



# PROJECT IDENTIFICATION FORM (PIF)

PROJECT TYPE: MEDIUM-SIZED PROJECT

TYPE OF TRUST FUND: GEF TRUST FUND

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## PART I: PROJECT INFORMATION

Project Title:	<b>Small Hydropower-based Mini-grids for Rural Electrification in Congo-Brazzaville</b>		
Country(ies):	Congo-Brazzaville	GEF Project ID: <sup>1</sup>	5424
GEF Agency(ies):	UNDP	GEF Agency Project ID:	4685
Other Executing Partner(s):	National Agency for Rural Electrification (ANER)	Submission Date:	30 April 2013
		Re-submission Date	24 July 2013
GEF Focal Area (s):	Climate Change	Project Duration (Months)	48 months
Name of parent program (if applicable):	N/a	Agency Fee (\$):	184,692
<ul style="list-style-type: none"> <li>• For SFM/REDD+ <input type="checkbox"/></li> <li>• For SGP <input type="checkbox"/></li> </ul>			

### A. INDICATIVE FOCAL AREA STRATEGY FRAMEWORK<sup>2</sup>:

Focal Area Objectives	Trust Fund	Indicative Grant Amount (\$)	Indicative Co-financing (\$)
CCM-3 - Promote Investment in Renewable Energy Technologies	GEFTF	1,944,133	13,500,000
Total Project Cost		1,944,133	13,500,000

### B. INDICATIVE PROJECT FRAMEWORK

**Project Objective: To promote investment in small and micro hydropower-based mini-grids for rural electrification in Congo-Brazzaville**

Project Component	Grant Type <sup>3</sup>	Expected Outcomes	Expected Outputs	Trust Fund	Indicative Grant Amount (\$)	Indicative Cofinancing (\$)
1. Policy and financial de-risking instruments and incentive scheme	TA	Enabling policy and institutional framework for MHP-based mini-grids set up	1.1 Policy package for MHP-based rural electrification adopted 1.2 Cornerstone policy instrument defined, adopted and enforced, e.g. financially viable tariff for MHP-based mini-grids 1.3 Other policy changes proposed and approved: harmonized, concession regimes, licensing rules, PPAs, land and water use rights 1.4 Targeted capacity building program delivered to relevant national agencies 1.5 Output-based Aid (OBA) Scheme for MHP-mini grid designed and financial commitments secured to sustain its operation beyond GEF project duration from the Government and other donors	GEFTF	330,000	3,000,000
	INV	Financial viability of MHP mini-grid ensured	1.6 Output-based Aid Scheme for MHP-mini grid set-up	GEFTF	500,000	1,500,000
2. Technology	TA	Capacity for	2.1 Guidebook on MHP	GEFTF	350,000	300,000

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

<sup>2</sup> Refer to the reference attached on the [Focal Area Results Framework](#) when completing Table A.

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

supply chain		delivering turnkey solutions and quality O&M&M services for MHP	2.2 On-the-job capacity building program for MHP manufacturers delivered, including on MHP design, construction, O&M 2.3 Business and technical advisory services to MHP developers and end-users			
3. Pilot investment	TA / INV	Improved confidence in the technical and financial viability of MHP-based rural electrification	3.1 Pilot sites identified and assessed, and institutional/investment model defined 3.2 Projects prepared and financing mobilized 3.3 5-10 MW of MHP-based power generation capacity 3.4 Sustainable O&M&M models demonstrated	GEFTF	440,000 (TA)	8,000,000 (INV)
4. PR and Investment Promotion	TA	Increased awareness about MHP potential and investment climate	4.1 National clearinghouse mechanism for MHP developers set-up 4.2 PR and investment promotion campaign conducted	GEFTF	180,000	300,000
Subtotal					1,800,000	13,100,000
Project Management Cost (PMC) <sup>4</sup>				GEFTF	144,133	400,000
Total Project Cost					1,944,133	13,500,000

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

Sources of Cofinancing	Name of Cofinancier	Type of Cofinancing	Amount (\$)
National Government	ANER/MMEH	In-kind	200,000
National Government	Development Fund	Grant	1,000,000
GEF Agency	UNDP	Grant	500,000
Other Multilateral Agency (ies)	World Bank/AfDB	Soft Loan	3,000,000
Bilateral Aid Agency (ies)	tbd	Grant	1,500,000
Private Sector	Technology suppliers/IPPs	Equity	7,300,000
<b>Total Cofinancing</b>			<b>13,500,000</b>

**D. INDICATIVE TRUST FUND RESOURCES (\$) REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY<sup>1</sup>**

GEF Agency	Type of Trust Fund	Focal Area	Country Name/Global	Grant Amount (a)	Agency Fee (b) <sup>2</sup>	Total c=a+b
UNDP	GEFTF	Climate Change	Congo	1,329,863	126,337	1,456,200
UNDP	GEFTF	Biodiversity	Congo	614,270	58,355	672,625
<b>Total Grant Resources</b>				<b>1,944,133</b>	<b>184,692</b>	<b>2,128,825</b>

**E. PROJECT PREPARATION GRANT (PPG)<sup>5</sup>**

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

Amount

Agency Fee

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

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

- |   |                       |                                 |
|---|-----------------------|---------------------------------|
|   | <u>Requested (\$)</u> | <u>for PPG (\$)<sup>6</sup></u> |
| • (upto)\$100k for projects up to & including \$3 million | 65,000                | 6,175                           |

