above, account needs to be made of recommendations of ADER and other organizations that already have data of the identified sites (GIZ, donors, private operators) as well as any master plans for rural electrification using hydropower or other electricity infrastructure development (e.g. grid extension, interconnection). If the above data are not sufficient, it will be necessary to undertake field visits to obtain the following more detailed information:

- *The pros and cons of each site selection;*
- *Seasonal capacity according to water flows;*
- *Productivity evaluation;*
- *Difficulties and feasibility to implement the construction;*
- *Access challenges;*
- *The exact length of the transmission line and required implementation;*
- *Estimate costs of the entire installation, by defining a cost estimate of each work and equipment in relation to turbine capacity, length of the pipe, transport distance, gridline length etc. to serve as a model.*

In parallel to the technical and socio-economic assessments, this activity will re-confirm and report on the socio-economic data, including the demand of future beneficiaries and evolution over time. This data will be highly accurate at this stage so that financial plans for each project can be defined exactly encompassing:

- *The exact number of customers by type. A percentage of productive data consumers compared to all beneficiaries should be defined for the power demand and energy consumed.*
- *The ability of energy users to pay and willingness to pay. Indicators will be developed to ensure the viability and sustainability of the project.*
- *A model of tariff and price set for the financial viability assessment of the sites*
- *Environmental Impact Assessment*
- *Assessment of the social impact of SHP on local communities: positive and possible negative impact of SHP for different members of the communities*
- *Carbon dioxide emissions from hydro power can be quantified according to international standards (considering construction and operational emissions) and compared to fossil fuel sources:*
  - *Assuming 1 kWh of energy from diesel generators emits at least 0.5 kg of CO<sub>2</sub>*
  - *A plant of 1MW providing an average 4 GWh/year will therefore avoid 2,000 tons of CO<sub>2</sub> per year.*
  - *Moreover, when using diesel 1 kWh requires at least 0.2 litres so generation of 4 GWh requires 800 m<sup>3</sup> diesel per year.*

The results of the preceding technical and socio-economic reports will allow a full financial and economic study of the sites which will consist of:

- *Investment needs: A model of the construction costs and the electro-mechanical equipment and transmission lines costs will be developed according to the capacity of SHP turbine, control panels, civil works requirements, penstock pipes, valves and detailed analysis of the length of the grid lines*
- *The costs of operation and maintenance: typical matrices will be set up to serve as a reference*

- *The pricing model and energy prices according to law and regulations*

## **2.1.2 Operationalise cooperation modality with private sector partner(s)**

The project will provide the incremental cost for private sector players to move into SHP; a GEF grant intensity of approximately 20-25% is put forward for the prioritized SHP sites. The selection process of project sites will be based on transparent eligibility criteria (such as concession by GoM, cofinancing, emission reduction, innovation, replication potential, environmental sustainability, etc.), and will be fully described in the project Operational Manual (currently under development). The rest of the investment will be provided by the project developer (through loan or equity or a combination).

One of the key outcomes of the project is to stimulate the market for SHP in Madagascar, and crucial to this aim is the involvement of the private sector, participating with GoM in the realisation of the SHP potential of the country. To date, there are only a couple of examples of public-private partnerships for renewable energy developments. The work undertaken will provide the blueprint for standardised approaches that private sector players can follow in partnership with GoM in the various stages of SHP development.

### **OUTPUT 2.2 At least 2 MW of SHP capacity (in the 0.1 to 1.5 MW range) constructed and operational**

#### **2.2.1 Establishment of the construction schedule and project planning with the private sector partner(s) based on technical evaluation of the sites (M&E, civil engineering, transmission line etc.) with provision of tailored technical assistance where required and raising awareness of local population**

This activity will provide the detailed planning and specify all the phases and the timing for constructing the SHP schemes chosen:

- *Licensing requirements (water use, ORE, Ministry approval)*
- *Preparation of the site (land agreements, impact assessments, establishing access, transport plan for equipment and materials)*
- *Orders, manufacturing and transport of bought-in items (e.g. pipes, turbines, control panels, electricity transformers, cabling etc.)*
- *Construction and civil engineering works plan (ground-works, stone, concrete, road grading etc.)*
- *Installation plan for hydro-electric equipment, control systems and transmission line network*
- *Commissioning*
- *Testing and reporting*

The local municipal and communal level should be engaged at this planning stage, to facilitate good relations on the ground, raising awareness of the local population and developing a consultation process to facilitate establishing the distribution and tariffication methodology.

The advancement of the grid to rural areas does not automatically lead to better access to electricity for the poor, indeed millions of poor people in Madagascar live near the grid network but cannot afford a grid connection. Some SHP projects implemented in Madagascar do not fully consider the local population living nearby as potential consumers, as privately operated schemes have to focus on return on investment, so the electricity feeds only the existing grid and is sold to JIRAMA. And because of the financial situation of JIRAMA, no sustainable rural electrification model has been demonstrated, based on generating productive use activities that then enable ability to pay for electricity. Therefore, in the case of decentralised SHPs and in order to ensure sustainability, the ability to pay will need to be assessed in detail, and appropriate models considered with a primary (though not solely) focus on income generating activities. This assessment will include the following steps:

- *Support to define the best consumer payment scheme, such as*
  - *Fixed Price (monthly payment per consumer connection, based on consumer type),*
  - *Consumption Based Price (sets a fixed price on kWh consumed at the consumer / connection level),*
  - *Pre-payment (electricity is pre-paid through a mobile transaction or scratch card)*
- *Analyze the opportunity for energy hub (such as Energy Powered for small industrial park ) to support productive use in close coordination with local community,*
- *Promote Micro Finance Institutions (MFIs) activity to foster productive use and local entrepreneurship.*

#### **2.2.2 Monitoring and evaluation of the construction and operationalization of at least 2 MW of SHP capacity in total**

This activity will see the private sector take the lead in constructing and operating the projects, with full from the project and its partners. The project will closely monitor the progress, provide support where required, and evaluate for the formulation of lessons learned for the scale-up phase. As a set, the five pre-selected schemes display good demonstration qualities for the GEF project, and will involve a range of approaches to initially open up the site, construction types, technology choices and ultimately means of operating and maintaining the plant. The capacity to be installed will be at least 2 MW.

This activity will log the final roll-out of project development and depending on the results, will be able to make recommendations back through reporting, at government level, through the GEF tracking tool and by independent evaluations.

***Long-term sustainability of global environmental benefits and institutional continuity through national ownership for Component 2 – PRIVATE-LED SHP TECHNOLOGY DEMONSTRATION***

This component 2 is the largest within the project because of the establishment of the projects themselves, but there is also a large amount of work involved in the activity packages that develops ‘capability by osmosis’ (participants are doing real projects). As such the SMEs and other stakeholders will begin to truly understand the SHP options available to them and to make informed choices therefore increasing the replication potential of SHP projects. The training committee, manuals and formal trainings will further reinforce this and these support mechanisms will last beyond the project ensuring continued ability for replication through learning.

Demonstrating the technical feasibility and commercial viability of private sector-led SHP projects provides national examples that can be replicated across the country. Not only will the demonstration projects show what is possible and the examples be disseminated widely in the country, but the implementation and operation of these projects will build up the technical capacity within the private and public sector stakeholders to help in the replication of these projects. Given the commercial interest in these projects, the different SME proponents will have an interest in keeping the projects running as well as realising new ones, and hence sustain the global environmental benefits beyond the life of the GEF project.

**COMPONENT 3: CAPACITY STRENGTHENING FOR SUSTAINABLE REPLICATION**

This component will build on the lessons learnt in establishment of the pilot SHP projects, by developing appropriate capacities as well as funding mechanisms to facilitate public-private partnerships which can attract the required finance. It is expected that the pilot projects will contribute to reducing the (perceived) risks, through the demonstration of the technical and economic viability, and this could be complemented by financial instruments such as a guarantee scheme or a revolving fund. The national polytechnic university of Diego Suarez (Antsiranana) trains engineers in hydroelectricity, but does not provide them with practical training. A partnership with the universities will be established and the project will facilitate the practice to strengthen the capacity of students. A letter of partnership interest was provided. The design and implementation of the appropriate instruments will be done in close coordination with government and development partners.

The replication of SHP projects will further be facilitated by preparing a pipeline of SHP projects for investment through relevant studies, feasibility study and business plans, in close coordination with GoM and private sector players. Cofinancing partners such as Bank of Africa have expressed their interest to provide credit for SHP projects, for both the pilot and the replication stage. The activities below are designed to help achieve the sustainability for the SHP sector in Madagascar.

**OUTCOME 3 - ENABLING ENVIRONMENT FOR SUSTAINABLE SHP REPLICATION IN PLACE AND CAPACITY OF KEY NATIONAL ACTORS STRENGTHENED**

Based on the experience of the pilot projects, and based on the collaboration with financial institutions such as Bank of Africa and African Development Bank, the best scheme can be selected to be promoted as a blueprint for future SHP project developments in the rural areas of Madagascar. The aim is for this approach to significantly and sufficiently remove the identified barriers. Technical assistance will be provided to develop a pipeline of projects which can be developed and replicated without the triggering investment support from this project.

It is expected that this exercise will take concrete form, in collaboration with financial partners, as of the 3<sup>rd</sup> year of implementation. The project will work with national project developers, strengthen capacity at private sector level and also trigger local manufacturing of SHP components (such as the poles), thus supporting innovation, sustainable industrial and economic development and long term job creation.

**OUTPUT 3.1 A mechanism to facilitate sustained securing of finance set up through development of appropriate business models between public entities and private & financial sectors developed**

### **3.1.1 Select a financing instrument to facilitate scale-up (e.g. guarantee scheme, revolving fund) in close coordination with government and development partners**

Under this activity, the project will keep close links with the key decision-makers in the Ministry of Energy and Hydrocarbons, ORE and JIRAMA, where decisions about rural electrification are made, as well as with the development partners and their respective strategies, in order to assess which financing instrument would be most suited to boost the sustainability of the project. The project itself will have no funds to pledge to such a financing instrument, but aims to play a facilitating role and provide support through the experience of its pilot projects and bringing the respective levels together. One option would be for a financing facility to be established as a partial risk guarantee fund to support the development of future projects.

### **3.1.2 Development of supporting tools to facilitate risk mitigation**

The PPG phase has already generated detailed business plans for development of the five pre-selected sites, in a format that is easily digested by the private sector. This includes the profile of the sites, topographically, hydrologically and their socio-economic profile, and includes the full range of costs and financial performance based on field-tested assumptions on local demand and tariffs, for households, small enterprises and other larger consumers (school, health centres, street lighting, water pumping etc.), and knowing the likely funding profile for the projects (subsidy, loan, grant etc.).

It is expected that this activity will work on developing a matrix of financial tools that can be available for SHP development, coming up with financial due diligence guideline and creating a spreadsheet of the techno-economic parameters for each type of SHP installation, based on head and flow and therefore technology type (which has differing financial needs) as well as capacity and therefore the ability of an individual project to support the grid connection costs that may be needed to make the project economically viable.

The following tools will be developed in order to help reducing risks for private sector and financing partners:

- Matrix of financial tools for SHP
- Financial due diligence guidelines
- Standardised techno-economic parameters developed
- Standardised business plans
- Best practice business model
- Best practice social impact model

This activity will be carried out by a working group to discuss and validate the tools.

### **3.1.3 Pipeline of future SHP projects prepared for investment**

A pipeline of at least 5 SHP projects will be prepared for investment through carrying out relevant studies, feasibility study and business plans, in close coordination with government and private sector players.

## **OUTPUT 3.2 Capacities of major actors from private, government, and finance and target SME sectors strengthened in the specifics of SHP through tailored training(s) and knowledge management**

### **3.2.1 Development and delivery of tailored training based on capacity needs assessment**

In order to strengthen local capacities, targeted trainings, train-the-trainers and awareness campaigns will be organised for government agencies, target industries, financial institutions, entrepreneurs as well as industry associations and universities. Research, networking and international cooperation to promote the transfer of technology, exchange of information and dissemination of best practices will be encouraged. Based on the additional needs assessment from the pilot demonstration phase, tailored trainings will be delivered to strengthen capacities where most needed through a well-coordinated set of dissemination activities.