## PART II: PROJECT JUSTIFICATION<sup>7</sup>

### **A. Project Overview**

#### **A.1. Project Description**

##### *1) Global environmental problems, root causes and barriers that need to be addressed*

Most of Congo-Brazzaville’s rural population does not have access to electricity: only 5% has power supply, primarily through off-grid diesel generators/diesel-powered mini-grids. The rest rely on diesel fuel, firewood and agricultural residues to meet basic energy needs. Use of stand-alone diesel-based electric generators in Congo is quite wide-spread; they consume about 163,000 t of diesel oil per year. Also, household lighting system uses predominantly kerosene for lighting, 13,200 t/year<sup>8</sup>. Due to high suppressed demand, economic growth and abundant domestic supply of cheap diesel products, the rate of diesel and kerosene use is growing exponentially: according to 2nd National Communication, use of diesel has been steadily increasing between 1994 and 2010 and is projected to nearly double by 2020. The result is high GHG emissions, deforestation and environmental degradation. With a projected steady increase in population volume (2.8% per year) and energy demand (3.4% per year) and in the absence of more climate-friendly sources of power supply, GHG emissions from rural energy use will continue to grow.

Congo has substantial hydropower potential (approximately 14,000 MW), which, however, has been barely harnessed; just over 200 MW is currently in place:

- Moukoulou station (74 MW)
- Djoue station (15 MW)
- Imboulou Hydroelectric Station (120 MW).

Especially in remote rural areas, harnessing the abundant hydropower potential via decentralized small and micro hydropower (MHP)-based mini-grid systems can provide for an economically viable, environmentally sustainable and climate-friendly power supply alternative.

In spite of on-going efforts by the Government and development partners to promote rural electrification and micro hydropower, there has been no significant involvement of private operators in the sector up to now and there is no single commercial small or micro hydropower-based mini grid system in the country. The sector faces numerous problems and barriers, which cumulatively make the risk profile of MHP-based mini grids much higher and less attractive than any conventional power generation project. These barriers are enumerated below.

Legal, regulatory and institutional framework: The current legal framework is a barrier to the development of micro hydropower in Congo-Brazzaville because there are no specific provisions enabling IPPs to implement and operate MHP-based mini-grids. There are a number of critical issues which haven’t been addressed under the Power Sector Reform process initiated in 2003 (see details below in the baseline section), such as land and water use by MHP, tariffs, certification and licensing, procedures for conflict resolution, incentive measures (especially in the view of MHP completion with partially subsidized diesel oil in an oil-producing country), etc. Institutional and human capacities at all levels (sub-regional, national and local) are also insufficient (if at all existent) to support rural

<sup>6</sup> PPG fee percentage follows the percentage of the GEF Project Grant amount requested.

<sup>7</sup> Part II should not be longer than 5 pages.

<sup>8</sup> Source: 2<sup>nd</sup> NC

electrification based on decentralized small and micro hydro power plants. Neither the Agency for Rural Electrification (ANER), nor the Ministry of Mines, Energy and Hydraulic (MMEH), have dedicated units and staff to deal with these issues.

Technology supply chain: The technology supply chain for micro hydropower in Congo-Brazzaville is in a very nascent stage. There are a few local SMEs capable of assembling simple MHP installations based on imported machinery and turbines, but they lack the technical and engineering capacities to ensure optimal system design, installation and maintenance. In the rural areas there is only very limited local technical expertise available on how to properly administrate, operate and maintain MHP systems. The low quality and quantity of skilled and competent workers in the power sector adds additional risks and increase the cost MHP operation due to the need to rely on expensive imported services even for basic repair and maintenance.

Sustainable O&M&M model: The lack of experience with and demonstration of sustainable operation, maintenance and management (O&M&M) of MHP-based mini grids poses a significant barrier. Before any large-scale replication can take place, such model has to be designed and tested in order to minimize otherwise substantial transaction costs and prove economic and technical viability of MHP operations in remote rural communities. The key aspects of sustainable O&M&M model, which have to be put in place and are currently missing are: technical oversight over plant operations, efficient tariff structure which adequately cover both start-up and O&M&M costs, financial management, billing and payment collection system, community mobilization, customer relations and conflict resolution procedures (such as in case of illegal connections), engagement of productive end-users, etc.

Investors' awareness, access to information and perception of risks: Information about the potential and the benefits of micro hydropower for rural electrification and development is scarce. There is no clearinghouse mechanism where investors can obtain the required information and advice on MHP development; this is primarily due to the lack of vision on how to promote MHP, as well as weak institutional and human capacity of relevant stakeholders at national (Agency for Rural Electrification, Ministry of Mines, Energy and Hydraulic, Ministry of Environment) and local level. The primary focus and efforts of the Government and its relevant agencies so far have been on facilitating implementation of large hydro power projects with public and IFI financing. Promotion of investment in MHP requires different approach, more geared towards private sector and local communities, and the one which implies open and transparent access to information to enable potential investors making an informed decision. There is very little data about prospective sites, their hydrological, climatic and other characteristics. Even when such studies exist, they are not publicly available. Basically, there is no single information point where a potential developer can receive required guidance and data to make an informed investment decision. The lack of publicly available information about planned grid expansion adds substantial risks and uncertainties, which negatively impact on MHP commercial viability. The absence of a single successful and sustainable pilot MHP project is in itself a big deterrent to market development for the perceived risks of a first-of-its-kind investment are always higher than the risks associated with replication of a successful model.

## ***2) Baseline scenario and associated baseline projects***

The Government of the Republic of Congo realizes that lack of energy access in rural areas is a major detrimental factor for country's economic development, social and environmental sustainability. To address the problem, it has created ANER, a national agency responsible for rural electrification under the Ministry of Mines, Energy and Hydraulic (MMEH). ANER's goal is to improve the electrification rate from 5 % to 50% by 2020.