At least 200 people of the target group will be trained through 5 workshops; gender balance of both participants and trainers will be given specific attention.

Focused trainings will be carried out for engineering offices, SMEs, ADER according to financial institution investment criteria for SHP in order to strengthen the business models presented in feasibility studies:

- *Engineering offices: This training is designed to strengthen the ability engineer's offices and private sector about economics aspect for feasibility studies. The training will include all the necessary modules to conduct studies with SHP:*
  - Identification and estimation of the power and productivity of the site;

- Demand studies and capacity forecast;
  - Estimating the cost of investment;
  - Profitability analyses and Business Plans;
  - Environmental Impact Assessment
- *Operators: Potential operators need to have strong knowledge in price setting forecasts, business cases and economics to prepare coherent proposals to ADER in order to get concessions. Training needs to be done in order to consolidate feasibility studies proposed by engineering offices.*
  - *Banking Institutions: To date FIs have not been involved in SHP project development because of the perceived high risk in rural electrification. FIs stress the points that the SHP investment cost is very high return on investment is long and rate of return on sales is too low. In this project, FIs will be involved by co-financing through credit line facility to the selected chosen private sector operators. This amount, to be available will be defined, mainly according to a Business Plan analyses if consistent with Banking Investment criteria. Therefore, this activity will focus on better understanding of Business Plan proposed by potential operators for FIs and tailored training to design guidelines of acceptable criteria that operators needs to follow to benefit from the credit facility.*

Apart from technical level trainings for engineers and SHP technical staff, the training programme will also be tailored for management (CEOs, Managing Directors). This activity is supposed to increase awareness at the decision making level about the procedures defined in the technical design manual and the quality standards to follow for a project. Additional trainings will be provided to managers of SHP plants on Staff Management, Customer Management and Commercial Service, Financial Management and Supply Management.

The capacity will be institutionalised in entities like ADER and JIRAMA (on government related aspects) as well as in a knowledge platform for the business society, as further detailed in Output 3.3.

### **3.2.2 Establishment of a central SHP information platform as a supportive tool for project developers and other key stakeholders**

The involvement and active participation of the private sector and financial institutions dedicated to SHP operation needs well-established national government guidance for SHP projects development. The project website will act as a centralised and networking platform to provide relevant information and easy links to GoM entities (e.g. ORE, Ministry of Energy and Hydrocarbons and ADER). Information will include regulatory information (such as Call for projects and procedures from ADER with all information needed for any SME to participate; National Law about Renewable Energy and especially regarding SHP; information about price ceiling defined by ORE provided), technical (mapping of all hydro potential sites such as from ESMAP, best practice pilot plants, etc.), and networking (list of different stakeholders involved in SHP), and will be tailored and simplified where needed for target groups. Also an overview of operational SHP projects will be initiated, with related technical data. Reports made from the pilot projects will be made available together with flyers and newsletters, as communication tools on best practice for the public to gain an increased awareness in Madagascar. Biannual newsletters broadcast would allow every SHP projects being implemented to communicate about progress, lessons learned, best practices and remaining challenges in SHP sector. This would include as well project from other countries, particularly through the IC-SHP. These biannual newsletters will be available online and some numbers will be printed, for effective communication to some stakeholders.

### **3.2.3 University course developed and put in place on SHP at a technical university in Madagascar**

The integration of Malagasy SHP sector could be pursued through selected local technical universities (Ecole Polytechnique) with teachers specialized in hydraulics or civil engineering. Internships in hydro engineering, electro mechanics, civil engineering will be facilitated for students from these institutions, encouraging women students to take up studies. The study course will be improved and practical training will be organised for the students. A team of international and local experts will review the course, which will cover the implementation of SHP and other renewable energy technologies. The course will be reviewed in close consultation with the Scientific Boards of the university to ensure the course content meets their approval. The strongest and most relevant polytechnic university is in Diego, and it may constitute the best partner of the project; this will be reconfirmed in the start-up phase of the project.

The University course will be reviewed to cover different angles related to SHP, including also environmental and social sustainability, and topics including Water Resources and Environment, Integrated Watershed Management, Hydrology, as well as development aspects of SHP and the energy-water nexus and will be actualised in

collaboration with the Ministry of Energy and Hydrocarbons, and Ministry of Superior Education and Scientific Research.

The National School of Polytechnic in Diego Suarez has already formally expressed its interest to collaborate and benefit under the project. A second university or educational organization, most likely in Antananarivo is currently under consideration for inclusion in the GEF project. Additional training institutes may be identified in cooperation with the Ministry of Energy and Hydrocarbons, and the Ministry of Education. The detailed arrangements will be specified during the project inception phase.

### **3.2.4 Training strategy for the local manufacture of turbines and training in building concrete poles**

This activity will stimulate local manufacturing of SHP components (including concrete poles) with a view to initiate a socio-economic impact by stimulating sectoral development and creating jobs through technology and manufacturing innovation.

Despite some small turbines manufactured locally (by Vitasoa and AIDER), there are no certified manufacturing company producing hydroelectric turbines in Madagascar. Therefore, operators are forced to import their turbines from overseas. Despite the state policy for zero taxes on renewable energy products, the imported equipment raises the initial investment cost of projects. In addition, there is a lack of knowledge of the international turbine market and the fact that Madagascar is an island further accentuates the difficulty of technology transfer.

The technology to manufacture concrete poles locally is important for Madagascar because wooden poles are usually used and are contributing to large-scale deforestation. In countries such as China, the construction of affordable concrete poles is done by many small companies but in Madagascar only JIRAMA is able to produce concrete poles. It is crucial to promote affordable concrete poles construction locally by sharing experiences and provide tailored trainings.

Firstly for local manufacture of turbines, the training will make available to local manufacturing companies (metal, sheet metal and general engineering) knowledge and experience in design and turbine designs for different site parameters. Licenses on existing brand or developing a new brand could be considered and a Call for Expression of Interest will be launched for the companies interested in acquiring these licenses. Cooperation with other countries from the South who already have strong experience in field will be considered (e.g. China, India, Sri Lanka and Thailand) and technical support of UNIDO's SHP projects will be provided, e.g. through the International Centre for Small Hydropower (IC-SHP). A list of worldwide SHP turbine manufacturers and their conditions of purchase will be provided to local operators and the list will be available on the website dedicated to SHP projects in Madagascar.

### **3.2.5 Co-operation visits between local actors and international centres and technology providers**

Through international centres of excellence, knowledge enhancement exchange will be established, aiming at technicians and operators as well as their administrative staff. This will include all operational and technical administrative activities during operations with focus on quality maintenance, covering civil engineering (dams and penstocks), hydro-mechanics (turbines, regulators), electro-mechanics (alternator, transformer, controls), AC grids (transmission lines and operation of distribution network), commissioning, operation, monitoring and maintenance, water management, generation and demand.

One of the centres could be the International Centre for SHP (IC-SHP) in China, which, on behalf of UNIDO, has implemented SHP projects in other African countries (Zambia, Rwanda, Nigeria) and has expertise on general knowledge transfer, operational and maintenance need and quality standards promotion. One of the key ways to help SHP projects are a success is to ensure that various stakeholders exchange information with each other. Therefore, workshops and site visits will be held in each of the pilot SHPs to disseminate information from one SHP to another.

## **OUTPUT 3.3 A Nationally Appropriate Mitigation Action (NAMA) for the SHP sector developed**

### **3.3.1 Development of a Nationally Appropriate Mitigation Action (NAMA) for inclusion in the NAMA Facility**

Madagascar as well as many developing countries are presently preparing and implementing Nationally Appropriate Mitigation Actions (NAMA) as part of their national efforts to address climate change. NAMAs are mitigation actions taken in the context of sustainable development which are measurable, reportable and verifiable and can partly be supported by finance, technology and capacity building from the international community. When NAMAs were first introduced at COP13 in Bali in 2007, Parties' aim was to increase emission reduction activities in developing (non-Annex I) countries. Further, the Cancun Agreement also encouraged all Parties to develop low emission development strategies (LEDS) to identify sustainable paths for decoupling sustainable economic growth from GHG emissions.

Parties to the UNFCCC decided “to invite all Parties to initiate or intensify domestic preparations for their Intended Nationally Determined Contributions (INDC) and to communicate them well in advance of the twenty-first session of the Conference of the Parties in a manner that facilitates the clarity, transparency and understanding of the intended contributions.” INDCs may contain a mitigation goal which may be transformed into an eventually legally binding mitigation commitment in the 2015 agreement and which should be transparent, quantifiable, comparable, verifiable and ambitious.

LEDS provide Parties with an opportunity to formulate a low-carbon growth path, while considering their own development needs and aspirations. NAMAs can be understood as a tool to partially implement such strategies, to give a face to more abstract policy and seek a measurable, reportable and verifiable low-emission development.<sup>8</sup>

The project will, based on the developments as part of the international climate change negotiations (particularly the 21<sup>st</sup> session of the Conference of the Parties – COP - to the UNFCCC in Paris at the end of 2015) and in consultation with the GoM, design a NAMA (or INDC) in support of a low-carbon growth path, with particular focus on SHP and incorporating a gender responsive agenda.

### ***Long-term sustainability of global environmental benefits and institutional continuity through national ownership for Component 3 – REPLICATION STRATEGY***

This component focuses on the establishment of a medium-term mechanism for financing such projects, preparing a pipeline of SHP projects, and enlarging the potential beneficiaries through innovative business models which will make it easier for the private sector to take projects forward in the future. The financing activities will be designed in line with GoM priorities and a financing instrument such as a partial risk guarantee fund is expected to be established so that further private-sector-led SHP projects can be developed beyond the end of the GEF project.

The creation of local experts that have been trained to be highly skilled and fully equipped in the development and implementation of SHP projects, provision of technical know-how and other services, is expected to play a most important role in bringing new SHP projects forward after the completion of the GEF project implementation. During the GEF project implementation period not only will stakeholders be trained directly but trainers will be trained to ensure that the training continues beyond the timeframe of the project. Therefore trained hydropower experts will continue offering and providing training as result of increased demand, kicking-off the development of technology provider start-ups and the growth of a national market. In addition the capacity of academic and research institutions and potential local manufacturers will be enhanced in innovative SHP technologies providing the basis for continued R&D in this area. The increased capacity will be anchored in the technical university(-ies) where the university course is organised, and in a relevant industry association (to be identified).

The project is expected to generate the level of awareness needed to boost the interest in and demand for SHP projects. It will see the involvement and active participation of private sector organizations, which can rely on well-established national networks and platforms. The awareness and capacity built through this component will stimulate the development and implementation of new SHP and potentially other renewable energy projects and generate additional GHG emission savings.

Each of the activities of this component will serve long-term sustainability by anchoring the capacity in the relevant national entities, i.e. the GoM partners such as ADER and JIRAMA, and SME, private and finance sector partners, the academic partners such as National School of Polytechnic in Diego Suarez.

### **Global Environment Benefits**

The direct emission reductions are estimated at 131,400 tonnes CO<sub>2</sub> based on 2 MW, with indirect emissions reductions ranging between 525,600 tonnes (bottom-up) and 578,160 (top-down) tonnes CO<sub>2</sub>.

More information on how the emissions reductions were estimated is provided in Annex F.

### **Institutional continuity and replicability, and sustainability of global environmental benefits**

The strategy for long-term national ownership to ensure sustainability and replication in other sectors has been described at the end of description of the activities in the main individual components. The focus of the activities is to develop national capacities by developing real pilots by setting up the necessary financial mechanisms, learning through the numerous trainings and disseminating results, so that SHP technologies remain a focus beyond the timeframe of the project. Key to this is enabling key agencies within the country such as the Ministry of Energy and Hydrocarbons, ADER and supporting SMEs which have commercial interest in these projects. With the combined

<sup>8</sup> How are INDCs and NAMAs linked? GIZ, UNEP DTU, November 2014

efforts of the actors and stakeholders within the five project components the GEF work is designed in such a way to ensure the sustainability of global environmental benefits beyond the life of the project.

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

The results of risk assessment carried out during the PPG identified the following major project risks and risk mitigation measures:

Risk Factors	Description of risk	Risk Level	Mitigation measures
<b>Political risk</b>	Stability of the country and the mechanisms of GoM to underpin the project in terms of the co-financing.	Medium	After the military coup in Madagascar in 2009 condemned by the international community, democratic elections took place in December 2013 allowing all sanctions to be removed. Despite the normalization of the situation, the history of Madagascar, with recurrent political crisis (2001-2002, 2009-2013), shows that the democratic process remains volatile. Therefore, the political situation and its potential impact on the project will constantly be monitored.
<b>Policy risk</b>	Risk that the important policy changes required in the project will not be possible.	Low/medium	The policy risk will be mitigated through strong involvement of lead ministries and private sector throughout the implementation.
<b>Technology risk</b>	Risk of the chosen technology not being applicable or developable in the chosen areas.	Low	Small hydro-power is based on well-established technology that is centuries old and now well practised in many developing countries for electrification. The particular technology risk as applied to Madagascar will be mitigated through involvement of technical experts and UNIDO's expertise and by South-to-South partnerships facilitated in Component 4.
<b>Investment risk</b>	Risk that the financial sector and investment requirements of the project are not realised.	Medium	The investment risk will be mitigated through bringing in international and local private finance. The GEF project is expected to provide an incremental 20-25%, with the other 75-80% coming from the private sector project developers, through equity and/or loans. Bank of Africa is one of the commercial banks having expressed its willingness to provide loans for the type of SHP investments targeted under the GEF project.
<b>Private sector risk</b>	Appetite of the private sector to engage with the pilot SHP projects	Low/medium	The willingness of local SMEs to shift to modern technologies: will be mitigated through continuous involvement of the target SME sectors.
<b>Social risk</b>	Risk of social resistance against project activities, especially with regards to women inclusion	Low	There will be thorough communication and stakeholder involvement at all levels of decision-making to ensure that there is consensus around project objectives.
<b>Climate Change and Water Supply risks</b>	Madagascar is subject to uncertain climatic behaviour with global warming now affecting the planet, which puts rainfall patterns at some risk.	Medium	The pre-feasibility studies suggest that water supplies are sufficient to justify investments. Other studies show uncertainty as Malagasy rainfall has not been studied sufficiently (rainfall during wet season supposed to increase by 5-20%; rainfall during dry season to decrease by 10-30% though unclear whether referring to Madagascar or areas affected by ENSO in general (WWF n.d.). Rainfall in the north is expected to increase but to occur as more sporadic and intense periods (USAID 2008). This will be assessed in further detail for the target sites to be developed under the project, in cooperation with the private partner.

## A.7. Coordination with other relevant GEF financed initiatives

The World Bank, EU and GIZ all have active energy programmes in Madagascar which fully or partially focus on the SHP sector (e.g. the PIC of the World Bank, PHEDER and Rhyviere of EU and PERER of GIZ). Consultations with these institutions have been essential in defining the correct regions and sites for the GEF project, firstly to not replicate initiatives already on-going and to harmonise project linkages where possible.

The UNDP has recently had a large GEF USD 40.3 million project approved, the objective of which aims to strengthen the capacities of vulnerable communities of Androy, Anosy, Atsinanana, Analamanga and Atsimo Andrefana to cope with the additional risks posed by climate change and variability on livelihood opportunities. Whether this will entail provision of electrification services in these areas using local renewable energy sources is

yet to be seen, as the project was only approved in February 2014, and operational details are not yet available. Coordination with this project, where required, will be ensured.

In addition, a number of projects in the field of SHP are currently ongoing, notably by GIZ and by the World Bank: The World Bank is running the PAGOSE project (Projet d'Amélioration de la Gouvernance et des Opérations dans le secteur de l'Electricité), which aims to assist the country in the reform of the energy sector and ensure the long-term sustainability of JIRAMA. Another project funded by the World Bank is the PIC project "Pôles Intégrés de Croissance" and aims to reduce poverty through economic growth in some regions with high development potential. The initiative started in 2010 and the first phase focused on Nosy Be, Tolagnaro and Antsirabe.

A second phase will be initiated in 2015, will aim to design and prepare the project activities for the regions of DIANA and ATSIMO ANDREFANA, especially on the axis Antsiranana (Diego Suarez) - Ambanja (northern part of the country) and in South-West: axis-Morombe – Toliara to develop tourism and exports in these two regions and foster the creation of new jobs and the development of income generation. Development of access to electricity is considered, based mainly on wind power (2000kW approximately 500kW Toliara and Antsiranana). A hydroelectric project is planned around the city of Diego Suarez for a total capacity of 300 kW.

The European Union (EU), under the program "Facility Energy" has about ten ongoing projects focusing on small scale power plant installation with a capacity range of 80 to 300 kW, based on pico hydropower, wind and solar energy depending on the sites. Secondly, The European Union Energy Initiative (EUEI) was founded in 2004 and its Partnership Dialogue Facility (PDF) is a flexible instrument that works with partner countries and regions (focused on Africa) to develop policies and strategies to help improve access to affordable and sustainable energy services. The EUEI is supporting the Ministry of Energy and Hydrocarbons to develop a national policy for the energy sector, and a strategy for implementation, all aligned on the quantified goals of SE4ALL. The main objectives are (i) the co-ordination of policy with other ministries involved in energy, (ii) transitioning to renewable energy, (iii) promoting knowledge of alternative energy to traditional fuel wood, (iv) promoting the electrification of the country considering sustainability, environmental considerations and increased financial and economic resources. EUI-PDF is currently financing a policy strategy for the energy sector in Madagascar, which should be ready for the end of January 2015. Finally, the EU participates to the evaluation of the JIRAMA in order to prepare a financial injection of around 100,000,000 EUR available from the 10<sup>th</sup> FED. This amount should foster renewable energy projects in different towns of Madagascar with high economic potential.

The African Development Bank (AfDB) partly financed the setup of the hydro sites of Sahainvotry with a potential of 18 MW. In order to increase electricity access on the touristic island of Nosy-be, the AfDB is financing feasibility studies to implement a hydro site through PPP.

Since 2009, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) has been involved in the energy sector and cooperates directly with the ADER. GIZ has been running the project "PERER" which basically consists of institutional strengthening of ADER and provide technical assistance for private sector in operating SHP/Hydro project. The GIZ has recently financed technical training to the ADER about new turbine technology, brought by the Swiss company "Entec". GIZ has been very open and positive to partner with UNIDO and it should be clear from the above that both interventions could be complementary and mutually reinforcing in support of reaching increase the development objective. The GIZ project is expected to start in early 2015, a timeline, which can smoothly be brought in line with the activities under this planned GEF project.

Groupe de Recherche et d'Echanges Technologiques (GRET; a French NGO) developed a project called "rHYvière" which plans to build SHP for rural electrification with a targeted capacity production up to 50 kW. GRET designs, tests and popularizes mechanisms of development of rural power grids powered by micro-hydro in Madagascar. It designs, with industry players, tools and procedures for the development of the sector, and supports the development of three hydroelectric systems in the context of Public-Private Partnership (PPP) for supplying electricity to over 14,000 people in three regions of Madagascar (the site of Tolongoina has already been finalized, and the delegates of the three networks were selected). It is also developing an observatory of rural electrification (Ampere) for monitoring the evolution of the sector by the ADER. The introduction of "Payment for Environmental Services" (PES) is tested to ensure sustainability of the water resource that feeds the plant of Tolongoina in terms of quantity and quality. Moreover the "rHYvière" project aims to strengthen SHP turbine manufacturing capacities for the lower capacity range (up to 30kW).

Discussions between UNIDO and the mentioned actors have been ongoing and will continue in order to maximize potential synergies between the different initiatives. Sharing knowledge through joint workshops and dissemination activities will be pursued and encouraged through the GEF project.

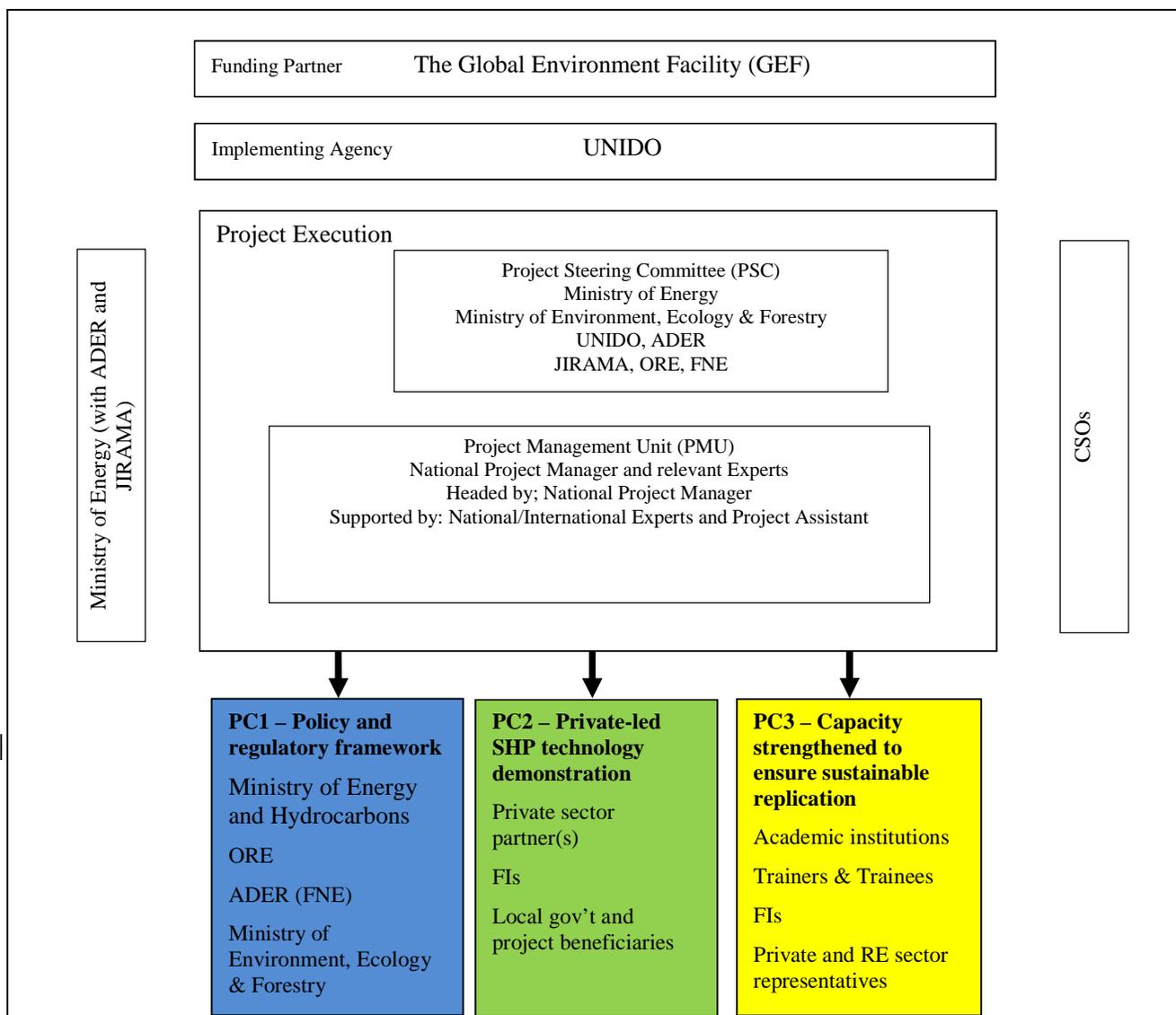
**B. ADDITIONAL INFORMATION NOT ADDRESSED AT PIF STAGE:**

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

At the beginning of the GEF project implementation, following the finalisation of institutional set-up and co-ordinations are made clear between stakeholders (through ToRs and setting up of the Project Steering Committee), a work plan for the first year of implementation will be detailed by a Project Management Unit (PMU) in collaboration with UNIDO and GoM. The initial focus of activities will be on the Policy Component as well as on technical preparations for the SHP pilots in Component 2. Thereafter, a yearly work plan will be laid down to continue to clearly define roles and responsibilities for the execution of project activities, including monitoring and evaluation; it will set milestones for deliverables and outputs. The overall and annual work plans will be used as management and monitoring tools by the PMU and UNIDO and the overall work plan will be reviewed and updated as appropriate on a regular basis. Amendments to the project will follow the relevant GEF policy paper C.39.9.