The Government has also established the Development Fund for the Electricity Sector and embarked on an ambitious program to improve the energy infrastructure in the country. This program includes major investments in power generation, transmission, and rural electrification, including the recently commissioned new 120 MW hydro power plant at Imboulou and a 74 MW hydropower facility at Moukoulou.

Further, to attract private investment in new power generation and grid expansion, a major restructuring of the electricity sector has been underway since 2003 after adoption of new Electricity Code aimed at creating the enabling regulatory and market framework for provision of electricity services by Independent Power Producers (IPPs), public

or private, in a manner, which would encourage private initiative and competition. The reform also envisaged the creation of independent Power Sector Regulatory Agency, the key entity in charge of tariff regulation for all power producers. The World Bank is supporting this process via a 3 million US\$ component of the “Water, Electricity and Urban Development Project”; aimed at the development of a comprehensive strategy for the reform of electricity sector and improvement of the Government’s capacity to implement the reform. Also, the African Development Bank has committed 5 million US\$ for the Rural Electrification Project which will connect some 50 rural localities to hydropower based electricity generation plants in Moukoulou and Imboulou. Further, the Ministry of Mines, Energy and Hydraulic signed a Memorandum of Cooperation with the Hangzhou Regional Center for Small Hydro Power (HRC) of China concerning grid reconstruction and joint small hydropower project development.

Finally, UNDP under its “National capacity building for micro-hydro power development and drinking water supply in rural areas” project conducted a comprehensive assessment of small/micro hydropower potential in Congo-Brazzaville, including field studies of prospective 17 sites across the country. The Atlas of micro-hydro sites has been produced and identified the six most promising projects for a total installed capacity of almost 20 MW (see Table 2 below).

**Table 1 Summary of Baseline Conditions, Policies, Programs and Targets**

<b>Conditions regarding energy access and MHPs</b>	<ul style="list-style-type: none"> <li>- Rural energy access rate: 5%</li> <li>- Rural energy use patterns: use of diesel-based generators (163,000 t/year); use of kerosene for lighting (13,200 t/year). Source: 2nd NC;</li> <li>- Installed capacity of MHPs: 0 kW</li> <li>- Installed capacity of large hydro power: 200 MW</li> </ul>
<b>National rural access target</b>	<ul style="list-style-type: none"> <li>- To increase rate of rural electrification from 5% up to 50% by 2050</li> </ul>
<b>Baseline policies and institutions</b>	<p>Electricity sector reform was initiated in 2003 with the adoption of a comprehensive legal package which established new institutional and regulatory structure for power sector, put specific emphasis on rural electrification, and opened up the power generation sector to Independent Power Producers (IPPs), namely:</p> <ul style="list-style-type: none"> <li>- Law #14-2003: New Electricity Code: access to the grid for IPPs</li> <li>- Law #15-2003 establishment of the Agency for Rural Electrification</li> <li>- Law #16-2003 establishment of the Power Sector Regulatory Agency: independent regulatory body in charge of tariffs</li> <li>- Law #17-2003 creation of the Fund for Power Sector Development</li> </ul>

***3) Proposed alternative scenario: brief description of expected outcomes and components of the project***

The proposed UNDP-GEF project will be complementary to the baseline initiatives as it addresses barriers that are specifically related to the investment in decentralized micro and small hydropower plants, which are not covered under the baseline.

The Program consists of the following four components:

- Strengthening the policy and institutional framework for MHP-based mini-grids;
- Development of the domestic technology supply chain for MHP;
- Proving economical and technical viability of MHP deployment and management; and
- Raising investors’ confidence and awareness in MHP-based mini-grids.

**Component 1: Policy and financial de-risking instruments for MHP-based mini-grids**

This component envisages the preparation and adoption of a comprehensive policy framework for the promotion of MHP-based rural electrification. The framework will complement existing policies on power

sector development and rural electrification (i.e. Laws ##14-17-2003 mentioned above) by putting explicit emphasis and providing more favorable conditions for MHPs. Such policy framework will include specific timeframe and targets for development of MHPs consistent with national 50% rural electrification target for 2050. MHP-policy framework will also establish a cornerstone policy instrument (e.g. financially viable tariff for MHP-based mini-grids) and supporting policies and regulations, including, but not limited to harmonized and simplified concession regimes and licensing rules for MHPs, standardized PPAs, land and water use rights for MHP projects. In order to support the implementation of proposed policy framework capacity building program will be provided to relevant national agencies, ANER, Power Sector Regulatory Agency and the Fund for Power Sector Development.

Setting financially viable tariffs to obtain the right energy price is one of the most important factors to ensure sustainability of MHP-based mini-grids. Under Component 1 the project will assist Power Sector Regulatory Agency with developing and introducing new regulation for MHP tariffs. It is proposed that mini-grid tariff system have a graded tariff regime, similar to the one grid system has. This will allow the tariffs to be set in better proportion to the customer's ability to pay<sup>9</sup>. The project will conduct a comprehensive assessment and prepare a proposal for tariff setting methodologies, which would balance the requirements for minimizing public subsidies, ensuring adequate rates of return for investors and respecting the social electrification objectives set by the government.