Anticipated Project Management and Implementation

The execution of the respective tasks through the 5 year project will be carried out by the organizations indicated in Annex A with key experts made part of contractual arrangements with UNIDO and in line with UNIDO’s rules and regulations. Regular consultations with stakeholders and local beneficiaries will ensure that the project’s impact on- and appropriation by the local communities can be assessed throughout project implementation. Figure 3 shows a diagram of the planned project implementation and execution arrangement.



**Figure 3: Diagram of planned project implementation structure with stakeholders**

- **UNIDO:** As the GEF Implementing Agency, UNIDO holds the ultimate responsibility for the implementation of the project, the delivery of the planned outputs and the achievement of the expected outcomes; UNIDO will be responsible for supervision and monitoring of the project, and reporting on the project performance to the GEF. UNIDO has a country office in Antananarivo which has been instrumental in the preparation of the project and gather support from key government and other stakeholders. It is clear that this office will be crucial in the implementation of the project. UNIDO currently has a number of projects ongoing in Madagascar.
- **Project Steering Committee (PSC):** The PSC will be established for regular reviewing and monitoring project execution progress, providing strategic advice, facilitating co-ordination between project partners, providing transparency and guidance, and ensuring ownership and sustainability of the project results. The Terms of Reference and final composition of the Steering Committee will be defined during the project start-up phase and is expected to be chaired by the Ministry of Energy and Hydrocarbons and include representation from, the Ministry of Environment, Ecology, Sea and Forestry (i.e. the GEF OFP), the Office for Regulation of Energy (ORE) and/or Fond National de l'Electricité (FNE).
- **Ministry of Energy and Hydrocarbons with ADER:** In order to give the project a strong lead, a Ministry of Energy and Hydrocarbons focal point person will be appointed to the project and ADER will ensure that the SHP pilot project activities are properly coordinated with the other supporting activities within the Project Components. The Ministry of Energy and Hydrocarbons will ensure that the co-financing is correctly co-ordinated and assigned into the GEF project and will be responsible for co-operation with the financing institutions such as the banks and outside private investors for the important replication component.
- **Project Management Unit (PMU):** The PMU will be responsible for the day-to-day management and execution of project activities as in the agreed project work plan. The PMU will be headed by the National Project Manager (NPM); other relevant experts such as a technical, financial and capacity building expert will be added as required. It will be verified during the start-up phase of the project where the PMU will be located.
- **Private sector partner:** Given the tendering procedures of the GoM, it is not yet clear with which private sector partner(s) the project will form a formal cooperation, as it depends on which partner obtains the licenses and concessions for prioritized sites or which other government procedures may define or restrict the options. It is expected that one of the currently active players such as Henri Fraise, Hydelec, Tozzy Energy, Enelec, Assist and others, would be the private sector partner, some of which have already committed their support and cofinancing (e.g. Assist) to this form of cooperation. UNIDO continues to keep close contacts with each of the players. The final selection of the private sector partner will be discussed and agreed at PSC level, and will take into account UNIDO rules and regulations.
- **CSOs and NGOs:** Potential CSOs and NGOs will be consulted, including those focusing on gender equality issues and advocating women's empowerment, such as women's associations (also see Annex 8), will be consulted and/or involved whenever appropriate during project implementation.

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

The project will work closely with national project developers, strengthen capacity at private sector level and also trigger local manufacturing of SHP components (such as the concrete poles), thus supporting innovation, sustainable industrial and economic development and long term job creation.

The pilot SHP projects will generate new business for entrepreneurs in consulting, design, project implementation, manufacturing, operation and maintenance, which will be enhanced social status through the creation of employment. Some of the project operators will substitute their existing fossil fuel projects with hydropower and as such will hedge risks against price fluctuations. SHP does not require fossil fuels, thus significantly reducing the cost of operation and the overall level of CO<sub>2</sub> emissions.

**B.2.1 Gender Mainstreaming at UNIDO**

UNIDO recognizes that gender equality and the empowerment of women have a significant positive impact on sustained economic growth and inclusive industrial development, which are key drivers of poverty alleviation and social progress. Commitment of UNIDO towards gender equality and women's empowerment is demonstrated in its policy on Gender Equality and the Empowerment of Women (2009), which provides overall guidelines for establishing a gender mainstreaming strategy which:

- Ensures that a gender perspective is reflected in its programmes, policies and organizational practices

- Advances the overall goal of gender equality and the empowerment of women, particularly the economic empowerment of women
- Benefits from the diversity of experiences and expertise within the United Nations system to advance the internationally agreed development goals related to gender equality and the empowerment of women
- Accelerates the Organization's efforts to achieve the goal of gender balance, in particular at decision-making levels

At the operational level, UNIDO has developed an energy-gender guide to support gender mainstreaming of its sustainable energy programmes and initiatives at all stages of the project cycle. In addition to introduction of basic concepts and strategic approaches, it also includes tools that can be used at relevant points of the project cycle to guide the thought processes and activities. These tools include

- Gender categorization tool which assesses how much direct impact the project will have on gender dimensions
- Gender mainstreaming check list which summarizes key considerations which must be considered during project development
- Gender analysis tool which provides specific questions that can guide the project developer in considering gender dimensions of a project, before full gender analysis is conducted by an expert
- Gender mainstreaming the project cycle tool, which lists key activities to be considered at each step of the project cycle
- Gender indicator framework that encourages results based management by indicating potential gender dimensions and quantitative indicators for specific energy interventions

To ensure that all projects consider gender dimensions from inception, UNIDO has also integrated a robust method as part of the project appraisal process both at technical and organizational level.

### **B.2.2 Project gender mainstreaming strategy**

Guiding principle of the project will be to ensure that both women and men are provided equal opportunities to access, participate in, and benefit from the project, without compromising the technical quality of the project results.

In practical terms:

- Whenever possible existing staff will be trained and their awareness raised regarding gender issues. Sensitization will be done for instance through workshops, trainings, etc. Considerations will be made to cooperate with regional centres or other stakeholders such as local women's associations
- Decision-making processes will consider gender dimensions and include representatives of SSOs and NGOs promoting gender equality and empowerment of women (providing them with equal voice). This is both at project management level, such as Project Steering Committee meetings. If it is not possible to nominate a gender-sensitized PSC member, an observer will be invited to attend the PSC meetings to ensure that gender dimensions are represented. Also at the level of project activity implementation, efforts will be made to consult with stakeholders focusing on gender equality and women's empowerment issues. This is especially relevant in policy review and formulation
- To the extent possible, necessary efforts will be made to promote participation of women in training activities, both at managerial and technical levels. This can include advertising of the events to women's technical associations, encouraging companies to send women employees, etc
- When data-collection or assessments are conducted as part of project implementation, gender dimensions will be considered, particularly with reference to the impact of SHP on the livelihood of community members whether male or female. This can include sex-disaggregated data collection, performing gender analysis
- In case of awareness raising activities targeting communities, changing the medium of communication may be considered to reach the illiterate population, for example to rely more on images and radio instead of

text. Additionally, to promote participation of mothers, the time of trainings should be taken into consideration as well as childcare facilities

This project is expected to have overall limited direct influence over gender equality and/or women's empowerment in the countries (and therefore could be classified as a project with "limited gender dimensions" according to the UNIDO Project Gender Categorization Tool). Nevertheless, UNIDO recognizes that all interventions dealing with energy and/or natural resources (such as the water) are expected to have an impact on people and are, therefore, not gender-neutral. In fact, due to diverging needs and rights regarding natural resources, energy consumption and production, women and men are expected to be affected differently by the project (in terms of their rights, needs, roles, opportunities, etc.). Therefore, (regardless of the project's gender category,) the project aims to be gender responsive and to demonstrate good practices in mainstreaming gender aspects into SHP projects, wherever possible, and avoid negative impacts on women or men due to their gender, ethnicity, social status or age. Hence, gender aspects will be integrated in the plan as appropriate, especially for training and capacity building. In addition, the support this GEF project gives for industrial innovation and increasing competitiveness of the country by moving towards more electrification from hydropower plants (not reliant on imported and expensive oil) will be favourable for Madagascar by sustaining better social and economic conditions, giving employment, economic well-being and therefore gender equality. A general gender analysis for Madagascar is provided in Annex 8.

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

There are two key facets within the cost of the GEF project, (i) the cost of the SHP pilots themselves, which with up to 2 MW of capacity have a certain invested cost, and (ii) the staffing and their overhead cost to run the project over the 5 years, including delivering the trainings and workshops.

The SHP capital costs have been derived through the APD process that ADER have outlined and re-assessed by UNIDO's local consultants within the project preparation phase. It has been assessed that the cost of the SHP projects of potentially up to 2 MW in total, with approximately USD 3,500 per kW installed. This is known to be good value, as tested internationally, for fully installed small hydro power projects and already includes grid connection and access costs.

### **C. DESCRIBE THE BUDGETED M&E PLAN:**

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

The final component is the monitoring and evaluation, which particularly focuses on Components 1 and 2 (the Policy and Demonstration activities) but also considers the effectiveness of the replication and capacity building activities in Components 3 and 4. The dissemination work in this Component is on the reporting of carbon benefits within the GEF project and setting up an ability to continue this formally within the country for SHP and potentially other forms of renewable energy. Gender aspects, as mentioned in Section B2, will be paid particular attention to during M&E activities including mid-term and final evaluation. For this purpose a gender specialist will be consulted whenever possible and gender issues addressed accordingly.

## **OUTCOME 4 Project's progress towards goals confirmed and necessary adjustments made. Evaluation system for the GHG emission reductions from the project in place**

### **4.1 Mid-term and final evaluations on GEF project carried out**

In order to watch progress of the project as a whole and the efficacy of the many activities, it is essential to undertake proper monitoring and evaluation. This will be carried out primarily by the PMU as part of the annual monitoring exercise (Project Implementation Reports), and in addition there will be formal M&E activities for GEF reporting, carried in the mid-term and end of project. These evaluations will be conducted independently, by a suitably resourced and experienced team of international and national consultants, with experience of GEF projects and SHP in developing countries, particularly in Africa. They will have access to all documentation and it will be essential to carry out interviews with the full range of stakeholders. The mid-term finding will be essential to then integrate into the final half of the project activities and the final evaluation will be useful to inform future GEF projects of a similar nature.

### **4.2 Tool to assess GHG emissions and carbon registry platform set up**

The main dissemination activities for the project will have taken place within Component 3, but a highly important activity is to assess the GEF work in respect of the GHG emissions reductions the project will make, now and over

the next 30 years, considering the replication of projects that should result. This activity will be technical in nature and a suitably qualified consultant will develop the tool to assess the emissions (likely to be web-based with parameters that can be changed in the future).

Currently no formal registration of carbon emissions from SHP exists in Madagascar, so this final activity will establish a platform for this to happen. An appropriate body will need to be identified to host the platform for registration of all SHP projects in the country, for a proper understanding of the carbon emissions abatement compared to other forms of electrification in those areas, meaning that other forms of RE could also be potentially hosted on the platform. This information may be used at an international level, to see the benefits of the SHP projects, and to support the relevant NAMA or other mechanism under the international climate change framework.