However, the ability of MHP operators to secure required cash flow to recoup its investment and cover O&M cost will depend on two factors: a) consumer's ability to pay; and b) existence of high-paying consumers, such as commercial enterprises, willing and able to pay higher than average tariff rate. If these conditions are met, there is no need for additional public subsidies for MHP mini-grids. However, as experience of other developing countries have shown, with poor clients, the MHP projects can rarely survive commercially on their own, so they might need additional subsidies and risk mitigation measures. Therefore, along with an appropriate tariff structure, other incentives and de-risking instruments will be considered. For example, Output Based Aid (OBA) schemes have proved to be a powerful instrument to jump start the market, leverage private interest and investments and ensure adequate O&M&M for micro hydro power-based mini grids across the world. GEF resources will be used to develop and co-finance such OBA scheme to reduce the operational, delivery and market-related risks of pilot investment projects to be facilitated under Component 3. OBA scheme will be designed to enable its continuation and sustainability beyond UNDP-GEF project duration; for this purpose close collaboration with the National Fund for Power Sector Development is envisaged. At OBA design stage, complementary sources of public financing will be explored, the scale, source and modality of public subsidy provision assessed and incorporated in the MHP policy framework. These might include introduction of special tax or levy (e.g. on fossil fuel sales, vehicle or pollution charges) or state budget allocations.<sup>10</sup> This will also include the implementation modalities of OBA scheme during and after completion of GEF project. The sequence of the activities under proposed project will be the following: establishing national MHP target and timeframe, estimating the amount of public subsidies needed to achieve the target, analysing and proposing sources and modalities of financial support provision for MHP operators after completion of GEF-financed OBA, preparing required legal and regulatory documents for official adoption. Also, there is a high interest among the international donor community to explore the application of OBA scheme for promoting rural electrification and energy access in Africa: Norway-led Energy+ Partnership, DFID and the European Commission have all expressed interest in supporting such a scheme and approach.

## Component 2: Technology supply chain

This component will address technical barriers to the implementation of MHP-based mini-grids. The aim is to help local manufacturers and service providers upgrade their capacity for delivering turnkey solutions for MHPs with up

<sup>9</sup> Current tariffs paid by grid-connected consumers in Congo are in the range of 5.5 cents US\$/kWh and 10 cents US\$/kWh for various categories of users. This level of tariff, should, in principle, be sufficient to make investment in MHP commercially viable. For example, recent analysis from IRENA and ESMAP have shown that in Africa, the average production cost for MHP is 7.7 cents US\$/kWh.

<sup>10</sup> For example, under similar on-going UNDP-GEF project "Technology Transfer and Market Development for Small Hydro Power in Tajikistan", a new levy on all national electricity sales was introduced by the Government in order to capitalize the Renewable Energy Fund established with GEF support, as a source of performance-based grants for off-grid micro and small hydro power projects

to 50% of the value provided by locally made goods and services. Technical assistance will be provided to a number of competitively selected local SMEs through an open Call for Expression of Interest. An international technology transfer partner (an experienced MHP manufacturer) will be sub-contracted to deliver such assistance. In addition, the project will provide training courses to system designers and end-users, develop and publish guides on design, installation and maintenance of micro-hydro systems. Also, community organizations in pilot locations (local NGOs and SMEs/productive users) will be provided with assistance and advice on the relevant aspects of MHP operations, such as identification of potential sites, pre-feasibility assessment, business planning.

### Component 3: Pilot MHP-based mini-grids

The expected outcome from this component is the improved confidence of communities, developers and potential investors in the technical and economic viability of MHP-based mini-grids for rural electrification and local socio-economic development as an alternative solution to centralized grid-expansion schemes.

Through the implementation of the pilot investment projects, the appropriateness of proposed policy and financing de-risking instruments will be demonstrated (Component 1). The demos/pilots will also be used as a testing ground for developing a domestic technology supply chain (Component 2). Furthermore, these demos/pilots are expected to generate valuable information on the suitability of, and the practical implementation of the operation & maintenance & management (O&M&M) models that will be developed. The project will seek to test a few alternative models, i.e. involving community-based organizations (CBOs) (e.g. MHPs owned by association of energy users), and/or private operators (technology providers, local companies and/or external investors).

Table 2

Location	Region	Type	Average flow rate (m3/sec)	Head (m)	Site capacity (kW)	Annual generation (kWh)
TSIAKI	Region	Reservoir	0,34	40	200	869,000
BELA	POOL	Reservoir	3	108	3,180	27,860,000
KIMBANDA	POOL	Dam	8,2	50	4,020	35,200,000
ZANAGA	LEKOU MOU	Reservoir	2,27	9	200	1,752,000
ASSOUMOUNDELE	SANGHA	Reservoir	14	45	6,180	54,000,000
KIMPANZOU	POOL	Run-of-river	56,8	10	5,510	48,300,000

The project will aim at facilitating the preparation and implementation of a first batch of commercial MHP-based mini-grid systems in the locations identified in MHP Atlas developed by UNDP (See Table 2 for the list of most promising projects) for a total of up to 10 MW of MHP-based capacity. Pilot projects will be implemented in conjunction with OBA scheme to be designed under Component 1.

An important part of pilot project implementation will be the identification of a sustainable O&M&M model. Some of the short-listed projects are more suitable for community-based operation (i.e. 200 kW) while larger ones (3-6 MW) will require an external investor and an experienced mini-grid operator. For larger projects, assistance will be provided to the Government with organization of public tenders, facilitating the signature of concession agreements, feasibility assessment, and other preparatory and monitoring activities to ensure that the first MHP projects in Congo-Brazzaville are designed and implemented in line with best international standards. Also, the project will work with local and international financial institutions and facilities (such as the AfDB Sustainable Energy Fund for Africa) to facilitate access to affordable loan financing for the pilot IPPs. For the smaller community-based projects, GEF resources will also be used to cover their higher O&M&M costs by providing the required training and institutional support to grid operators.

### Component 4: PR and promoting investment



This component will address the informational barrier. It will establish a national clearinghouse mechanism for MHP developers within the National Agency for Rural Electrification or other appointed national entity. Assistance will be provided to collect and present all essential information for potential MHP developers, such as a) prospective sites and their characteristics; b) required process for permitting and licensing; c) policies and regulations governing MHP project development; d) information about local technology service providers; e) potential sources of financing and incentive. The information will be presented on-line and published as MHP investor guide. Also support will be provided to assigned national entity to ensure its regular update and wide dissemination. The project will also promote investment opportunities in MHP among local and foreign partners, financial institutions, developers, social impact investors via targeted PR campaigns, conferences and other marketing and communication tools.

#### 4) Incremental cost reasoning and expected contributions from the baseline, the GEFTF and co-financing

The GEF funds will be used for incremental activities designed to remove the identified barriers. In particular, the GEF funds will be used for those incremental activities that expand the scope of, or supplement, the baseline activities in leading to or enhancing global environmental benefits. The table below summarizes Project Activities and Incremental Reasoning:

Baseline practices	Alternative to be put in place by the project	Expected Global Benefits
<b>Component 1: Policy and financial de-risking instruments for MHP-based mini-grids</b>		
<p>- World Bank is supporting the Government in creating enabling regulatory and market framework for provision of electricity services by Independent Power Producers (IPPs), but there is no specific provisions for RE power generation, especially MHP-based mini grids, i.e. standardized PPAs, concession regimes, licensing rules, land and water use rights for MHP projects</p> <p>- African Development Bank is providing financing for the Rural Electrification Project which will connect some 50 rural localities to hydropower based electricity generation plants in Moukoulou and Imboulou</p>	<p>A market-oriented policy, institutional, legal and regulatory framework for the RES-based electricity generation will be created. The GEF funded activities will result in the preparation and adoption of comprehensive policy package for promotion of MHP-based rural electrification, which will in turn form an integral part of the broader national rural electrification and power sector reform policies and plans supported by WB and ADB in the baseline. This will include Policy instrument (e.g. financially viable tariff for MHP-based mini-grids) and supporting policy package, including, but not limited to harmonized concession regimes, licensing rules, PPAs, land and water use rights for MHP projects.</p> <p>The project will also conduct a comprehensive assessment and prepare a proposal for tariff setting methodologies, which would balance the requirements for minimizing public subsidies, ensuring adequate rates of return for investors and respecting the social electrification objectives set by the government. Along with appropriate tariff structure, other incentives and de-risking instruments will be considered such as Output Based Aid (OBA) schemes. GEF resources will be used to develop and co-finance such OBA scheme to reduce the operational, delivery and market-related risks of pilot investment projects to be facilitated under Component 3.</p>	<p>The electricity generated from MHP facilitated by the project will result in a reduction of 860,000 t CO<sub>2</sub> over technology 20 years lifetime.</p> <p>The establishment of this framework will also apply to all future investments in small hydro and other RES and thus can be estimated to indirectly contribute to additional emission reductions post-project (this will be defined at the PPG phase)</p>
Baseline practices	Alternative to be put in place by the project	Expected Global Benefits
<b>Component 2: Technology supply chain</b>		
<p>There is no experience of MHP in the country. All hydropower installations are at large scale (15MW and above)</p>	<p>The GEF funded activities will provide technical assistance to local manufactures and service providers to upgrade their capacity for delivering turnkey solutions for MHPs with up to 50% of the value provided by locally made goods and</p>	<p>The electricity generated from MHP facilitated by the project will result in a reduction of 860,000 t CO<sub>2</sub> over technology 20 years lifetime.</p>



	services. International technology transfer partner (an experienced MHP manufacturer) will be sub-contracted to deliver such assistance. In addition, the project will provide training courses to system designers and end-users, develop and publish guides on design, installation and maintenance of micro-hydro systems. Community organizations in pilot locations will also receive assistance.	All future small and minihydro projects will benefit from enhanced domestic technological capacities and O&M services and thus can be estimated to indirectly contribute to additional emission reductions post-project (this will be defined at the PPG phase)
<b>Baseline practices</b>	<b>Alternative to be put in place by the project</b>	<b>Expected Global Benefits</b>
<b>Component 3: Pilot MHP-based mini-grids</b>		
A resource map of the country's mini hydropower potential has been conducted but there is still no experience of MHP in the country. All hydropower installations are at large scale (15MW and above). There are several mini-grid operators/IPPs, which run diesel-based power plants in isolated communities, but none is operating a MHP plant.	The project will aim at facilitating the preparation and implementation of a first batch of commercial MHP-based mini-grid systems in the locations identified in MHP Atlas developed by UNDP. The GEF funded activities will generate up to 10 MW from 4 pilot MHP plants: Tsiaki (200 kW), Kimbanda (4,020 kW), Zanaga (200 kW) and Kimpanzou (5,510 kW). Pilot projects will be implemented in conjunction with OBA scheme to be designed under Component 1. The project will establish an efficient tariff structure which adequately covers both start-up and O&M&M costs, financial management, billing and payment collection system, community mobilization, customer relations and conflict resolution procedures (such as in case of illegal connections), engagement of productive end-users, etc.	The electricity generated from MHP facilitated by the project will result in a reduction of 860,000 t CO <sub>2</sub> over technology 20 years lifetime.
<b>Baseline practices</b>	<b>Alternative to be put in place by the project</b>	<b>Expected Global Benefits</b>
<b>Component 4: PR and investment attraction</b>		
There is very little data about perspective sites, their hydrological, climatic and other characteristics. Basically, there is no single information point where a potential developer can receive required guidance and data to make an informed investment decision.	The GEF funded activities will establish a national clearinghouse mechanism for MHP developers within the relevant national entity. Via clearing house an interested investor can receive all required information about a) prospective sites and their characteristics; b) required process for permitting and licensing; c) advise on technical and economic valuation and local technology service providers; and d) source of financing and incentives for MHP. The project will also promote investment opportunities in MHP among local and foreign partners, financial institutions, developers, social impact investors via targeted PR campaigns, conferences and other marketing and communication tools	The electricity generated from MHP facilitated by the project will result in a reduction of 860,000 t CO <sub>2</sub> over technology 20 years lifetime.  PR and investment promotion activities will benefit all future investments in small and mini hydro, as well as other RES and thus can be estimated to indirectly contribute to additional emission reductions post-project (this will be defined at the PPG phase)

### 5) Global environmental benefits

The project will result in direct and indirect GHG emission reduction from supporting demonstration projects (direct) and facilitating design and implementation of national policies for MHP-based electricity generation (indirect).