*Project's Indicative Monitoring and Evaluation Work plan*

Type of M&E activity	Responsible Parties	Budget USD*	Time frame
Inception Workshop (IW) and inception report	UNIDO Project Manager (PM); Project Management Unit (PMU)	0*	Within first two months of project start up
Regular monitoring and analysis of performance indicators (technical, social, policy, environmental)	UNIDO Project Manager (PM); Project Management Unit (PMU) and M&E specialists as required	0*	Regularly to feed into project management and Annual Project Review
Annual Progress Reports (APRs) and Project Implementation Reviews (PIRs)	Project Management Unit (PMU) to prepare prior to the annual project review PM UNIDO to validate and finalize to submit to GEF	0*	Annually
Annual Project Review to assess project progress and performance	Project Management Unit (PMU), PM UNIDO HQ and Project Steering Committee to review the project performance and make corrective decision	0*	Annually prior to the finalization of APR/PIR and to the definition of annual work plans
Steering Committee (SC) Meeting	Project Management Unit (PMU), PM UNIDO HQ and Project Steering Committee	0*	Annually coincide with the Annual Project Review and whenever urgent and important decisions need approval of SC
Mid-term Evaluation including survey to measure progress against baseline for industry, manufacturers and policy makers	PMU, external consultants, UNIDO PM, UNIDO Evaluation Unit (ECA) in advising on TOR and selection of evaluators, Steering Committee and M&E specialists as required	20,000	Mid of project
Final survey to measure progress against baseline for industry, manufacturers and policy makers	UNIDO Project Manager (PM); Project Management Unit (PMU) and M&E specialists as required	0*	
Terminal Project Evaluation	UNIDO Evaluation Unit (ECA), Project Management Unit (PMU), PM UNIDO HQ and Project Steering Committee, independent external evaluators	30,000	Evaluation at least one month before the end of the project; report at the end of project implementation
Lessons learned	PMU, external consultants, UNIDO PM	0*	By the end of project implementation; annual as part of PIR
Visits to field sites	PM, PMU Representative from the Steering Committee	0*	Annually
<b>TOTAL indicative cost</b>		50,000	
* The costs are covered under Project Management Costs			

**Legal Context:**

The Government of Madagascar agrees to apply to the present project, mutatis mutandis, the provisions of the Revised Standard Technical Assistance Agreement concluded between the United Nations and the Specialized Agencies and the Government on 31 August 1956 and as amended on 3 October 1963.

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

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

NAME	POSITION	MINISTRY	DATE(MM/dd/yyyy)
Mrs Ralalaharisoa Christine Edmee	General Director for Environment and GEF Operational Focal Point	Ministry of Environment and Forestry	10/06/2011

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

This request has been prepared in accordance with GEF/LDCF/SCCF/NPIF policies and procedures and meets the GEF/LDCF/SCCF/NPIF criteria for CEO endorsement/approval of project.

Agency Coordinator, Agency Name	Signature	Date (Month, day, year)	Project Contact Person	Telephone	Email Address
Mr. Philippe R. Scholtès, Managing Director, Programme Development and Technical Cooperation Division (PTC), UNIDO GEF Focal Point		May 5, 2015	Mark Draeck, Industrial Development Officer, Energy Branch	+43 1 260265317	 <a href="mailto:m.draeck@unido.org">m.draeck@unido.org</a>

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

Project Strategy		Objectively verifiable indicators				
		Indicator (quantified and time-bound)	Baseline	Target	Source of verification	Risks and Assumptions
<b>Objective of the project</b>	The project aims to stimulate the use of small hydropower (SHP) to reduce GHG emissions and trigger productive use for income generation in line with priorities of GoM, with the overall aim to increase the competitiveness of the Madagascar SME sector and reduce its dependency on fossil fuels	1. Number of SHP projects installed and stimulated  2. Energy generated from SHP technology (in MWh)  3. Direct CO <sub>2</sub> emissions reduced (tonnes of CO <sub>2</sub> eq)	1. Limited no. of SHP projects established in recent years  2. Limited power generation from SHP (projects less than 10 MW) in 2013  3. Carbon emissions reductions from SHP not properly monitored	1. SHP capacity of at least 2 MW realised  2. Energy generated annually from SHP through demonstration projects = 13,140 MWh per year, operating from 2018-2038  3. Direct emission reduction of 131,400 tonnes, and indirect emission reductions between 525,600 tonnes (bottom-up) and 578,160 tonnes (top-down)	Ministry of Energy, ORE and ADER co-ordinated reporting  Project documents completed, audited and made available. GEF project tracking tools  GEF Tracking Tool for climate change mitigation projects  Project Monitoring & Evaluation process,  Project outcomes against continued GoM strategic and policy priorities	The Ministry of Energy, ORE & ADER remain committed to the development of SHP in rural areas  Private sector can be engaged with the projects  Financial sector can be brought in to support the private sector players  Adequate human and financial resources mobilized to realise the projects  Implementation of project activities will foster investment in extra SHP projects
<b>COMPONENT 1: POLICY AND REGULATORY FRAMEWORK STRENGTHENED</b>						
<b>OUTCOME</b>	National Low-Carbon Energy Development Plan developed and tailored initiatives to support SHP in place	Extent to which National Low-Carbon Energy Development Plan (NLCEDP) and SHP support legislation are proposed and adopted by 2017	No national overarching RE plan yet  Current legislation (Law No. 98-032 on the Reform of the Electricity Sector) inadequate for SHP and does not provide	NLCEDP discussed, drafted and put in place  Legislation reviewed to allow increased development of SHP in rural areas with clarity for other RE	Ministry of Energy  ORE  ADER  Project website.	Sustained GoM support and leadership from key stakeholders  Ability to review legislation in current political climate

Project Strategy		Objectively verifiable indicators				
		Indicator (quantified and time-bound)	Baseline	Target	Source of verification	Risks and Assumptions
			for other RE.	(wind, solar, biomass).		
<b>Output 1.1</b>	Policy framework on RE for productive uses reviewed and recommendations to streamline policies/incentive schemes towards a greater use of rural-based SHP proposed	<p>National Low-Carbon Energy Development Plan (NLCEDP) in place by 2017, to harmonize and improve existing legislation for SHP and RE in general</p> <p>Development of a Policy Document Legislative Code as support for SHP carried through as part of the NLCEDP, that is also gender responsive</p>	<p>Regulatory framework for management of National Energy Fund (FNE) and for rural electrification with RE is lacking</p> <p>Productive use not specifically included within policies for SHP and RE</p> <p>Lack of a regulatory framework for the use of waterways to avoid conflicts between agriculture, fisheries, biodiversity and hydro electricity producers</p> <p>Lack of co-ordination between Ministry of Energy, ORE and ADER on RE master planning</p>	<p>Better management of regulation of RE and rural electrification programmes</p> <p>Productive uses from RE made a key indicator within reporting mechanisms</p> <p>Marked change in problematic aspects of current legislation, e.g. on licencing use of water from rivers and incentives for SHP (i.e. tax and customs)</p>	<p>Ministry of Energy and ADER reporting. Periodic review of National Low-Carbon Energy Development Plan against projects realised</p> <p>Ministry of Energy, ORE and ADER co-ordinated reporting</p> <p>Regular review of NLCEDP against policy arena</p> <p>Policy document as part of GEF project</p>	<p>National Low-Carbon Energy Development Plan is adopted by all key stakeholders - GoM, Private Sector and Civil Society</p> <p>NLCEDP is used as key policy framework for measuring success of RE and SHP in implementing rural electrification with link to productive activities</p> <p>Co-ordination between Ministry of Energy, ORE and ADER, and political will to realise legislative support. Changes in country policy backdrop affecting Legislative Code for SHP</p>
<b>Output 1.2</b>	Standardized reference emission levels established	Calculation tool in place agreed by stakeholders by mid-2016	Ad hoc reporting on emissions levels obtained from SHP and RE in general	System in place for standardisation of CO <sub>2</sub> emission levels and M&E in place (in line with Output 5.2)	<p>Ownership of system by Ministry of Energy (or other appropriate body)</p> <p>GEF Tracking Tool for climate change mitigation projects</p>	

Project Strategy	Objectively verifiable indicators					
	Indicator (quantified and time-bound)	Baseline	Target	Source of verification	Risks and Assumptions	
<b>Project Component 2. SHP projects operational</b>						
<b>OUTCOME</b>	Construction of SHP based mini-grids for productive use and income generation.	<p>Number of projects established in rural areas with link to productive uses. MW installed</p> <p>Volume of investment mobilised</p> <p>Tonnes of CO<sub>2</sub>eq avoided</p> <p>Income generation as a result of SHP electrification for women and men</p>	<p>Limited number of existing and successful SHP projects</p> <p>Limited examples of private sector-led SHP development (incl. co-finance)</p> <p>Limited tonnes of SHP related avoided CO<sub>2</sub> emissions</p>	<p>SHP capacity of at least 2 MW realised</p> <p>USD 7 million mobilised through private sector</p> <p>Approx. 131,400 tCO<sub>2</sub>eq of direct emissions avoided</p>	<p>Ministry of Energy and ADER reports.</p> <p>Independent monitoring &amp; evaluation reports.</p> <p>Project website.</p> <p>Private sector project reports.</p> <p>Financing partner data.</p> <p>GEF Tracking Tool for climate change mitigation projects.</p>	<p>GoM actors remain committed to GEF project.</p> <p>Rural electrification alternatives (diesel gensets or grid extension) prices remain high or not viable in the medium-term.</p> <p>Private sector has technical and financial ability to help realise projects.</p> <p>Co-financing for GEF projects available.</p>
<b>Output 2.1</b>	Target SHP projects fully prepared for development and co-financing secured	Limited number of technical documents / project assessments made of potential SHP projects leading to co-finance	No previous assessments leading to appropriate reports carried out	At least 2 specification documents assessed as appropriate for presentation for co-financing	<p>Project documents</p> <p>Private sector project reports</p>	Cooperation between GEF project actors, technical experts and potential financial institutions, to develop assessment reports
<b>Output 2.2</b>	At least 2 MW of SHP capacity realised	<p>Number of SHP projects implemented with support from GEF</p> <p>Number of projects with link to productive use activities by women and men</p>	Zero SHP projects supported by GEF	At least 2 MW of SHP capacity realised with direct support from GEF	<p>Project reports and copies of Case Studies</p> <p>GEF project tracking tool</p> <p>Independent monitoring &amp; evaluation reports</p>	<p>Consultants available for conducting training</p> <p>Active reporting and M&amp;E processes in place</p> <p>Climate change impacts on hydrology</p>