With regard to direct GHG emissions from demo-projects, socio-economic analysis conducted by UNDP in a number of potential MHP sites reveal the following baseline energy use patterns:

- Kerosene is the primary source of lighting for households,

- For other energy needs, rechargeable batteries are in common use, which are either charged on-site from diesel gensets or require long travel (over 20-30 km) to nearby centers for recharge;
- Diesel generators exist in some of the locations to supply power to community centers (hospitals and schools) and SMEs (companies dealing with processing of agricultural, fisheries, livestock and forestry products, as well as local carpentry production). Access to energy is essential to strengthen these SMEs and improve prospects for local economy growth. Under BAU, their GHG emissions will likely increase, because in that case they can only rely on diesel and other fossil fuel based energy to continue operations and grow<sup>11</sup>.

The project does not intend to benefit timber and forestry exploitation enterprises. These enterprises are usually larger and their energy demand exceeds the proposed range of MHPs. Other suitable ways are needed to promote environmentally sustainable business practices within these enterprises, but this is out of the scope of the proposed GEF project.

In this context, project-supported MHP electricity will replace fossil fuel consumption, such as kerosene burning for lighting, use of fuel for transport, use of diesel for on-site batteries recharge, as well as use of diesel for power supply to community facilities and will result in direct GHG emission reduction in the amount of 43,000 tCO<sub>2</sub>/year or about 860,000 t CO<sub>2</sub> over the technology's 20 years lifetime. The estimates are based on expected average power generation by pilot MHP plants (Table 1, projects Tsiaki (200 kW), Kimbanda (4,020 kW), Zanaga (200 kW) and Kimpanzou (5,510 kW) and conservative<sup>12</sup> emission factor of 0.5 t CO<sub>2</sub>e/MWh). Considering the US\$ 1,944,133 from the GEF as support for this project, the unit abatement cost is about 1,944,133 / 860,000 = **US\$ 2.3** per ton of CO<sub>2</sub> reduced.

Detailed baseline analysis for each selected pilot location and estimation of direct and indirect GHG emission reduction will be conducted at PPG stage and presented in the Request for CEO Approval.

### ***6) Innovativeness, sustainability and potential for scaling up***

**Innovativeness:** The project has several distinctive features, which makes it highly innovative. First, it will pilot output-based aid scheme to support MHP-based power generation thus making provision of grant resources more targeted and performance-oriented. Second, it will focus on identifying and supporting private sector-led MHP projects (as opposed to traditional public/donor-driven approach), thus maximizing long-term financial and operational sustainability of MHP. Finally, as opposed to traditional approach of delivering readily-available turn-key solutions for rural electrification, the project will work with the entire domestic value chain for MHP, starting with design through construction and commission and up to operation, maintenance and management.

**Sustainability:** From technical and economic points of view, the sustainability of MHP-based power generation has been proven in the international market, both in the context of developed and developing countries. By addressing the underlying policy and financing barriers that impede the development of MHP in Congo, the creation of a sustainable niche for MHP systems will be realized. Financial sustainability of MHP will be ensured via the introduction of financially viable tariff structure, which in its pilot stage will be supported with output-based aid scheme. Implementation of pilot scheme will allow assessing viability of the proposed tariffs, as well as estimating the amount of additional incentives needed to sustain the scheme. Results of OBA pilot will feed into the design of comprehensive policy package for the promotion of MHP-based rural electrification, including the supportive financial mechanism, sources of funding to enable continuation and gradual phase-out of the scheme after completion of UNDP-GEF project. In addition, the project will support the integration of local industries into the

<sup>11</sup> The project does not intend to benefit timber and forestry exploitation enterprises. These enterprises are usually larger and their energy demand exceeds the proposed range of MHPs. Other suitable ways are needed to promote environmentally sustainable business practices within these enterprises, but this is out of the scope of the proposed GEF project

<sup>12</sup> MHP-based mini-grids will primarily replace diesel fuel generators with emission factor of 0.786 tCO<sub>2</sub>/MWh

MHP sector by addressing capacity needs of all actors across the entire MHP value chain. This will be achieved through the provision of focused support to local engineering firms/specialized engineering workshops for installation, maintenance and repair of electro-mechanical equipment at the MHPs. With the increase over time in MHP installations, it is envisaged that such efforts will intensify with opportunities being created for additional players to provide such services.

Potential for scaling-up: Congo’s large, but unexploited potential for hydro power development (3,000 MW) means there is a substantial scope for replication and scaling-up investment in MHP-based mini-grids, especially for rural electrification where 95% of customers are yet to be served. The project will enable large-scale replication by removing underlying policy, technical and financial barriers to investment in MHP-based mini-grids. In order to do so, it will adopt a three-pronged approach. First, it will introduce pro-MHP policies, which will significantly reduce the risks of investment and operation of MHP projects and thus reduce the cost of upfront investment. Second, it will support domestic technology supply chain and O&M&M, which will reduce operational risks and bring down the cost of running and exploitation of MHP plant. The residual risks will be mitigated via introduction of financially viable tariff for MHP-based mini-grids and identification of appropriate funding sources to replace OBA-based scheme after project completion. By removing policy, financial and technical barriers, the project aim at linking this vast supply potential with equally sizable demand.