Project Strategy	Objectively verifiable indicators					
	Indicator (quantified and time-bound)	Baseline	Target	Source of verification	Risks and Assumptions	
<b>Project Component 3. Replication in place Targeted capacity strengthening carried out and knowledge management in place</b>						
<b>OUTCOME</b>	<p>Appropriate financial measures to create conditions for SHP project replication developed and operational</p> <p>Capacity of project developers on technical, productive use aspects and financial viability of SHP enhanced and local capacity to manufacture SHP equipment strengthened</p>	<p>Financing facility identified</p> <p>Quantity (USD) of funding identified</p> <p>No. of organisations applying to financiers for SHP projects</p> <p>Training needs assessment (TNA) done in a gender responsive manner</p> <p>Number of technical, social, financial and manufacturing training sessions provided.</p> <p>Number of trained personnel; women and men</p> <p>Number of future SHP projects identified for local equipment supply</p>	<p>Case by case financing facilities for SHP available for private sector</p> <p>No dedicated funding for SHP projects.</p> <p>Limited or no organisations applied for financing SHP-specific TNA limited and without gender dimension</p> <p>Limited or no previous relevant training sessions</p> <p>Limited no. of trained personnel</p> <p>Only small capacity SHP projects identified for local equipment supply</p>	<p>A financing facility established with initial funds (estimate USD 5 million) identified as partial risk guarantee</p> <p>At least 5 private sector players apply for future SHP financing</p> <p>6 training workshops designed based on TNA (including the gender dimension) and conducted (indicatively 3 x SHP technical, 1 x productive uses, 1 x financial viability and 1 x local manufacture)</p> <p>250 trained people - at least 30% women</p> <p>2 SHP future projects identified for local equipment supply</p>	<p>Financing records from FIs</p> <p>Project reports and copies of Case Studies</p> <p>ADER records as per FNE</p> <p>Project TNA report Ministry of Energy / ADER sponsoring training sessions</p> <p>Official training reports</p> <p>Independent monitoring &amp; evaluation reports</p>	<p>Interest from FIs (local and international) in financing SHP projects.</p> <p>Stable lending situation in Madagascar</p> <p>National and international experts according to the TNA</p> <p>Commitment from GoM stakeholders</p> <p>Availability of SHP projects identified for local equipment supply</p>
<b>Output 3.1</b>	<p>A mechanism to facilitate sustained securing of finance developed through appropriate business models between public entities and private &amp; financial sectors</p>	<p>Matrix of appropriate financial tools based on business models</p> <p>Financial due diligence guidelines for SHP projects</p>	<p>No matrix available to assist in selecting financial model appropriate to SHP</p> <p>No due diligence guidelines available</p>	<p>Matrix developed.</p> <p>Due diligence guidelines for the various aspects of SHP developed.</p> <p>Standardised financial</p>	<p>Project documents.</p> <p>Financing partner data</p> <p>Report from financing lead agency (to be decided)</p>	<p>Technical capacity developed to enable private sector to present assessment reports to banks</p> <p>Cooperation between GEF project actors,</p>

Project Strategy		Objectively verifiable indicators				
		Indicator (quantified and time-bound)	Baseline	Target	Source of verification	Risks and Assumptions
		Standardised financial and technical parameters for reporting against	No standardised parameters for project feasibility studies	and technical parameters for reporting developed.		technical experts and potential FIs, to develop financial tools
<b>Output 3.2</b>	Capacities of major actors from private, government, and finance and target SME sectors strengthened in the specifics of SHP through tailored training and knowledge management	<p>Training materials developed around productive uses from electrification projects (and are gender responsive)</p> <p>Number of training sessions for SMEs; sex-disaggregated reporting on participants</p> <p>Number of trained entities (SMEs, academia etc)</p> <p>Number of female participants in training sessions</p> <p>No. of best practice reports and project flyers developed</p> <p>Tailored course in place at university or polytechnic institute</p> <p>Awareness raising and marketing material available (and is gender responsive)</p> <p>Evidence of fostering of south-south LDC</p>	<p>No dedicated training material on productive uses developed for SMEs</p> <p>Very limited trainings on link of SHP to productive uses</p> <p>Some SMEs self-trained through project experience</p> <p>Low no. of women in trainings</p> <p>No best practice reports or flyers exist in Madagascar</p> <p>No tailored course in place</p> <p>Shortage of effective and good quality public awareness raising and marketing material</p> <p>Some north-south co-operation for small-scale SHP development</p>	<p>Training material developed for different target audiences – i) vocational training for utilisation of SHP for productive uses, ii) for financiers</p> <p>2 productive use training workshops conducted including on social aspects</p> <p>20 trained SMEs and academic institutions</p> <p>At least 30% of participants women</p> <p>Reports and flyers published for each project</p> <p>Tailored university course in at least 1 university or polytechnic institute in Madagascar</p> <p>Public awareness raising, marketing and training material developed and made available</p> <p>South-south SHP co-</p>	<p>Official training reports</p> <p>Participant logs and evaluation forms.</p> <p>Project reports</p> <p>Monitoring and evaluation on training effectiveness</p> <p>Published materials on best practice</p> <p>University website</p> <p>Project websites</p> <p>Visits of and to international centres</p> <p>Involvement of technology providers</p> <p>Manufacturing workshops held with SMEs attending</p>	<p>Growth in SHP industry leading to sufficient growth in training demand</p> <p>Appropriate topics are identified by SMEs and academia</p> <p>Experienced trainers available during project duration</p> <p>Relevant Case Studies used during trainings</p> <p>Continued support of the key GoM stakeholders and industry representatives for technology suppliers</p> <p>Interest of universities and polytechnic institutes</p> <p>Limited interest or lack of capability in local turbines and concrete pole manufacturing</p>

Project Strategy		Objectively verifiable indicators				
		Indicator (quantified and time-bound)	Baseline	Target	Source of verification	Risks and Assumptions
		co-operation  Link to technology suppliers for training on local turbine and concrete pole manufacturing	Limited local turbine and concrete poles manufacture	operation visit conducted Trainings held on turbine and concrete pole manufacturing  All communication and training materials will be gender responsive  20% female trainers/facilitators (where appropriate and feasible)		
<b>Output 3.3</b>	A Nationally Appropriate Mitigation Action (NAMA) for the SHP sector developed	NAMA developed for inclusion in the NAMA Facility	No NAMA developed	Tailored NAMA ready in line with international climate change rules and procedures	NAMA in the NAMA Facility	GoM support to NAMA Continued role for NAMAs (or similar) in future international climate change framework

**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).

**France comments at PIF stage**

<b>Comment:</b>	<b>GEF Agency response at PIF stage</b>	<b>GEF Agency response at CEO Endorsement stage</b>
<p>The project is coherent as a whole.</p> <p>However, the duration of 4 years for the work program seems somewhat short. This range of power requires detailed field studies. Compared with the experience of the other projects on the duration of the studies in this power range, it shows, if sites are already predefined, that studies do not last more than 18 months with drafting of preliminary design and final design. It is rather the constructions phase that may suffer from the vagaries of cases of major forces: cyclonic weather, administrative delays (especially the amount to be invested by ADER).</p>	<p>The comment on the duration is well taken; the Project Preparation Grant (PPG) phase is about to start and a detailed timeline will be developed for the target sites. This timeline will depend on the quality and reliability of the existing preliminary studies and designs for a number of the target sites; Proposed sites are based on existing data with one year water flow measurements, and some design already established and verified. The PPG phase will confirm the feasibility and the design.</p> <p>This technical assessment should allow for a more detailed timeline for the project as a whole, and for the realisation of the small hydropower plant(s) in particular. Once agreed by counterparts, the project duration will be extended to 5 years.</p>	<p>The suggestion is well appreciated, and confirmed during project preparation phase. The project duration is accordingly changed to 60 months (5 years) from the earlier 48 months (4 years).</p>
<p>The target area seems relevant. EDF had originally identified it for a similar program but later withdrew. The two areas are interesting and road to the region Alaotra - Mangoro current will facilitate travel and work.</p> <p>It is crucial to make sure that the NGO ECOMAD, with the CNRIT, is able to provide a real technical support. The NGO ECOMAD has an agricultural vocation and apparently CNRIT is its partner in the small technology and research. CNRIT which is a research center does not have the capacities of a partner for technical support and managing such a project.</p>	<p>The NGO ECOMAD and its technical partner CNRIT are specifically mentioned in the PIF as a potential source of technical and substantive assistance.</p> <p>The PPG phase through consultations will investigate the existing expertise and detail how different partners can contribute and cooperate in the framework of this project.</p>	<p>The mentioned partners have been reached out to during PPG phase, and this will continue during project implementation to assess synergies wherever possible and appropriate.</p>
<p>We may wonder whether ADER, given its very limited human resources, can performed support to the project as expected. It is a big concern. The disbursement of the financial part of ADER has to be negotiated. It's a very high participation (\$1,300,000). The budget expected from ADER is a bit high</p>	<p>This comment is well taken and the concern is shared. The PPG phase will identify more clearly where the cofinancing will be sourced from; The amount of ADER has not been defined yet, it will constitute a share to be defined among other contributions from the private sector</p>	<p>The "Rural Electrification Development Agency" (ADER) is mandated by the Ministry of Energy and Hydrocarbons (MEH) to act as the government's representative on rural electrification and decentralized energy. As such,</p>

<p>and this situation may the disbursement process at risk. Currently ADER is unable to make new commitments as long as there is no new Director. ADER is still without a Director, the previous having been fired 15 months ago. ADER was greatly disrupted because of the internal problems within the Department of energy and the political crisis in Madagascar. On the other hand, the project should provide an opportunity to lean more on how to best engage with the private sector.</p>	<p>as well as development partners. Consultations with development partners are already ongoing.</p>	<p>UNIDO will work closely with ADER in this project in order to ensure alignment with the government’s procedures, policy and priorities.</p> <p>The cooperation with government counterparts MEH, ADER and JIRAMA has generally been very positive, as reflected by the letter of cofinancing (for 4 MUSD) from the MEH. While the mentioned concern is partly shared by UNIDO, it can be observed that the country has recently been entering a period of increased political stability. While this situation is still fragile, and national structures and capacities still need re-building and improving, the project aims to support the country in this exercise where possible and required. As ADER may indeed need tailored assistance, the project aims to strengthen ADER’s capacity and capability to adequately assist the private sector and facilitate the replication of similar SHP projects. This strengthening will take into account lessons learned and good practices from the UNIDO GEF project.</p> <p>Following a decision from the Council of Ministers on 15/04/2015, the selection of the new manager (“Executive Secretary”) of ADER is still under process.</p>
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**Germany comments at PIF stage**

<b>Comment:</b>	<b>GEF Agency response at PIF stage</b>	<b>GEF Agency response at CEO Endorsement stage</b>
<p>Incremental cost reasoning should show among other things that the proposed activity represents the least cost option to achieve the targeted global benefits. As the focus of the proposed activity is solely on hydropower this question is especially</p>		<p>Data from the Private Participation in Renewable Energy database (World Bank &amp; Norwegian Trust Fund for Private Sector and Infrastructure, 2012) indicate that an average project cost per MW of installed SHP capacity</p>

<p>relevant and comparison to other sources of renewable energy might be worthwhile especially in the combination with productive uses of energy.</p>		<p>was USD 1.9 million. Even though the cost assumptions under this GEF project are significantly higher (at approx. USD 3.5 million due to the cost of grid connection and/or mini grid among other things), this cost is still favourable in comparison to other renewable energy technologies such as solar photovoltaics or bio-energy. In addition, the GE project will contribute an incremental investment of approximately 20-25%, with the remaining 75-80% of the investment coming from the project developer (through equity and/or loans).</p>
<p>The expected outcome under component 1,2,3 is very vague by covering a range from 0.1 MWe to 4.5 MWe in terms of the installed generation capacity attributable to the proposed activity.</p>		<p>Indeed, the range has now been narrowed to between 100 and 1,500 kW based on the prioritised SHP sites. It is anticipated that at least 2 projects with a combined capacity of 2 MW will be realised under the GEF project.</p>
<p>Regarding component 3, Germany seeks clarification in how far the mentioned co-financing of 1.6 mln US\$ would also cover the up-scaling potential in order to be able to judge the sustainability of the proposed activity.</p>		<p>The activities and consultations during the PPG have shown very clearly the key barriers to an accelerated and sustainable activation of the small hydropower potential. These barriers include the lack of (quality) data for Small Hydropower Project (SHP) sites, a limited involvement of private sector players due to a lack of confidence, and a policy and regulatory framework which is insufficiently streamlined and enabling to provide that confidence. The project will address those barriers by realising exemplary SHPs to demonstrate a systematic approach which can be replicated to activate the vast SHP potential in the country.</p> <p>Based on the results of components 1 and 2 and especially the experience of the pilot projects, and based on the collaboration with financial institutions such as Bank of Africa and African Development Bank, the best scheme can be selected to be promoted as a blueprint for future SHP project developments in the rural areas of Madagascar. It is expected that this exercise will take form as of the 3<sup>rd</sup> year of implementation, and will integrate the results of the mid-term evaluation.</p>

		<p>It is indeed clear that the mentioned cofinancing in itself will not be sufficient to feed a long-term financial incentive scheme. As was demonstrated during PPG phase, the project's rationale is taking into account that the private sector project developers will be willing and confident to invest in future SHP projects once the mentioned barriers are (at least partly) removed, and the approach has proven its merit. In that sense the GEF project from the start will act in a facilitating role, and let the local private sector players take the lead, while the GEF project will provide support both through technical assistance and through incremental financing. Such approach will prepare both local private sector players, local banking community and government authorities to be in a position to scale-up SHP projects in the country.</p>
<p>The mentioned basis for the determination of the baseline is very weak as it compares hydropower production data from 2010 to 2011 only. This stands in contrast to the importance of a thorough baseline in order to determine the global benefits of any proposed activity. Especially for renewable energy sources that heavily depend on natural conditions (e.g., in wet years hydropower production will significantly deviate from the production in dry years) fixing the baseline calculation on a two year interannual comparison is not appropriate.</p>		<p>The pre-feasibility studies suggest that water supplies are sufficient to justify investments. Other studies show uncertainty as Malagasy rainfall has not been studied sufficiently (rainfall during wet season supposed to increase by 5-20%; rainfall during dry season to decrease by 10-30% though unclear whether referring to Madagascar or areas affected by ENSO in general (WWF n.d.). Rainfall in the north is expected to increase but to occur as more sporadic and intense periods (USAID 2008). For the area where the prioritised pilot projects are located the risk has been assessed and has been deemed limited, even though some uncertainty remains. This will be further elaborated as part of the full feasibility and, in cooperation with the local partner, for those sites selected by the Government for realisation under the project.</p>

<p>In the same line, the statement that an annual increase of 8% in the use of diesel based power generation is expected needs further clarification regarding the reference (i.e., increase in absolute or relative terms).</p> <p>The benefit of establishing pilot plants should be further elaborated in the light of a significant hydropower share in the current energy mix of Madagascar.</p>		<p>The accuracy of the 8% is indeed questionable and has thus been left out; the tendency of diesel based power generation to significantly increase remains valid though and the country's economy is clearly suffering from the fossil fuel's import bill. JIRAMA, the national utility, in particular is struggling because of this and would principally welcome a higher share of hydropower in the country's energy mix, thus reducing the country's energy dependence.</p>
<p>Regarding the targeted public-private-partnerships the specification of who could be the operator is not responded to, but shared investment is the sole focus, thus far.</p>		<p>The local project developer will assume this overall responsibility. The GEF project will provide financial and/or technical assistance though, especially in terms of capacity, awareness, best practice tariffication models etc.</p>

### STAP comments at PIF stage

<b>STAP comment</b>	<b>GEF Agency response at PIF stage</b>	<b>GEF Agency response at CEO Endorsement stage</b>
<p>The project aims to stimulate SHP and the productive use of electricity for income generation and to reduce dependence on fossil fuels. This is a typical SHP project and similar SHP projects are being funded by GEF. The project has many innovative components such as linking power generation to productive demands and linking to industries. However, STAP has a number of comments which could be addressed during the next phase.</p> <ol style="list-style-type: none"> <li>1. Consideration of the seasonality of the water flow for SHP is necessary to ensure year round power supply</li> <li>2. If the water availability is seasonal then what is the alternative for the gap months</li> <li>3. Will the power generated be for off-grid use or for feeding it into the regional or national grids? This is a very critical for decisions on investment in the grid systems. This will have cost and technology implications as it is not simple to feed power from SHP systems</li> </ol>	<p>Proposed sites are based on existing data with one year water flow measurements, and some design already established and verified. The PPG phase will confirm the feasibility and the design, and will consider mentioned elements e.g. seasonality, distance to the grid, demand (industrial, rural, other), GHG calculation.</p>	<ol style="list-style-type: none"> <li>1. The PPG phase has revealed that lack of accurate data (especially on water flow measurements but equally on energy demand, water seasonality, site accessibility etc.) form a major barrier to SHP project development. The PPG phase has aimed to fill the gaps for at least 5 preselected sites, by carrying out additional studies where required, and translate the available data into a Business Plan to facilitate private sector entry into the project. This approach (essentially to remove those critical barriers which currently hamper private sector to take the lead) will be further pursued in the project implementation phase, to launch at least 2 demonstration projects (project component 2), and to also form the blueprint for the replication approach (project component 3).</li> <li>2. See above.</li> <li>3. Both options are being considered (i.e. 2 of the 5 preselected sites are stand-alone mini grids, while the three others are to be grid-connected with distances between 6 and 30 km from the grid); costing of grid connection has been considered and taken into account in initial feasibility assessment. Grid-connection (essentially fuel switch) projects have the</li> </ol>

STAP comment	GEF Agency response at PIF stage	GEF Agency response at CEO Endorsement stage
<p>to the national grids. In addition, the location of the grid in relation to the hydro site can generate high connection costs if not nearby</p> <p>4. Will the power generated be largely for industries or for rural applications also?</p> <p>5. How will the GHG emission reduction calculated? If the diesel-fired power generation continues to be largely used by urban areas and large industries, and the SHP electricity is used for rural lighting and small industries, then GHG reduction is from diesel and kerosene substitution and possible avoidance of deforestation for traditional biomass.</p>		<p>advantage of being able to sell to the national utility JIRAMA (and thus typically preferred by IPPs), but have the disadvantage of (sometimes indeed long and costly) grid connection. Mini grids have direct rural empowerment potential and do not need grid connection, yet on the other hand need the entire mini grid construction (distribution lines etc.) as well as an operator of the system who needs to be selected / set up /trained to operate and maintain the system, run a tariff and fee collection scheme etc.</p> <p>4. Both are possible. Final site selection will depend on government tendering process and private sector interest and outcome.</p> <p>5. The aim is for the SHP projects to support economic activity in areas with economic activity and growth potential (thus replacing primarily diesel), yet in rural areas or stand-alone situations also rural lighting etc would be expected to be covered by the SHP plant (thus at least partly replacing traditional biomass use)</p>
<p>6. The PIF states that the firewood used in the rural domestic sector will be replaced by electricity. This may not be feasible since electricity for cooking is often a high demanding, costly alternative.</p> <p>7. Regarding the impact of climate change on future water availability, one could refer to National Communications Project Report and the World Bank data base on climate change projections.</p>	<p>UNIDO RESPONSE: Noted with thanks.</p> <p>UNIDO RESPONSE: Noted with thanks.</p>	
<p>8. Which are the potential productive users that are being considered so that the power generation and the demand schedule profiles can be matched?</p> <p>9. In effect, this is a typical hydro project with little that is innovative, but still worthy of GEF support. The 3 small hydro plants proposed will provide limited power generation 24 hours a day but not all year round if the water source is constrained. The major problem will therefore be to match supply with demand, or more likely, to continue with diesel-gensets as a back-up system.</p>	<p>The PPG phase will carry out detailed demand surveys.</p>	<p>8. The surveys are part of the Annexes to the CEO Endorsement document. Which productive uses are most likely to be supported/strengthened by the SHP will depend on the concrete sites, and will be assessed during the detailed feasibility.</p>
<p>10. With so much hydro resource potential in the country, it is good some</p>	<p>The PPG phase will assess the quality and</p>	<p>10. The project aims to use the data as collected for the demonstration projects as a starting point</p>

STAP comment	GEF Agency response at PIF stage	GEF Agency response at CEO Endorsement stage
<p>GEF funding is maybe being well spent to help develop a long-term national strategy to develop the resource in an organised manner with cost/ benefit and environmental impact analyses identifying priorities for developing the 22 individual hydro plants already mapped by the UNIDO project. Power generation is only one part of a system-distributing the power needs investment in wires and poles or upgrading an existing network. This has to be part of the national system design. The three small plants in this project were selected based on the UNIDO project. It is not clear whether that included social and environmental impacts as well as economic and technical viability.</p> <p>11. For the wide range of benefits that hydro power can provide for Madagascar, it is better to provide quickly the hydro resources, especially where it is cost-effective to do so and where minimal environmental impacts will occur. This project will help that process and hopefully provide models and a learning curve to enable other hydro projects to be developed.</p>	<p>reliability of the existing preliminary studies and designs for the prioritised target sites, including social and environmental impact. A sustainable replication model to activate the small hydropower potential is specifically mentioned in the PIF (component 3), and the details of such model will be further defined during PPG and project implementation.</p>	<p>for a central government-managed database which follows a systematic approach for data collection and use.</p> <p>11. Indeed, the activities and consultations during the PPG have shown very clearly the key barriers to an accelerated and sustainable activation of the small hydropower potential. These barriers include the lack of (quality) data for Small Hydropower Project (SHP) sites, a limited involvement of private sector players due to a lack of confidence, and a policy and regulatory framework which is insufficiently streamlined and enabling to provide that confidence. The project will address those barriers by realising exemplary SHPs to demonstrate a systematic approach which can be replicated to activate the vast SHP potential in the country. This systematic approach will consist of the following three steps:</p> <ul style="list-style-type: none"> <li>• <i>STEP1: Address the primary barrier hampering the development of Small Hydropower Projects (SHP) in Madagascar, namely the lack of quality data on the feasibility of project sites:</i></li> </ul> <p>This lack of data is due to the fact that the government does not have the resources to invest in data collection and preliminary studies, and the private sector does not have enough confidence in the policy regulatory system. The project resources will be smartly used to unlock this situation by focusing on key target sites.</p> <ul style="list-style-type: none"> <li>• <i>STEP2: Trigger the realisation of 2 MW of SHP through a private-led partnership</i></li> </ul> <p>The construction of exemplary SHP will familiarize both the private and public sector with a straightforward approach which can easily be replicated after the project ends. From the start the initiative will be given to the private sector, with the project acting in a supporting and facilitating mode. In that sense only a limited financial incentive will be provided to private sector project developers, with the rest of the investment coming from the project developer (either as equity or through loans from local banks).</p> <p>The priority sites for development under the GEF project will be decided jointly with the Government of Madagascar (based on the</p>

STAP comment	GEF Agency response at PIF stage	GEF Agency response at CEO Endorsement stage
		<p>applicable procedures). It is anticipated that with 1.4 MUS\$ earmarked for investment, and assuming a 20% financial support from the UNIDO-GEF project, and an average cost of US\$ 3500/kW, it is anticipated that the project will directly trigger 2 MW of SHP capacity. (US\$ 1,400,000 being 20% means a total investment of 7 MUS\$; at an average US\$3,500/kW this equals 2 MW).</p> <ul style="list-style-type: none"> <li>• <i>STEP3: Replication ensured through tailored capacity building and development of a pipeline of projects</i></li> </ul> <p>Based on the results of Steps 1 and 2 the activities of the replication strategy will be fine-tuned in order to ensure sustainability after the end of the project. These activities are expected to kick-in in the second part of the project, and will integrate the results of the mid-term evaluation.</p>

#### GEF Secretariat comments at PIF stage

Items to consider at CEO endorsement/approval	The agency is requested to provide updates about the political and impacts on the project to the GEF Secretariat before and after the upcoming election	After the military coup in Madagascar in 2009 condemned by the international community, Democratic elections took place in December 2013 allowing all sanctions to be removed. Despite the normalization of the situation, the history of Madagascar, with recurrent political crisis (2001-2002, 2009-2013), shows that the democratic process remains volatile. . Therefore, the political situation and its potential impact on the project will constantly be monitored.
	a) Confirmation and detailed analysis of GHG emission reduction figures	The direct emission reductions are estimated at 131,400 tonnes CO <sub>2</sub> based on 2 MW, with indirect emissions reductions ranging between 525,600 tonnes (bottom-up) and 578,160 (top-down) tonnes CO <sub>2</sub> . More information on how the emissions reductions were estimated is provided in Annex F.
	b) A detailed analysis of financial instruments that will be adopted to promote sustainable replication of SHP in Madagascar	<p>The project starts from the assumption that an accelerated uptake and sustainable replication of SHP in Madagascar can be triggered by removing the key barriers, provide a (limited) financial incentive and bring private sector players from the start into the process.</p> <p>The activities and consultations during the PPG have shown very clearly the key barriers to an accelerated and sustainable activation of the small hydropower potential. These barriers</p>