**A.2. Stakeholders. Identify key stakeholders (including civil society organizations, indigenous people, gender groups, and others as relevant) and describe how they will be engaged in project preparation:**

Stakeholders	Expected role
<b>National Agency for Rural Electrification</b>	<ul style="list-style-type: none"> <li>• Coordination of the overall project preparation activities</li> <li>• Lead the formulation of MHP policy framework and its integration with the national strategies and plans for rural electrification</li> <li>• Facilitating investment promotion, support for MHP, and issuance of co-financing letters</li> </ul>
<b>National Fund for Power Sector Development</b>	<ul style="list-style-type: none"> <li>• Collaboration on the design and implementation arrangements for OBA scheme</li> </ul>
<b>Power Sector Regulatory Agency</b>	<ul style="list-style-type: none"> <li>• Proposal for developing financially viable tariff structure and methodology for MHPs</li> </ul>
<b>Ministry of Mines, Energy and Hydraulic</b>	<ul style="list-style-type: none"> <li>• Ensure consistency of the project and ensure the integration of proposed MHP-related policies in the national policy and institutional framework for power sector reform</li> <li>• Identification of pilot sites</li> <li>• Pan activities related to transfer and development of domestic MHP supply chain and O&amp;M&amp;M models</li> </ul>
<b>Ministry of Finance</b>	<ul style="list-style-type: none"> <li>• Provide guidance on the design of appropriate financial mechanisms and OBA scheme</li> </ul>
<b>Ministry of Environment</b>	<ul style="list-style-type: none"> <li>• Resources assessment for pilot projects</li> <li>• Ensure the Monitoring GHG emission reductions</li> <li>• Investment support and promotion for MHP, including from international climate finance</li> </ul>
<b>Private sector: mini-grid operators and SME/manufacturers of MHP systems</b>	<ul style="list-style-type: none"> <li>• Provide equity investment to pilot projects</li> <li>• Technology needs assessment for MHP supply chain</li> <li>• Design of O&amp;M&amp;M models</li> </ul>
<b>Local communities organization<sup>13</sup></b>	<ul style="list-style-type: none"> <li>• Identification of pilot sites</li> <li>• Organization and conduct of awareness raising campaigns</li> <li>• Ensure good buy-in from direct beneficiaries of the project</li> </ul>
<b>Local and international</b>	<ul style="list-style-type: none"> <li>• Providing loan financing models for pilot projects</li> </ul>

<sup>13</sup> During project implementation, local communities’ role will be even more profound, they will be involved in all stages of pilot project design, preparation, construction and implementation, including via community-owned MHP model that the project will pilot. The involvement of CSOs and local communities will also guarantee the primary use of energy for local population, and then avoid a situation that would trigger environmentally unsustainable behavior.

Stakeholders	Expected role
finance institutions	

**A.3 Risk. Indicate risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the project design (table format acceptable):**

Risk	Level of Risk	Mitigation Action
<p><b>Climate risk</b> Climate change is predicted to cause changes and increase variability of Congo's hydrological regime and precipitation patterns (increased precipitation in North and Central areas and decreased precipitation in Southern and littoral regions) which will pose additional challenges and risk to MHP development</p>	Medium	Results of climate models for Congo basin region will be incorporated in the design and selection of pilot sites. The existing and projected climatic data will be used to ensure that the chosen sites are not highly affected by irregular rain trends and are least vulnerable to projected changes in hydrological regime. In addition, policy recommendations for MHP promotion will include regulations to protect watersheds in order to maintain the necessary vegetation forest cover.
<p><b>Technology risk</b> Insufficient quality of locally produced equipment leading to early break-down of MHP systems and dwindling consumer confidence in the technology.</p>	Medium	Component 2 will address this risk. A range of standardized MHP design options, most applicable and relevant to Congo's landscape and hydro potential, will be identified with various rated capacity (e.g. 100 kW, 300 kW, 500 kW) and local manufactures will be supported to deliver turnkey solutions and spare parts in line with standardized design. The project will also build capacities of MHP operators for proper O&M&M services in order to minimize the risks of technology failure and the demand for spare parts

Risk	Level of Risk	Mitigation Action
<p><b>Financial risk</b> Widespread poverty and lack of sustainable source of income resulting in low ability to pay for energy supply services</p>	High	<p>Financial risks for MHPs will be addressed by introducing cost-recovery tariff system for off-grid MHPs (Output 1.2) supplemented by output-based aid (OBA) scheme (Output 1.5)</p> <ol style="list-style-type: none"> <li>1) Cost-reflective tariffs: Permitting cost recovery and cost-based tariffs is essential to enabling community-based organizations and private sector entities to implement renewable energy mini-grid systems. These developers have no ability to cross-subsidize electricity rates and must demonstrate financial viability to obtain financing. The key challenge and task here is to set up mini-grid tariffs at such level that balance profitability of MHP investment, on one side, with affordability of service for consumers, on the other side.</li> <li>2) OBA scheme: While cost-recovery tariff structure is essential to ensure commercial viability of the service providers for mini-grid systems, in practice, it is usually unrealistic to expect full cost-recovery tariff, given the low ability to pay in rural areas. Worldwide, almost all rural electrification programs, in developing and developed countries alike, involve some form of public subsidies. Therefore, OBA scheme is proposed as additional financial incentive to service providers in the situations when application of financially viable tariff is not feasible.</li> </ol> <p>All in all, the combination of two instruments, market tariffs and OBA scheme is seen as the most suitable choice of instruments to effectively address the underlying barrier, i.e. high financial risks faced by MHP projects in rural Congo. In addition, the capacity and willingness of local communities to pay for the services will be carefully measured in order to better define the financial instruments and investment needs</p>
<p><b>Market risk</b> In Congo, oil-producing country, MHP will have to compete with subsidized and locally available diesel alternatives. Without additional incentives, MHP will likely to remain uncompetitive.</p>	High	<p>Introduction of financial viable tariff for MHP-based mini-grids will be a cornerstone instrument of the proposed policy package, aimed specifically at addressing this market risk by leveling the playing field for MHP against other available alternatives.</p>
<p><b>Policy risk</b> The success of this project will be determined to a large degree by adoption and effective enforcement of the proposed policies. Lack of political support may jeopardize the achievement of immediate results and over-all impact.</p>	Low	<p>The project's design is fully aligned with the mandate and policy objectives of key national counterparts, which already ensured their buy in and commitment. Their political support will be further secured via close involvement in project preparation and implementation activities.</p>
<p><b>Political risk</b> Congo is in a very unstable part of the world: although the country itself is fairly stable, a sudden regime change might cause insecurity, negatively impact on the over-all investment climate and cause delays in project implementation.</p>	Low	<p>The project will build a wide coalition of partners and stakeholders whose interest in MHP promotion will likely to sustain, even in case of regime change. They include local businesses and communities, NGOs and international development agencies.</p>

#### **A.4. Coordination: Outline the coordination with other relevant GEF financed and other initiatives:**

During the PPG phase, in-depth consultations will be undertaken to establish partnerships and practical modalities for linking and collaborating with several ongoing and planned modern energy access related projects/programs in Congo. This is not only to avoid unnecessary duplication but also to ensure that GEF resources build on the progress and achievements made to date through such initiatives. A strategy and plan for collaboration with relevant ongoing and planned initiatives such as those stated below will be prepared during the preparatory phase, including defining the roles and responsibilities of critical stakeholders.

Apart from ensuring coordination and collaboration with relevant baseline projects listed in Section A.1, the proposed project will also forge partnership with the forthcoming Enabling Activity on preparation of the BUR and the 3<sup>rd</sup> National Communication. It will also coordinate closely with the Sustainable Energy for All Initiative's program of work at the country and global level.

The proposed project is one of a series of similar UNDP-GEF initiatives aimed at promoting small and mini-hydro based mini-grids in Africa (Sao Tome and Principe, Equatorial Guinea). These projects share the same market transformation approach and model for MHP-based rural electrification. The portfolio will be coordinated by UNDP-GEF Regional Coordination in Africa, including analysis and presentation of lessons learnt, organization of regular face-to-face and virtual networking, knowledge sharing and outreach activities and events.

### **B. Description of the consistency of the project with**

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

The proposed project is in line with the following national strategies and plans:

- National Development Plan 2012-2016 specifically calls for the needs “to improve the electricity coverage rate in rural areas with appropriate energy (solar, wind, and pico- et micro-hydroelectric plants)” among key national priorities in 2012-2016;
- 2nd National Communication identified the development of hydro power electricity generation as the main mitigation measure and priority both under “Energy” and “Technology Transfer” windows;
- National Portfolio Formulation Exercice (NPFE): This project is among the priority GEF-5 CCM projects stated in the National Project Formulation Document (NPFD). The NPFD specifically states UNDP as the GEF Agency for this project.
- Technology Needs Assessment (TNA) Report commissioned by the Republic of Congo in 2009 lists hydro power (both large and small hydro power) as the first priority technological option the country can deploy to simultaneously reduce GHG emissions from fossil fuel use and deforestation, as well as to improve the rate of rural electrification thus contributing to national socio-economic development priorities. As such, the proposed project is fully consistent with recommendations of TNA report.

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

This project is consistent with the GEF-5 strategy to address climate change, especially the Objective 3 (Renewable Energy: Promote investment in renewable energy technologies) because its main objective is to facilitate investment in small and micro hydropower-based mini-grid systems in Congo-Brazzaville.

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

UNDP has implemented over 230 GEF clean energy projects in close to 100 developing countries, and has acquired a unique base of institutional knowledge on transforming renewable energy markets in developing

countries. One of UNDP-GEF's three signature climate mitigation programs – Clean Energy – specifically promotes access to clean and affordable energy supply. Two recent UNDP publications on de-risking renewable energy investment environments ('Transforming Renewable On-Grid Energy Markets' and 'De-Risking Renewable Energy Investment') summarize UNDP's empirically- and theoretically-robust 'theory of change' for catalyzing private-sector renewable energy investment. With specialized staff devoted to energy, finance, NAMAs and carbon mechanisms, UNDP is one of very few international organizations with the understanding of national conditions and priorities (backed by its global network of 129 Country Offices), renewable energy sectoral expertise to be able to design and implement such a program.


The current proposal is also in line with the strategic priorities developed under the United Nations Development Assistance Framework of Congo-Brazzaville (UNDAF 2012 – 2017) where UNDP is a Lead Agency, specifically the following UNDAF Outcome "The Government of Congo improves the management of natural resources & associated benefits, the disaster management mechanisms & promotes green economy".

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

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

NAME	POSITION	MINISTRY	DATE (MM/dd/yyyy)
Joel LOUMETO	GEF Operational Focal Point Director General of Environment	Ministry of Tourism and Environment	06/27/2013

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

This request has been prepared in accordance with GEF/LDCF/SCCF/NPIF policies and procedures and meets the GEF/LDCF/SCCF/NPIF criteria for project identification and preparation.					
Agency Coordinator, Agency name	Signature	DATE (MM/dd/yyyy)	Project Contact Person	Telephone	Email Address
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