		<p>include the lack of (quality) data for Small Hydropower Project (SHP) sites, a limited involvement of private sector players due to a lack of confidence, and a policy and regulatory framework which is insufficiently streamlined and enabling to provide that confidence. The project will address those barriers by realising exemplary SHPs to demonstrate a systematic approach which can be replicated to activate the vast SHP potential in the country.</p> <p>Also see reply to comment 11 in the table above (STAP comments) for more details.</p>
	c) Strengthening of the project framework to include concrete, measureable indicators	See log frame (Annex A)
	d) Clarification on the number of persons gaining energy access through this project	The numbers will become available once the final sites and partners will be defined in early 2015 and will respect the Government tendering procedure which is still in process (see section “A.4.4 History and approach of identification of priority sites”) for more information

## ANNEX C: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS<sup>9</sup>

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

PPG Grant Approved at PIF: \$85,000			
<i>Project Preparation Activities Implemented</i>	<i>GEF/LDCF/SCCF/NPIF Amount (\$)</i>		
	<i>Budgeted Amount</i>	<i>Amount Spent to date</i>	<i>Amount Committed</i>
National subcontractor for baseline project, SHP site identification and prioritization, stakeholder consultation, development of financing model and preparation of CEO Endorsement document	70,000	70,000	0
National and international experts	15,000	10,000	5,000
<b>Total</b>	<b>85,000</b>	<b>80,000</b>	<b>5,000</b>

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

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

There are not expected to be any reflows from this project.

## ANNEX E: TRACKING TOOL FOR CLIMATE CHANGE MITIGATION PROJECTS

See separate file with file name “Annex E \_UNIDO\_GEF CC Madagascar Tracking Tool.xls”

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<sup>9</sup>If at CEO Endorsement, the PPG activities have not been completed and there is a balance of unspent fund, Agencies can continue undertake the activities up to one year of project start. No later than one year from start of project implementation, Agencies should report this table to the GEF Secretariat on the completion of PPG activities and the amount spent for the activities.

**ANNEX F: ESTIMATE OF ENERGY SAVINGS AND GHG EMISSION REDUCTIONS  
CALCULATIONS FOR CO<sub>2</sub> REDUCTIONS**

**GEF IMPACT AND BASELINE (BUSINESS-AS-USUAL) CASE**

**Marginal technology** = Diesel

**Investment for Diesel** = 0.2 litres/kWh

**Emissions assumed** = 0.5 tonnes/MWh

It has been estimated by the World Small Hydropower Development Report (2013) that a near-term 48.19 MW capacity of SHP could potentially be available in Madagascar, so an assumption is made for GEF analysis that within 15 years (5 years for project and 10 years 'influence period'), that 50% of this could be realised (i.e. 24 MW) in the next 15 years.

**DIRECT EMISSIONS REDUCTIONS**

**CO<sub>2</sub>** = e x l x c => energy replaced by SHP x lifetime (20 years) x CO<sub>2</sub> intensity

**CO<sub>2</sub>** = 13,140 MWh per year from 2 MW SHP (75% capacity factor) x 20 x 0.5 tonnes/MWh

**CO<sub>2</sub>** = 131,400 tonnes

**INDIRECT IMPACTS - BOTTOM-UP**

Replication Factor for SHP assumed 4

**CO<sub>2</sub>** = CO<sub>2</sub> (direct) x Replication Factor

**CO<sub>2</sub>** = 131,400 tonnes x 4

**CO<sub>2</sub>** = 525,600 tonnes

**REPLICATION & INDIRECT IMPACTS - TOP-DOWN**

**Level of GEF Impact and Causality Factor (CF) assumed as Level 3** (GEF substantial but modest indirect emission reductions can be attributed to the baseline) = 60%.

**P10** = Assessment of physical potential of hydro in country within 10 years after completion of GEF project, i.e. 15 years, allowing for 2 MW development within the GEF project.

P10 assumed as 24 MW - 2 MW = 22 MW which at future capacity factor of 50% (projects more likely on-grid) = 96,360 MWh per year x 20 years x 0.5 tonnes/MWh = 963,600 tonnes

**CO<sub>2</sub>** = P10 (in emissions) x CF

**CO<sub>2</sub>** = 963,600 tonnes x 60%

**CO<sub>2</sub>** = 578,160 tonnes

**Direct emission reductions**

131,400 tonnes

**Direct post-project emission reductions**

0 tonnes

**Indirect emissions reductions**

525,600 tonnes (bottom-up)

578,160 tonnes (top-down)

## ANNEX G: WORK PLAN

Madagascar SHP Workplan	Year 1												Year 2												Year 3												Year 4												Year 5																							
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12												
<b>0. Project management and set-up</b>	[Active]																																																																							
Finalised institutional set-up and co-ordinations	[Active]			[Inactive]																																																																				
Establish roles and responsibilities and TORs	[Active]			[Inactive]																																																																				
Establish Project Management Unit/Office	[Active]			[Inactive]																																																																				
Recruit Project Manager	[Active]			[Inactive]																																																																				
Establish Project Steering Committee	[Active]			[Inactive]																																																																				
Prepare ToRs and Workplans for Key Experts	[Active]			[Inactive]																																																																				
Prepare detailed Workplan and Activity table	[Active]			[Inactive]																																																																				
Day-to-day management of all project activities	[Active]																																																																							
Reporting on progress for continual M&E	[Active]												[Inactive]												[Active]												[Inactive]												[Active]												[Inactive]											
<b>PC1 – National Low-Carbon Energy Development Plan developed and tailored initiatives to support SHP in place</b>	[Active]																																																																							
Output 1.1 Policy framework on RE for productive uses reviewed and recommendations to streamline policies/incentive schemes towards a greater use of rural-based SHP proposed	[Active]																																																																							
1.1.1 Review of the policy and regulatory framework including law 98-032 concerning reform of the electricity sector and the regulatory frameworks concerning use of waterways and conditions for SHP development	[Inactive]			[Active]			[Inactive]																																																																	
1.1.2 Preparation of a National Low-Carbon Energy Development Plan (NLCEDP) with recommendations to harmonise and improve existing legislation for the deployment of RE and SHP in particular	[Inactive]			[Active]			[Inactive]																																																																	
1.1.3 Establishment of a SHP roadmap based on NLCEDP to build a sustainable SHP sector, including concrete and measurable initiatives such as the establishment of a single interface body to facilitate SHP implementation, the establishment of technical standards and norms for electrification adapted to Malagasy rural areas, and recommendations for the development of fiscal and customs incentive measures for SHP	[Inactive]			[Active]			[Inactive]																																																																	
Output 1.2 Standardized reference emission levels established	[Active]																																																																							
1.2.1 System for standardisation of CO <sub>2</sub> emissions monitoring.	[Inactive]									[Active]			[Inactive]																																																											





**ANNEX H: BUDGET SHEET (GEF FUNDING)**

COMPONENTS		GEF DISBURSEMENT				
	GEF FINANCING	YR1	YR2	YR3	YR4	YR5
<b>Component 1: Policy and regulatory framework</b>						
Outcome: National Low-Carbon Energy Development Plan developed and tailored initiatives to support SHP in place		60,000	50,000	30,000	30,000	30,000
<b>SUBTOTAL</b>	200,000					
<b>Component 2: Private-led SHP technology demonstration</b>						
Outcome : New SHP capacity (at least 2 MW) constructed and operational		150,000	150,000	1,400,000	50,000	50,000
<b>SUBTOTAL</b>	1,800,000					
<b>Component 3: Capacity strengthening for sustainable replication</b>						
Outcome: Enabling environment for sustainable SHP replication in place Outcome: Capacity of key national actors strengthened		25,000	95,000	150,000	250,000	150,000
<b>SUBTOTAL</b>	670,000					
<b>M&amp;E</b>						
Outcome: Project's progress towards goals confirmed and necessary adjustments made Outcome: Evaluation system for project's GHG emission reductions and carbon registry for the project in place		0	0	20,000	0	30,000
<b>SUBTOTAL</b>	50,000					
<b>Project Management</b>		27,000	27,000	27,000	27,000	27,000
Project Management	135,000					
<b>TOTAL</b>	<b>2,855,000</b>	<b>262,000</b>	<b>322,000</b>	<b>1,627,000</b>	<b>357,000</b>	<b>287,000</b>

**ANNEX I: BUDGET SHEET (COFINANCING)**

<b>PROPOSED CO-FINANCING BUDGET*</b>						
	<b>CO-FINANCING BUDGET COMPONENT 1</b>					
<b>Component 1: Policy and regulatory framework</b>	<b>GoM</b>	<b>Private sector</b>	<b>Banks</b>	<b>UNIDO</b>	<b>Total</b>	
Outcome: National Low-Carbon Energy Development Plan developed and tailored initiatives to support SHP in place	1,110,000				<b>1,110,000</b>	
	<b>CO-FINANCING BUDGET COMPONENT 2</b>					
<b>Component 2: Private-led SHP technology demonstration</b>	<b>GoM</b>	<b>Private sector</b>	<b>Banks</b>	<b>UNIDO</b>		
Outcome: New SHP capacity (at least 2 MW) constructed and operational	800,000	6,000,000	2,200,000		<b>9,000,000</b>	
	<b>CO-FINANCING BUDGET COMPONENT 3</b>					
<b>Component 3: Capacity strengthening for sustainable replication</b>	<b>GoM</b>	<b>Private sector</b>	<b>Banks</b>	<b>UNIDO</b>		
Outcome: Enabling environment for sustainable SHP replication in place Outcome: Capacity of key national actors strengthened	1,550,000	500,000	1,325,000	25,000	<b>3,400,000</b>	
	<b>CO-FINANCING BUDGET M&amp;E</b>					
<b>M&amp;E</b>	<b>GoM</b>	<b>Private sector</b>	<b>Banks</b>	<b>UNIDO</b>	<b>TOTAL</b>	
Outcome: Project's progress towards goals confirmed and necessary adjustments made Outcome: Evaluation system for project's GHG emission reductions and carbon registry for the project in place	60,000			60,000	<b>120,000</b>	
	<b>CO-FINANCING BUDGET PROJECT MANAGEMENT</b>					
<b>Project Management</b>	<b>GoM</b>	<b>Private sector</b>	<b>Banks</b>	<b>UNIDO</b>	<b>TOTAL</b>	
Project Management	640,000			35,000	<b>675,000</b>	
	<b>TOTAL:</b>	<b>4,160,000</b>	<b>6,500,000</b>	<b>3,525,000</b>	<b>120,000</b>	<b>14,305,000</b>
	<i>* Cofinancing may vary per component and per source during project implementation</i>					

## **OVERVIEW OF TECHNICAL ANNEXES**

### **BUSINESS PLANS AND PRE-FEASIBILITY FOR 5 PRESELECTED SHP sites (UNIDO)**

ANNEX 1 Bemanavy Business plan & Annexes (200 kW)

ANNEX 2 Marobokoly Business Plan & Annexes (1,050 kW)

ANNEX 3 Ankitsika Business Plan & Annexes (1,000 kW)

ANNEX 4 Andampibe Business Plan & Annexes (250 kW)

ANNEX 5 Andriamanjavona Business Plan & Annexes (500 kW)

ANNEX 6 Additional baseline information

ANNEX 7 History and approach of identification of priority sites

ANNEX 8 Gender Analysis, Checklist & Review for Madagascar (UNIDO)

ANNEX 9 Cofinancing Letters from (a) MEH; (b) Bank of Africa; (c) ASSIST; (d) MEEMF

ANNEX 10: UNIDO co-financing letter